

A NEW SPECIES OF *HABRODON* AND SOME UNRECORDED SPECIES OF MOSSES FROM INDIA

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ABSTRACT

A new species *Habrodon kashmiriensis* is described from Kashmir. Six new records for India are reported from the collections made from the Western Himalayas in recent years. These are *Hymenostyliella involuta* (Card. et Ther.) Bartr., *Astomum crispum* (Hedw.) Hamp., *Tortula subulata* Hedw. var. *angustata* (Schimp.) Limpr., *Funaria calcarea* Wahlenb., *Bryum alpinum* Huds. ex With. and *Brachythecium glareosum* (Spruc.) B. S. G. All these are described and illustrated.

INTRODUCTION

During September-October, 1961 an excursion was made to Kashmir for the collection of mosses. A tour was also taken in March 1963 to Tehri and Dehra Dun districts of Uttar Pradesh for the same purpose. These collections have since been identified by the author and a full account of these is awaiting publication in two separate papers. From these collections a new species belonging to genus *Habrodon* and five new records for India were obtained. These required further attention and were verified by the author in the herbarium of the University of Liverpool during his recent visit to U.K.

The new records are *Hymenostyliella involuta* (Card. et Ther.) Bartr., *Astomum crispum* (Hedw.) Hamp., *Tortula subulata* Hedw. var. *angustata* (Schimp.) Limpr., *Funaria calcarea* Wahlenb., *Bryum alpinum* Huds. ex With. and *Brachythecium glareosum* (Spruc.) B.S.G. The material for *Hymenostyliella involuta* (Card. ex Ther.) Bartr. was supplied to me by Mr. S. K. Malhotra, Botanist, Botanical Survey of India, Poona, who collected it from Dehra Dun and found it growing in mixture with *Hymenostylium recurvirostre* (Hedw.) Dix. This species which was so far known to be endemic to Philippines, where it occurs only in sterile condition, has been collected for the first time in fruits.

In this note it is intended to describe and illustrate these species in detail. The specimens are deposited in the herbarium of the Cryptogamic Unit, Botanical Survey of India, Calcutta.

***Habrodon kashmiriensis* Vohra sp. nov.**

Affinis *H. perpusillo* (De Not.) Lindb. sed differt peristomio duplici, bracteis perichaetialibus ad margines integris, sporis levibus et minoribus.

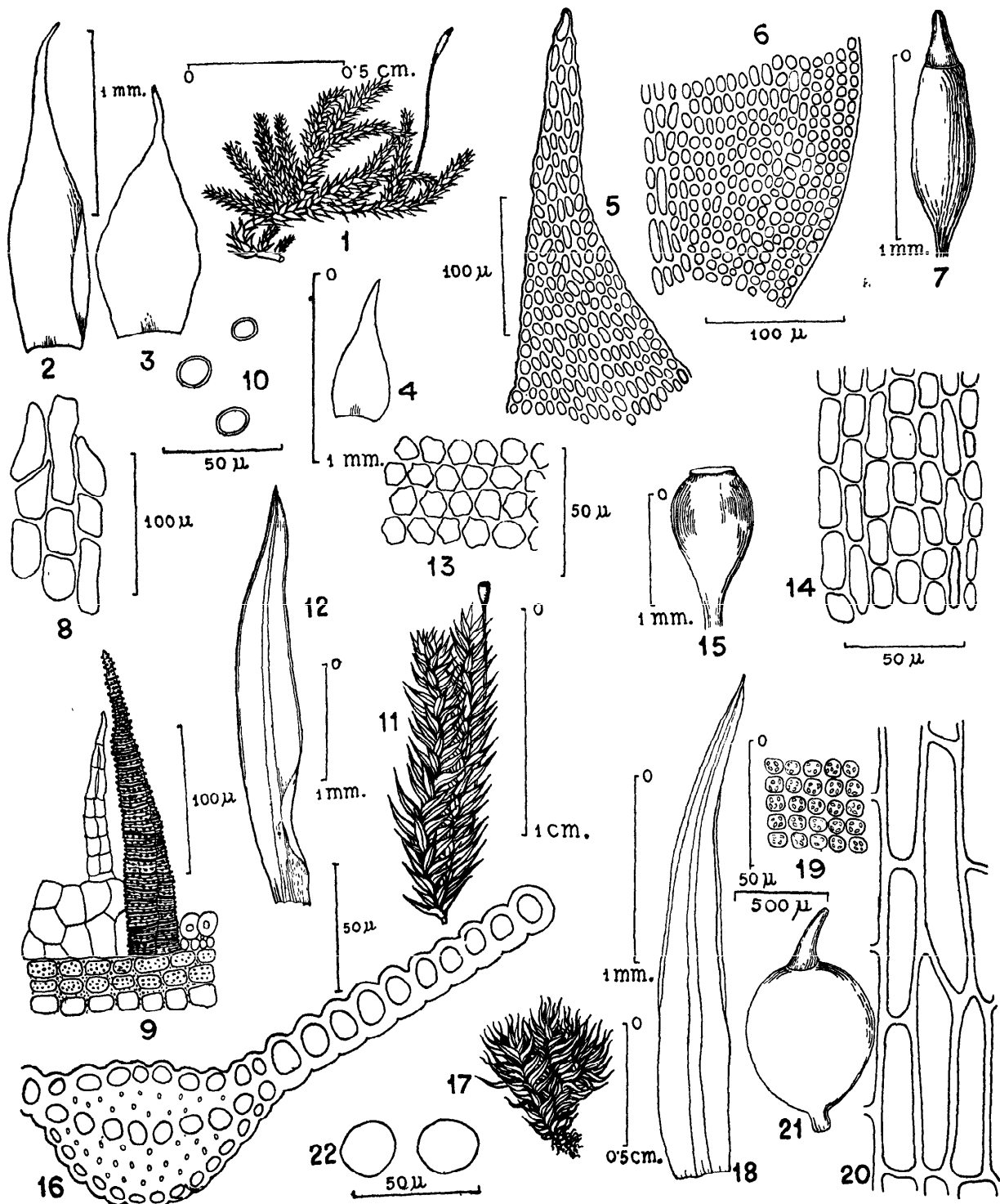
Gracillimus, viridescens vel viridescenti-brunneus efformans tegetes extensas. Rami ca. 1 cm longi, molles, ad apices filiformes, sicci julacei videntur. Folia patentia, sicca erecta et adpressa, concava, ovata, acuminata, 0.5×0.25 mm; margine plano, integro; nervo nullo vel brevissimo et obscuro; cellulis ovato-ellipticis, parietibus gracilibus, ad medium folii longioribus, $9-24\mu$, sursum brevioribus, ad basin non-nullis ordinibus cellularum elongatis, quadratis versus margines. Bractee perichaetiales maiores, $1.2 \times 0.5-0.6$ mm, ovatae vel ovato-lanceolatae, subito sursum contractae in acumen longum; cellulae anguste lineares, parietibus crassis, $5.9 \times 30-60\mu$, ad basin breviores et latiores; margine plano, integro vel aliquantum inaequali supra. Seta 5-7 mm longa, subrubra, sicca contorta. Capsula ovato-cylindrica, symmetrica, erecta; exothecii cellulae amplae, rectangulares vel rhomboideae; operculum conicum, acuminatum; annulus adest, disjungens. Peristomium duplex, exterius luteolum, dense papillosum, transverse striatum, interius pallide luteum, aliquanto brevius, leve vel indistincte papillosum ad apicem, cillis nullis, membrana basali ad trientem alta. Sporae leves, $12-18\mu$, maturantes tempore autumnali.

Typus (Vohra et Wadhwa 567) lectus in trunco *Abietis* ad Tangmarg in Cashemira, in montibus Himalaicis occidentaibus ad altit. 2000 m die 9.9. 1961, et positus in CAL.

***Habrodon kashmiriensis* Vohra sp. nov.**

Near *H. perpusillo* (De Not.) Lindb. but peristome is double, perichaetial bracts with entire margin and spores smooth and smaller in size.

Very slender, greenish to brownish green, forming extensive mats. Branches about 1 cm long,



Figs. 1-10. *Habrodon kashmiriensis* Vohra sp. nov. : 1. Plant. 2 & 3. Perichaetial bracts. 4. Leaf. 5. Leaf apex. 6. Leaf base. 7. Capsule. 8. Cells of exothecium. 9. Peristome. 10. Spores. Figs. 11-16. *Hymenostyliella involuta* (Card. et Ther.) Bartr. : 11. Plant. 12. Leaf. 13. Laminar cells. 14. Basal cells. 15. Capsule. 16. T. S. Leaf. Figs. 17-22. *Astomum crispum* (Hedw.) Hamp. : 17. Plant. 18. Leaf. 19. Laminar cells. 20. Basal cells. 21. Capsule. 22. Spores.

tender, filiform at apices, on drying appearing julaceous. Leaves spreading, on drying erect and appressed, concave, ovate, acuminate, 0.5×0.25 mm; margin plane, entire; nerve absent or very short and faint; cells oval-elliptic, thin-walled, longer in the middle of leaf, $9-24\mu$, shorter upwards, at base a few rows of cells in centre elongate, quadrate towards margins. Perichaetial bracts larger, $1.2 \times 0.5-0.6$ mm, ovate or ovate-lanceolate, suddenly contracting upwards into a long acumen; cells narrowly linear, thick-walled, $5.9 \times 30-60\mu$, at base wider and shorter; margin plane, entire or somewhat uneven above. Seta $5-7$ mm long, reddish, on drying twisted. Capsule oval-cylindrical, symmetrical, erect; cells of exothecium large, rectangular to rhomboidal; operculum conical, acuminate; annulus present, separating. Peristome double, outer yellowish densely papillose, transversely striate, inner pale yellow, somewhat shorter in length, smooth to faintly papillose at apex, cilia absent, basal membrane about $1/3$ in height. Spores smooth, $12-18\mu$, mature in autumn.

Large mats on the stem of *Abies*.

The holotype of this species (*Vohra & Wadhwa* 567) was collected from Tangmarg, Kashmir, N.W. Himalayas at an altitude of 2000 m, on 9.9.1961. The holotype has been deposited in the Central National Herbarium, Howrah, CAL.

This species is very close to *Habrodon perpussilus* (De Not.) Lindb. from which it is hard to separate if in vegetative condition, but significant difference lies in peristome structure. In the present species the peristome is double and inner peristome is well developed. On the basis of the double peristome one will be inclined to place it in *Myrinia* Schimp., but after a careful thought I have included it in *Habrodon* because of the presence of annulus and its close resemblance with *H. perpussilus* in habit and leaf-shape.

Hymenostyliella involuta (Card. et Ther.) Bartr. in Philp. J. Sc. 68: 108; 1939. *Hymenostylium involutum* Card. et Ther. in Bull. Soc. Bot. Geneve 26: 82, 1936.

In compact, yellowish green tufts. Stem robust, about 2 cm tall, densely clothed with rhizoids to almost its entire length. Leaves dense, in intermittent tufts, on drying flexuose with tips curled, when moist erecto-patent to spreading, linear-lanceolate, $4.5 \times 0.4-0.5$ mm, gradually narrowing above into an acute apex; margin entire, involute in the upper

half, erect below; nerve yellowish, at base 125μ wide, gradually narrowing upwards, percurrent; upper cells rounded, $10-15\mu$ wide, somewhat sinuose, angular, thickened at corners, mamilllose on the ventral surface, smooth at back, at base somewhat pellucid, rectangular, $10-15 \times 30\mu$, incrassate, walls sinuose, shorter and narrower towards margins. Perichaetial bracts not distinct. Seta 6 mm long, dark brown. Capsule oval, about 1 mm long, dark brown to almost black. Peristome none.

Robust close tufts, in mixture with *Hymenostylium recurvirostre*.

UTTAR PRADESH: Dehra Dun, 800 m, Sept. 18, 1964, S. K. Malhotra s.n.

Hymenostyliella is a monotypic genus and was established by Bartram in 1939. It is altogether distinct from the other genera of the family Pottiaceae. It can be recognised by the linear-lanceolate leaves with strongly involute margins, angular leaf cells which are strongly incrassate at angles, mamilllose at the ventral surface and smooth at back. Stems are however not as densely radiculose as the Philippine specimens.

Distribution: Philippines.

Astomum crispum (Hedw.) Hamp. Flora 20: 285.

1837. *Phascum crispum* Hedw. Sp. Musc. 21, 1801.

In lax, low tufts, pale green in colour. Stem about 0.5 cm tall, simple or once forked. Leaves when dry curled at tips, moist erecto-patent to spreading, lax below, crowded near the apex, from a wider base linear-lanceolate, $2.3 \times 0.2-0.3$ mm; margin involute in the upper half to $2/3$ portion, entire; nerve yellowish-brown, thick, glossy, 60μ wide at base, excurrent into a short mucro; cells at base pellucid, rectangular, $18-21 \times 60-90\mu$, smooth, 2-3 rows towards margin linear-rectangular, gradually becoming shorter and opaque upwards, upper cells quadrate, chlorophyllose, $6-9\mu$ wide, densely papillose, opaque. Perichaetial bracts \pm erect, longer than the leaves, 3-4 mm long, more strongly involute. Capsule minute, oval-globose, $0.5-0.7$ mm long, yellowish-brown, sessile or on a very short seta, almost concealed in the perichaetial bracts. Operculum short, conical, rostellate. Spores $15-20\mu$, mature in spring.

On loamy sand, not common.

NORTH WESTERN HIMALAYAS: Dharasu, Tehri Distt., on road to Barkot, 1500 m, *Vohra & Wadhwa* 1354, March 13, 1963.

A very minute species; can easily be overlooked in the field. It can hardly be separated from the

smaller forms of *Weisia controversa* if not in fruiting. But when fruiting the sessile cleistocarpous capsules surrounded by long perichaetial bracts will at once distinguish it.

Distribution: Europe, Algeria, Egypt, Amur, China, Japan, Tonkin, North America.

***Tortula subulata* Hedw. var. *angustata* (Schimp.)**
Limpr. Laubm. Deutschl. 1: 1888. *Barbula subulata* (Hedw.) P. Beauv. var. *angustata* Schimp.
Syn. 2: 224, 1876.

In loose tufts or cushions of bright green colour. Stem erect, simple or branched above, about 1 cm. tall, densely leafy. Leaves erectopate, lax below, crowded near the apex, on drying crisped and contorted, lanceolate to oblong-lanceolate, somewhat narrowed near the summit, $4.5 \times 0.5-0.6$ mm; margin plane, entire, toothed near the apex, yellowish and swollen at the border; nerve thick, yellowish-green, glossy especially near apex, smooth at back, excurrent into a short mucro; basal cells rectangular, hyaline, thin-walled, $75-140 \times 15-25 \mu$, 1-2 rows of cells at margin linear, thick-walled, forming a yellowish border which extends from base to the leaf apex, upper cells rounded-quadrate or hexagonal, thin-walled, $15-18 \mu$, chlorophyllose, very obscure, with many horse-shoe-shaped papillae in each cell. Perichaetial bracts ovate-lanceolate; border more sharply defined, 3-4 cells wide at base, deep yellow; nerve reddish-brown above, longly excurrent. Setae often upto 3 from the same perichaetium, 1 cm tall, reddish-brown especially at base, on drying spirally twisted. Capsule narrowly cylindrical, 5×0.4 mm, brownish, somewhat curved on one side. Peristome long yellowish, united into a tube in the lower $2/3$ portion, spirally twisted above; operculum $1/3$ the length of the capsule, obtuse at apex. Spores $13-16 \mu$ smooth, mature in autumn.

Low tufts or cushions on sandy soil by the side of stream, rare.

NORTH WESTERN HIMALAYAS: Kashmir, Tangmarg, 2000 m, *Vohra & Wadhwa* 559, Sept. 9, 1961.

Differs from the typical variety in the leaves narrower, tapering towards apex, and in the presence of a thickened border which extends up to the apex.

Distribution: Europe, North Africa, North America.

***Funaria calcarea* Wahlenb. in Vet. Ak. Nya Handl.**
27: 137, 1806.

In loose tufts, pale yellowish-green. Stem upto

$1/2$ cm tall. Leaves crowded at apex, on drying somewhat crisped or hardly changed, when moist erectopate to spreading, $3-4 \times 0.6-1$ mm, obovate-oblong, the apex suddenly passing into a long flexuose arista; margin entire below, sharply denticulate in the upper half, plane; nerve ceasing below the apex; upper cells rectangular, $21-30 \times 45-90 \mu$, narrower towards margin, basal cells $30-45 \times 90-150 \mu$, at apex somewhat shorter and rhomboidal. Perichaetial bracts not differentiated. Seta brownish, about 2 cm tall. Capsule brownish, pyriform, inclined, gibbous at back, smooth, somewhat sulcate at the neck, constricted below the mouth when dry; annulus absent; operculum convex, mamillate. Peristome double, outer teeth reddish-brown, yellowish near the apex, finely striate, papillose, appendiculate, appendages protruding from the margins, processes shorter than the teeth, yellowish, papillose. Spores 25μ , papillose, mature in spring.

On gravelly loam soil.

UTTAR PRADESH: Dehra Dun Dist., Rishikesh, on road to Tehri, 1000 m, *Vohra & Wadhwa* 1231, March 7, 1963; Mussoorie, Lal Tibba, 2000 m, *Vohra & Wadhwa* 1650, March 21, 1963.

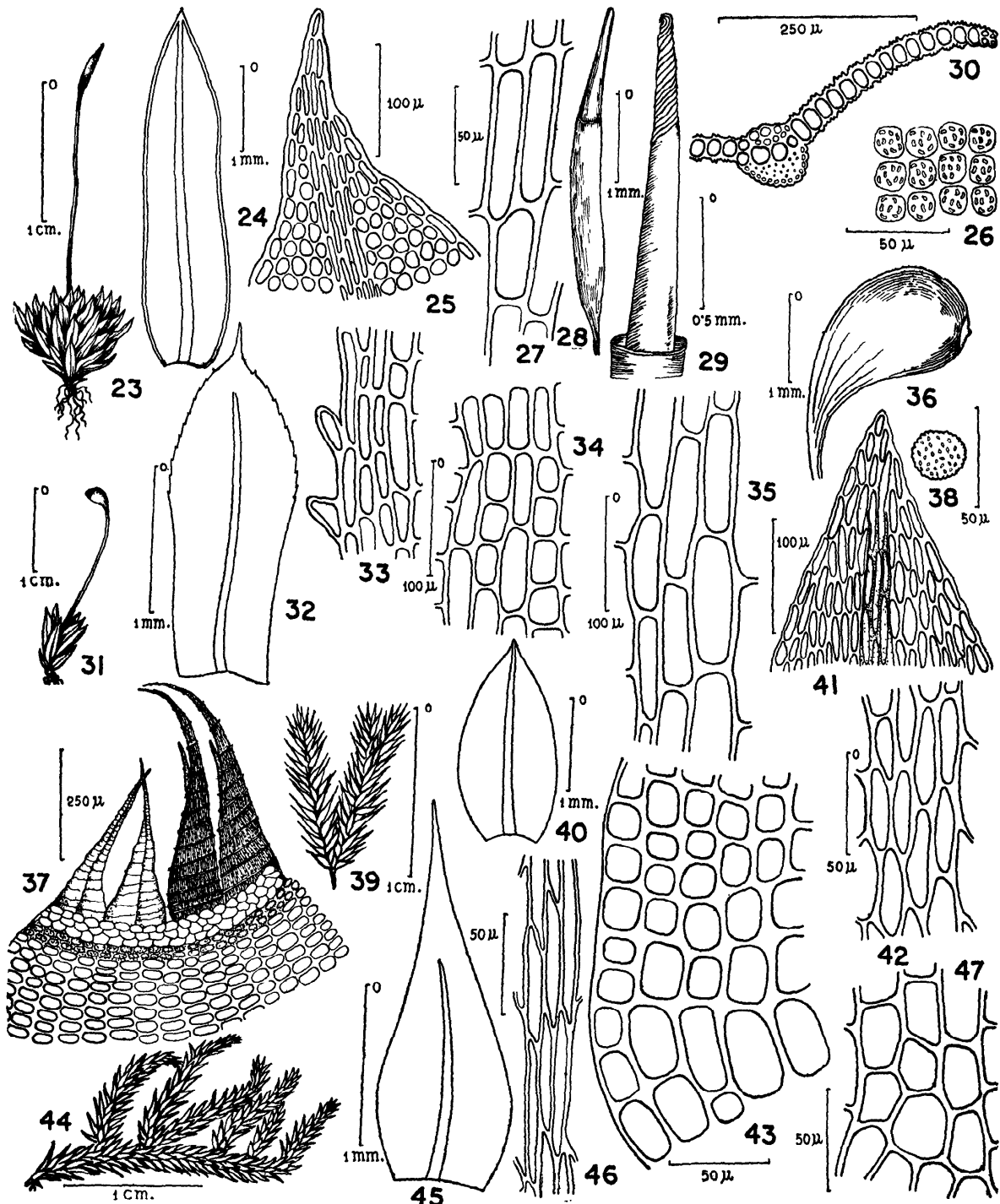
It bears a casual resemblance with *Funaria hygrometrica* in inclined, gibbous capsule, but differs from it in serrulate, piliferous leaves, erect seta, smooth capsule with erect mouth, absence of annulus and larger papillose spores.

Distribution: Europe, North Africa, Macaronesia, Morocco, Asia Minor, Caucasus, Syria, Western part of North America.

***Bryum alpinum* Huds. ex With. Syst. Arr. Brit. Pl.**
3: 824, 1801.

In compact tufts, reddish-brown below, pale green at the tips. Stem simple, 1-1.5 cm tall, densely leafy throughout. Leaves ovate-lanceolate, $1.5-2 \times 0.5$ mm, erectopate, on drying closely appressed, acute; margin revolute to almost plane, entire or with a few denticulations near apex; nerve thick, brownish to yellowish-brown, ceasing with the apex or a few cells below; upper cells narrowly rhomboidal to linear-rhomboidal, $8-11 \times 45-60 \mu$, somewhat narrower at margin but not forming a distinct border, cell walls thickened, glossy, brownish to yellowish-brown, at base quadrate to subrectangular, $15-21 \mu$, thick-walled, reddish. Sporophytes not seen.

Low tufts on a moist stone near stream.



Figs. 23-30. *Tortula subulata* Hedw. var. *angustata* (Schimp.) Limpr. : 23. Plant. 24. Leaf. 25. Leaf apex. 26. Laminar cells. 27. Basal cells. 28. Capsule. 29. Peristome. 30. T. S. Leaf. Figs. 31-38. *Funaria calcarea* Wahlenb. : 31. Plant. 32. Leaf. 33. Cells at leaf margin. 34. Laminar cells. 35. Basal cells. 36. Capsule. 37. Peristome. 38. Spore. Figs. 39-43. *Bryum alpinum* Huds. ex With. : 39. Plant. 40. Leaf. 41. Leaf apex. 42. Laminar cells. 43. Basal cells. Figs. 44-47. *Brachythecium glareosum* (Spruc.) B.S.G. : 44. Plant. 45. Leaf. 46. Laminar cells. 47. Basal cells.

NORTH WESTERN HIMALAYAS: Kashmir, Tangmarg, by the side of Ferozepur nallah, 2000 m, *Vohra & Wadhwa* 649, Sept. 11, 1961.

A robust plant, with a tinge of red colour, at least in the lower part of stem. It is closely related to *B. mildeanum* Jur. which is reported from Kashmir, but differs in narrower thickwalled cells and percurrent nerve. In *B. mildeanum* Jur. the nerve is excurrent and cells wider and thin-walled.

Distribution: Europe, Canaries, Algeria, Morocco, Tunis, Central and South Africa, Asia Minor, Central Asia, North America.

Brachythecium glareosum (Spruc.) B.S.G. Bryol. Eur. 6: 23. 552, 1853. *Hypnum glareosum* Bruch. ex Spruc. Musci Pyr. 29, 1847.

In extensive patches, glaucous green, shining, silky, irregularly branched; branches prostrate, terete, upto 3 cm long. Leaves when dry erect and loosely appressed, when moist erectopatent, crowded, strongly plicate, from an ovate base long acuminate, 1.5-2.5 × 0.6-0.7 mm; margin entire, involute upwards, plane near the base; nerve weak to moderately strong, greenish, ending halfway to 2/3 the leaf; upper cells linear-rhomboidal, thin-walled, chlorophyllose, 6-10 × 45-60 μ, longer towards margins, angular cells distinct, in many rows, quadrate to subrectangular, chlorophyllose, or somewhat pellucid, thin-walled, 18-24 μ. Sporophytes not seen.

Dense patches on stones by the side of stream.

NORTH WESTERN HIMALAYAS: Kashmir, Chandanwari, 3000 m, *Vohra & Wadhwa* 813, Sept. 25, 1961.

This species is allied to *B. buchananii* (Hook.) Jaeg., a common moss of Western Himalayas, but is more robust and leaves have a longer filiform acumen. It also closely resembles *B. salebrosum* (Web. et Mohr.) B.S.G. but is larger in size and leaves have an entire margin.

Distribution: Europe, Caucasus, Siberia, North America and Japan.

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REFERENCE

- BARTRAM, E. B : Mosses of the Philippines. *Philipp. J. Sci.* 68 : 108, 1939.