

Harumi OCHI*: Notes on Asiatic moss flora II. Mosses of
the families Bryaceae and Bartramiaceae collected by
the members of the Univ. Tokyo Bot. Exped.
to Eastern India 1960**

越智春美*: アジア産セン類おぼえがき II. 東京大学
東インド植物探検隊採集のカサゴケ科およびタマゴケ科セン類**

Through the courtesy of Dr. S. Hattori and Prof. A. Noguchi I was able to study the mosses belonging to the families Bryaceae and Bartramiaceae collected by the members of the Univ. Tokyo Bot. Exped. to Eastern India 1960 (directed by Prof. H. Hara) with 107 packets of material. Some of the species have already been discussed (Ochi 1963a. -b). In the present article, a new species and a new variety are proposed and members of the two families are summarised floristically. I should like to acknowledge here my great gratitude to the following persons for their kindness in making available the material studied or literature: Dr. S. Hattori of Hattori Botanical Laboratory, Prof. A. Noguchi of Kumamoto Univ., Prof. H. Hara and Dr. H. Kanai of Univ. of Tokyo, and Dr. J.E. Dandy of British Museum (Natural History).

I. Enumeration of species—BRYACEAE

Pohlia acuminata Hoppe et Hornsch. Sikkim: Gamothang, 3900 m. (NICH*** 201651).

P. cruda (Hedw.) Lindb. Darjeeling: Phalut, 3200–3550 m. (201731).

P. elongata Hedw. Sikkim: Jongri, 4000 m. (200716). Darjeeling: Phalut, 3500 m. (200683, 200719, 200728); Sandakphu, 3550 m.—Kala Pokri, 3000 m.—Karibans, 2600 m.—Tonglu, 3000 m. (200508, 200687, 200693, 200696—+*Pohlia longicolla*, 200697, 200698, 200740, 200741, 200745).

P. flexuosa Hook. Sikkim: Gantok, 1750 m. (200524—+ *Bryum* sp.). Darjeeling: Birch Hill, 2000 m. (200711, 200712, 200714).

P. longicolla (Hedw.) Lindb. Darjeeling: Sandakphu—Kala Pokri—Karibans—Tonglu (200696—+*P. elongata*, 200725, 200746, 200747).

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*** Herbarium abbreviations adopted in Lanjouw & Stafleu (1959)—*Index herbariorum* Part 1 (4 ed.). Specimen numbers are only cited hereafter except in special cases.

Brachymenium nepalense Hook. Sikkim: Pamianchi, 2000 m.—Gayzing Bazar, 1550 m. (200699); Yoksam, 1700 m. (200703—+*Bryum argenteum* var. *lanatum*, 200705, 200707, 200708, 200709); Gantok, 1750–1900 m. (200737, 200738, 201754, 201763). Darjeeling: Darjeeling, 2000–2200 m. (201397); Batasi-Palmajula, 2150–2300 m. (200691, 201419); Victoria Fall, 1950 m., on rocks (200679); Raman, 2400 m. (200689, 200715); Darjeeling—Ghum, 2800 m.—Senchal, 2400 m.—Tiger Hill—Darjeeling (200743); Happy Valley (200688).

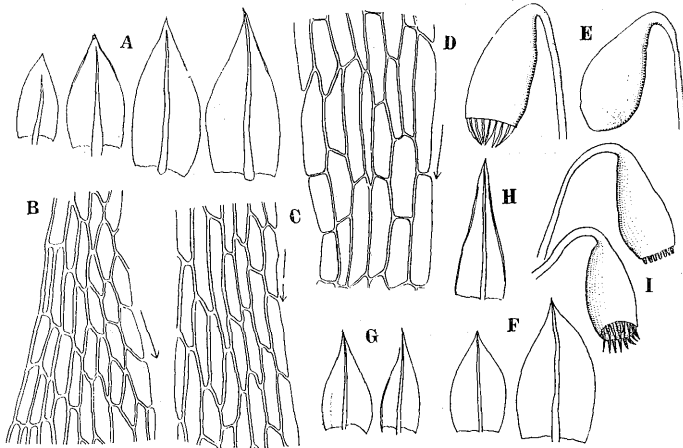


Fig. 9. *Bryum himalayanum* Dix.: A & F. Leaves of main stems. $\times 9$. B. Apical margin of leaf. $\times 83$. C. Cells from median portion of leaf. $\times 83$. D. Ditto from basal portion along costa. $\times 83$. E & I. Capsules. $\times 5$. G. Leaves of innovation. $\times 9$. H. Perichaetial leaf. $\times 9$. A–E drawn from the type and the remainder from "NICH 200700".

B. ptychothecium (Besch.) Ochi, *Advanc. Front. Pl. Sci.* **4**: 108. *pl. II, f. A–F.* 1963. Sikkim: Puleg Chu, below Bakkim, 2200 m. (201572). Darjeeling: Raman, 2400 m. (200690); Phalut (200681, 200682, 200684, 200686, 200717, 200718, 200720, 200726, 200729, 200730—+*Bryum filiiforme* var. *concinatum*, 200731—+*B. filiiforme* var. *concinatum*, 200734, 200736, 200739, 201479, 2015158, 201718); Phalut—Sandakphu (200694, 200695); Sandakphu—Kala Pokri—Karibans—Tonglu (200492, 200502, 200506, 200744).

Plagiobryum zierii (Dicks.) Lindb. Sikkim: Migothang, 3900 m. (200721).

Bryum argenteum Hedw. var. **lanatum** (Pal. Beauv.) B.S.G. Sikkim: Yoksam (200618—+*Bartramidula bartramioides*, 200703—+*Brachymenium nepalense*, 200704); Jongri, 4000 m. (200748).

B. capillare Hedw. Darjeeling: Phalut (200727).

B. filiforme Dicks. var. **concinatum** (Spr.) Boul Darjeeling: Kurseong, 1550 m. (200725); Phalut (200730—+*Brachymerium ptychothecium*, 200731—+*B. ptychothecium*, 200732—+*B. ptychothecium*, 201508); Darjeeling—Ghum—Senchal—Tiger Hill—Darjeeling (200326—+*B. pseudoalpinum* var. *reflexifolium*, 200742).

Bryum himalayanum Dix. (*in sched.*) sp. nov. (Fig. 9)

Diocum? Planta, laxe caespitosa vel gregaria, 4–7 mm. alta, nitidiuscula. Caulis erectus, 2–5 innovando ramosus, dense foliatus, inferne rubescenti-fuscus, radiculosus, superne rubescens. Folia sicca adpressa, madore erecta, imbricata, concaviuscula, ovata vel ovato-lanceolata, ad 1.1 mm. longa et 0.5 mm. lata, apice acuta et \pm acuminata, marginibus integris, planis vel anguste reflexis, non limbatis. Cellulis lineari-rhomboidalibus, tenui-membranis, ca. 60–80 x 12–15 μ , superioribus brevioribus, subhexagonis, marginalibus angustioribus et longioribus, basilaribus laxioribus et rectangularibus; costa tenuiuscula, percurrentia vel subpercurrentia. Folia perichaetia longior et angustior, longiore acuminata. Folia ramulina minor, triangulari-lanceolata. Seta erecta vel flexuosula, 1.2–1.5 cm. longa, tenuis. Capsula pendula, fusca, ca. 2–2.5 mm. longa et ca. 0.8–0.9 mm. crassa, oblongo-pyriformis, brevicolla; operculum brevi-conicum, haud apiculatum. Peristomium duplex; exostomii dentes subulato-lanceolati, basi lutescenti-fusci, apice hyalini, anguste limbati; endostomum lutescenti-hyalinum, membrana altiuscula, processu late perforati, cilia 3, longe appendiculata. Sporae globosae, 13–17 μ , laeves. Planta mascula ignota.

N. W. Himalaya: Lahul, Bhaga Valley, amongst stones, 16000 ft. (R. L. Badhwar, Aug. 27, 1928—Dixon, ref. No. 953—as type of *B. himalayanum*—holotype, in BM); ditto, 11500–16700 m., on dry soil or on exposed stones (ditto, Nos. 949, 950, 974, in BM). Sikkim: Jongri, 4000 m.—Choktschering Chu, 4300 m. (H. Hara & others, May 25, 1960—NICH 200700, 200701).

The specimens from Sikkim cited above are smaller in size, hardly lustrous and bear old and deoperculated capsules only. But they agree well in the other respects with N.W. Himalayan ones. This moss resembles in habit a small form of *B. caespiticium*, but differs in the gregarious or loosely tufted plants, the smaller and almost plane leaves without border and in far smaller capsules from the latter. Also it is allied in outer appearances of the gametophyte to *B. jing-huhnianum*, but differs in areolation, the costa being percurrent and slender neck of capsules from the other.

B. pseudoalpinum Ren. et Card. Darjeeling: Victoria Fall, on rocks (200680).

var. **reflexifolium** Ochi, var. nov. (Fig. 10)

A typo differt: Folia latior, ovato- vel oblongo-lanceolata, basi angustata, ± decurrense, marginibus latiore reflexis; cellulis crassiore membranaceis, sed in foliis innovationibus tenuiore membranaceis et laxioribus; costa percurrentia vel breviora excurrentia.

Darjeeling: Darjeeling—Ghum—Senchal—Tiger Hill (200326—+ *B. filiforme* var. *concinatum*); Sandakphu—Kala Pokri—Karibans—Tonglu (200465, 200507, 200517, 200692). Sikkim: Yoksam, 1700 m. (200706—holotype, in NICH); Sinohul, 10–11000 ft. (S. Kurz, 2072 in Herb. Hampe, 1881, in BM).

This moss is a very puzzling one. The stems having broader leaves with more lax areolation resemble those of *B. recurvulum*. But capsules of the former are quite different in shape from those of the latter. On the other hand, the stems having narrower leaves with denser areolation are similar to those of *B. alpinum*. But capsules of the former are far larger and held on longer and stronger setae than those of the latter. Of the specimens cited above, No. 200326 contains some stems as follows: Leaves of main stem oblong-lanceolate, slightly broader and with more reflexed margins than those of typical *B. pseudoalpinum*, though they have been fairly much broken; on the other hand, leaves of innovations of the same individual shorter, broader and with more lax areolation, and resembling those of *B. recurvulum*. Judged from the facts mentioned above comparing with the other specimens available in detail, I suspected that main stems having narrower leaves with denser areolation are possible to have grown in a fairly dry season and either the main stems or innovations having shorter and broader leaves with more lax areolation in the rainy season, respectively; and that such differences as in either shape of leaves or areolation are of little importance. Thus, I have come to conclude myself that this moss may be identical with *B. pseudoalpinum* at least specifically; though some gaps as mentioned in the original description are recognized between the former and the latter, therefore the former may be better differed as a variety from the latter.

For the specimen “S. Kurz, No. 2268 (in BM)” cited above, *B. reflexulum* Dix. had been given as a herbarium name. According to Wijk *et al.*: “Index Muscorum Part 1 (A-G)”, the name *B. reflexulum* Dix. *nom. nud.* has been carried on. But I have not recognized the definite specimen on which the name

was given; therefore I did not accept this name for this moss here.

Judged from the original description only, this moss is very allied to *B. pseudoalpinum* var. *latifolium* Gard. et Dix. from Western Ghats, India (Dixon 1911). But I have not examined the type of the latter moss.

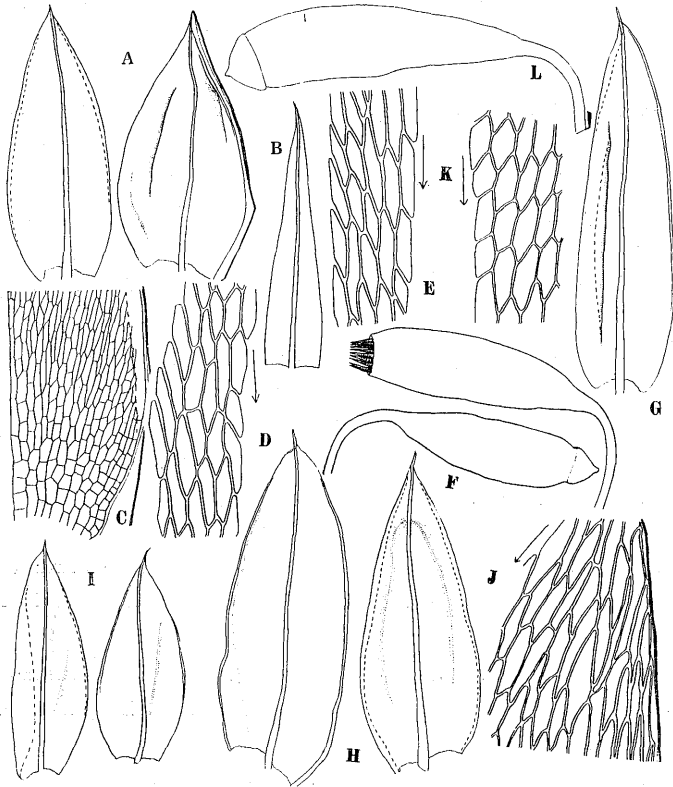


Fig. 10. *Bryum pseudoalpinum* var. *reflexifolium* Ochi: A, G & H. Leaves of main stems. $\times 6$. B. Perichaetial leaf. $\times 6$. C. Leaf-cells from basal part. $\times 28$. D & J. Ditto from the portions near apices. $\times 55$. E & K. Ditto from median portions. $\times 55$. F & L. Capsules. $\times 3$. I. Leaves of innovation. A—F drawn from the type. H—K from "NICH 200692" and the remainder from "Kurz 2074" in BM.

B. thomsonii Mitt. Sikkim: Yoksam, 1700 m. (200710).

B. truncorum (Brid.) Brid. Sikkim: Yoksam (200735).

Bryum sp. Sikkim: Gantok (200524—+*Pohlia flexuosa*).

BARTRAMIACEAE

Conostomum (?) sp. Darjeeling: Phalut, 3550 m. (200480, 200529).

This moss is in sterile conditions and very puzzling one. The leaves are fairly similar to those of *Plagiopus oederi*: distantly arranged on stem, lamina-cells hardly or slightly mamillate and short rectangular in the median part. But, judging from the stem being pentangular in section and the leaves being not strongly carinate, this moss should not be referred to the genus *Plagiopus*. Judged from the plants being very closely tufted and the shape and areolation of the leaves, this moss may be referred to the present genus provisionally.

Bartramia halleriana Hedw. Darjeeling: Rimbick, 2200 m.—Shiri Kola, 1900 m.—Raman, 2400 m. (200348).

B. pomiformis Hedw. Darjeeling: Ghum—Senchal (200346, 200347); Phalut (200345); Sandakphu—Kala Pokri—Karibans—Tonglu (200340, 20341, 200344).

The specimens cited above are very puzzling ones. Of these, 200346 and 200347 are sterile, but the others are fertile and the setae are relatively short: about 0.6 cm., 0.7–0.9 cm., 0.7–1 cm., and 1–1.1 cm., respectively. In 200340 a few stems have two capsules in a single perichaetium. Judged from these facts, I suspect that at least some of the sporophytes in these specimens may possibly be hybrids between *B. pomiformis* and *B. halleriana*, as Dixon (1954) suggested.

Bartramidula bartramioides (Griff.) Wijk et Marg. Sikkim: Yoksam (200305, 200618—+ *Bryum argenteum* var. *lanatum*).

Philonotis socia Mitt. Sikkim: Yoksam (200644). **New to India.**

Ph. revoluta Bosch et Lac. Darjeeling: Sandakphu—Kala Pokri—Caribans—Tonglu (200170, 200192).

Fleischerobryum longicolle (Hamp.) Loesk. Darjeeling: Sandakphu—Kala Pokri—Caribans—Tonglu (200405, 200406, 200418, 200530); Darjeeling—Ghum—Senchal—Tiger Hill—Darjeeling (200415).

Breutelia sp. (near to *B. dicranacea*) Darjeeling: Phalut (200337). Sikkim: Yoksam (201558); Jongri, 4000–4200 m. (201606).

II. Phytogeography

According to the author's phytogeographical classification system (Ochi 1959, '62), the mosses listed above are divided into the following types:

G cosmopolitan...1 sp.: *Bryum argenteum* var. *lanatum*.

Wide-spread...3 spp.: *Bryum capillare*, *B. filiforme* var. *concinntatum* and *Bartramia pomiformis*.

Circumboreal

a. Arctic and subarctic...5 spp.: *Pohlia acuminata*, *P. cruda*, *P. longicolla*, *Plagiobryum zierii* and *Bartramia halleriana*.

b. Subarctic and temperate...1 sp.: *Pohlia elongata*. Tropical and subtropical.

a. Pan-tropical...2 spp.: *Pohlia flexuosa* and *Bryum truncorum*.

b. Indo-Malayan and East-Asiatic...4 spp.: *Brachymenium nepalense*, *Bartramidula bartramioides*, *Philonotis revoluta* and *Fleischerobryum longicolle*.

Sino-Himalayan and Japanese...2 spp.: *Bryum pseudoalpinum* and *Philonotis socia*.

Endemic...4 spp.: *Brachymenium ptychothecium*, *Bryum himalayanum*, *B. setchwanicum* and *B. thomsonii*.

The "endemic" means the mosses whose distributional ranges may be limited within high-altitudinal regions of Himalayas; Tibet, Szechwan and Yunnan of China; and the vicinity. Of the mosses listed above, as enumerated 22 species excepting for three indefinite ones, endemic ones occupy only 18.2%, and the remainder have also been recognized to occur in Japan and the adjacent regions. This may be a proof of the fact that moss flora of Sikkim and the vicinity is closely related to that of Japan and the adjacent regions. This fact may be, caused by the followings: 1. Sikkim and southern parts of Japan belong climatically to the "East-Asiatic monsoon area", where such tropical and subtropical mosses as listed above are able to grow. 2. In both regions there are high mountains where circumboreal mosses are able to grow.

On the other hand, the endemic ones may also be of great significance: such endemic mosses as listed above may be differentiated in the high-altitudinal regions of Himalayas and the vicinity.

Literature cited

- Dixon, H.N. (1911): *Hyophilopsis*, a new genus of Pottiaceae, with further contributions to the bryology of India. Jour. Bot. **49**: 137-150. f. 1-5. ——— (1954): Student's handbook of British mosses. Eastbourne. Ochi. H. (1959): A revision of the Bryaceae in Japan and the adjacent regions. *Tottori*. ——— (1962): Mosses of the Bryaceae in Japan and the adjacent regions, Supplement III. Acta Phytotax. Geobot. **20**: 242-246. f. 1-2. ——— (1963 a): Contributions to the mosses of Bartramiaceae in Japan and the adjacent regions (2 and end). Nova Hedwigia **5**: 91-115. pl. 7-24. ——— (1963 b):

Notes on Asiatic moss flora, I. Advanc. Front. Pl. Soc. 4: 105-126. pl. I-VIII.

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本報告については 1962 年 10 月名古屋大学における日本植物学会第 27 回大会において講演し、その要旨は『蘚苔地衣雑報 2 巻 12 号』(1962) に掲載されている。ただ、その時用いた標本は 103 点であったのに、その後さらに 4 点が追加され、またその当時同定不能だったものや検討不充分だったものも、その後検討されてつぎの 5 種 1 変種が加わっている。*Bohlia cruda*, *Bryum himalayanum* (新種), *B. pseudoalpinum* var. *reflexifolium* (新変種), *Conostomum* (?) sp., *Bartramia halleriana* および *Philonotis socia*。これらのうち *Philonotis socia* は従来日本、韓国、台湾および中国からだけしか知られていなかったもので、インドからは今回新しく報告されたことになる。筆者はさきにセン類にみられる分布型の一つとして“Sino-Himalayan and Japanese”を考へ(1962)、本種をもその型の中に入れておいた(1963)。当時はこのことをいささか冒險かとも思っていたが、丁度よいところから本種がみつかったことになる。また、一応 *Bartramia pomiformis* に入れた標本のうちに、かつて Dixon (1954) が示唆した、*B. pomiformis* と *B. halleriana* との雑種ともみられる孢子体のあることをもものべている。その他については上記の『蘚苔地衣雑報』と重複するので割愛したい。

□ 属の進化に要した時間の例 The American Naturalist 97 (896): 319-331 (1963) にのった Colbert, E.H.: Phylogeny and the dimension of time は動物化石と層序から割出した数字を挙げている。米国内カナダ境(北モンタナと南アルバータ両州)に上部白堊紀層が 300 呎の厚さで推積し、その中に嘴を持った恐竜(hadrosaurian dinosaur)の各属が多数に化石となっている。主に三つの時代区分に分れて継代生存し、系統をたどることができる。これらの消長変遷と放射性元素による岩石の時代決定とを合せて、属が新生し発展消滅するのは 500 万年又はそれより長い位の年月であるとのべている。動物と植物とは標準も体制も違うが一つの参考に御紹介する。(前川文夫)

□ Archaeophytes に対する訳語「古来雑草植物」 本誌 38 巻 10 号, 308 頁に、水島正美氏が「史前帰化植物」に対する英語として、Archaeophytes が適切であることを紹介した。最近、これも偶然だが、この用語に対して、「古来雑草植物」という訳語が、中国科学院編訳出版委員会名詞室編訂〔俄英中〕植物地理学、植物生態学、地植物学名詞, p. 18 (1956) にでていたことを発見した。簡にして要をえた用語である。水島氏とは逆の発見であるがここに紹介する。(佐竹義輔)