

## BRYOPHYTA

### HEPATICAЕ (by Sinske Hattori)<sup>1)</sup>

#### HERBERTACEAE

**Herberta chinensis** Steph.: Fl. E. Himal. 503 (1966). [Fig. 18]

Bhutan. Thimphu-Wangdu Phodrang, 1450-3250 m (Apr. 9, 1967); Laum Thang-Chawa Gassar, 4100 m (May 19, 1967); Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967).

Distr. E. Himalaya, and W. China.

**Herberta fragilis** (Steph.) Herzog: Fl. E. Himal. 503 (1966). [Fig. 19]

Bhutan. Neylong-Tashiling, 2300-2400 m (Apr. 15, 1967); Tongsa, 2200 m (Apr. 17, 1967); Ritang-Ratsoo, 2000-2600 m (Apr. 23, 1967); Gasa-Chamsa, 2800-3750 m (May 14, 1967); Chawa Gassar-Seanchu Passa, 3900-4750 m (May 20, 1967); Nala-Tzatogang, 3200-3400 m (May 26, 1967).

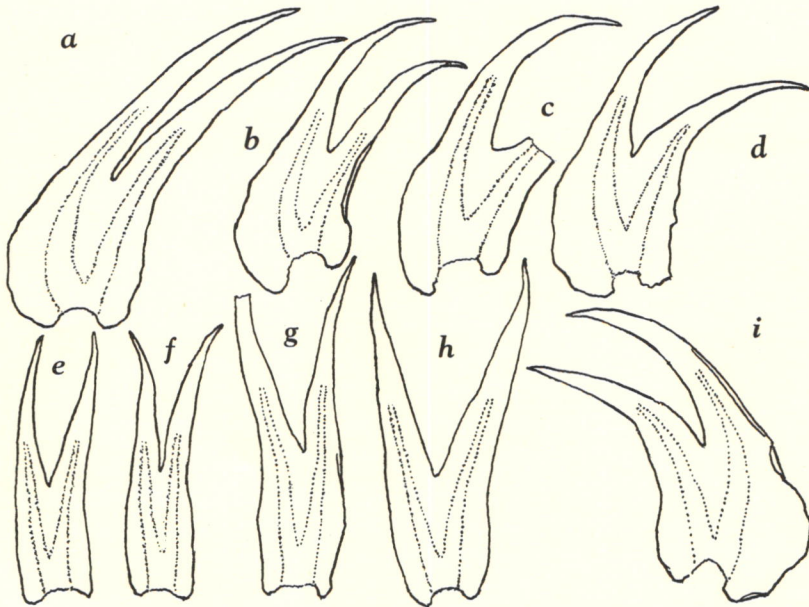


Fig. 18. *Herberta chinensis* Steph. a-d, i. Stem leaves  $\times 22$ . e-h. Stem underleaves,  $\times 22$ . Figs. a-g drawn from specim. from Nala-Tzatogang (May 26, 1967; NICH 287286); figs. h-i, from specim. from same loc. (May 26, 1967; NICH 287278).

1) Dr. T. Amakawa and other colleagues helped me with the identification of all the specimens of the following groups: 1) Jungermanniaceae, Scapaniaceae and Marchantiaceae (by Dr. Tairoku Amakawa); 2) Plagiochilaceae (by Dr. Hiroshi Inoue); 3) Lepidoziaceae and Jubulaceae (by Dr. Masami Mizutani); 4) Metzgeriaceae (by Dr. Yukinobu Kuwahara).

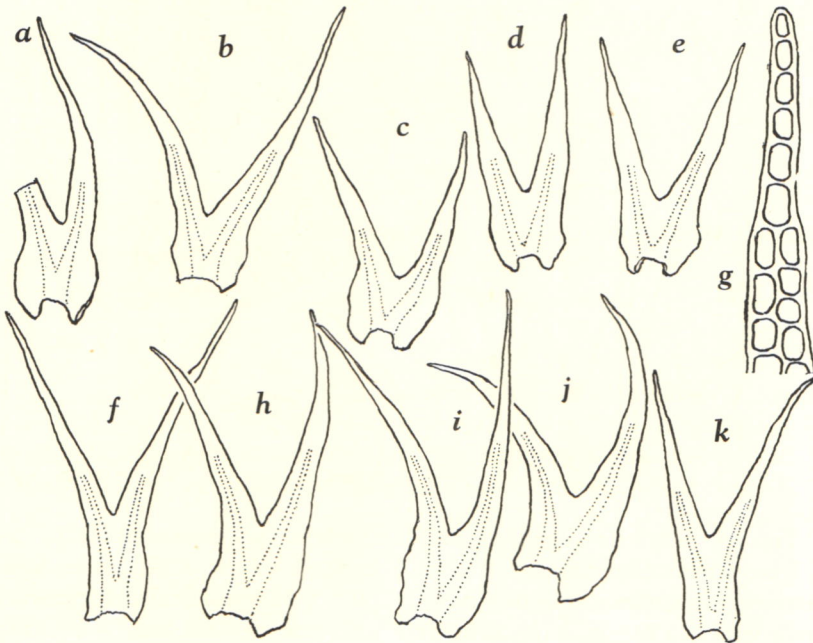


Fig. 19. *Herberta fragilis* (Steph.) Herz. a-c, h-j. Stem leaves,  $\times 22$ . d-f, k. Stem underleaves,  $\times 22$ . g. Apex of stem leaf lobe,  $\times 230$ . Figs. a-g drawn from specim. from Tongsa; figs. h-k, from specim. from Ritang-Ratsoo.

Distr. E. Himalaya (Sikkim, Bhutan).

Previously I (1966) used Miller's (1965) combination for the author name of this taxon. Lately, however, I found an earlier combination made by Herzog (1939) [as *Herberta fragilis* (St.) Herz. in Ann. Bryol. **12**: 80 (1939)]. The plant of this species is brown in herbaria, the stems are usually simple and 3-4.5 cm long, the leaves are julaceous when dry and squarrose when moist, up to 2 mm long, and ca.  $3/4$ -(or more) bifid, the segments are very slender, terminating in a row of 6-9 uniseriate cells and more or less fragile with the apical portion frequently broken away, leaf cells are verruculose, and the vitta is well developed and connate at the disc base.

***Herberta Giraldiviana*** (Steph.) Nichols. in Handel-Mazzetti, Symb. Sin. **5**: 27 (1930).

var. **verruculosa** Hattori, var. nov.

[Fig. 20]

A typo recedit cuticula cellulae foliorum et amphigastriorum distincte verruculosa.

Plants small to medium-sized, rigid and brown in herbaria; stems 3-5 cm long, subsimplex; stem leaves imbricate, julaceous when dry, slightly or moderately secund-spreading when moist, more or less fragile with the distal portion of segments often broken away, 1.5-1.8 mm long,  $2/3$ -(or less) bifid, segments somewhat



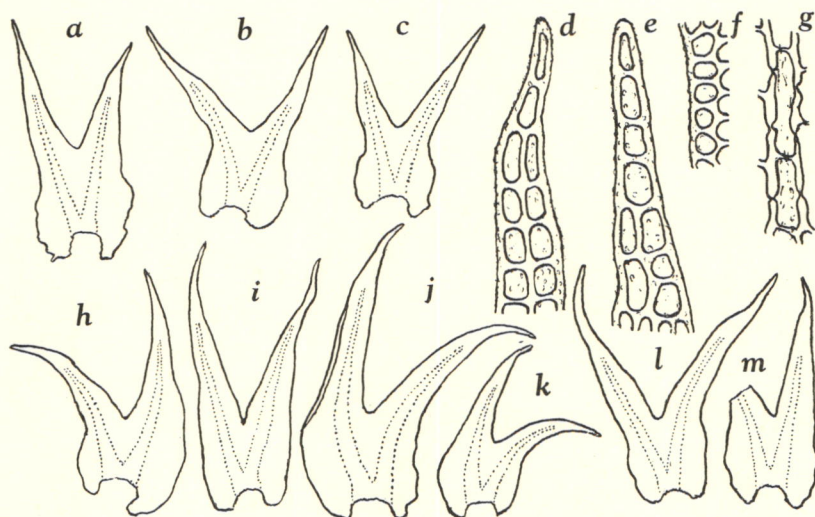


Fig. 20. *Herberta Giraldiana* (Steph.) Nichols. var. *verruculosa* Hatt. a-c, i, l-m. Stem underleaves,  $\times 22$ . h, j-k. Stem leaves,  $\times 22$ . d-e. Apical portions of segments of stem leaves,  $\times 230$ . f. Marginal cells of segment of stem leaf,  $\times 230$ . g. Vitta cells from disc base of stem leaf,  $\times 230$ . Figs. a-g drawn from specim. from Neylong-Tashiling (NICH 287369); figs. h-i, from type; figs. j-m, from specim. from Nala-Tzatogang (NICH 287290).

falcate, attenuate toward the apex terminating in a row of 2-6 uniseriate cells; marginal cells of segment  $10-18 \times 10-13 \mu$  and thick-walled (trigones indistinct), vitta cells of disc base  $40-60 \times 13-15 \mu$  and with trabeculate longitudinal walls and thin transverse walls; cuticle clearly verruculose throughout (striolately so in vitta area); stem underleaves more or less smaller than the leaves, symmetrical, segments divergent ( $50-80^\circ$ ).

Bhutan. Neylong-Tashiling, 2300-2400 m (Apr. 15, 1967); Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967 - type in NICH 287292).

Distr. var. *Giraldiana*: China (Shensi, Szechuan, and Yunnan); var. *verruculosa*: Bhutan.

In the original description Stephani (Spec. Hepat. 4: 22. 1910) did not mention the cuticle, though he usually described it except when the cuticle was smooth. H. A. Miller (Journ. Hattori Bot. Lab. 28: 316. 1965) described "Leaf cells weakly verruculose" based on the type material.

***Herberta himalayana*** (Steph.) Herz.: Fl. E. Himal. 503 (1966).

Bhutan. Chawa Gassar-Seanchu Passa, 3900-4750 m (May 20, 1967); Barshong-Nala, 3300-3700 m (May 25, 1967).

Distr. E. Himalaya (Sikkim, Bhutan).

Formerly I (1966) used Miller's combination (1965) but Herzog (Ann. Bryol. 12: 18. 1939) already made the above combination.

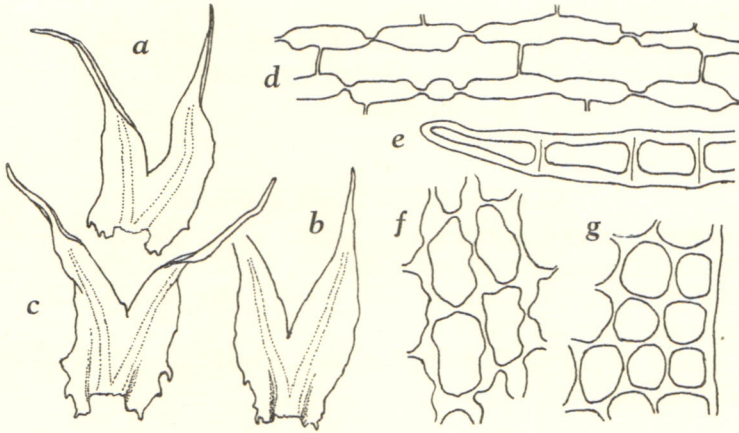


Fig. 21. *Herberta pseudoceylanica* Hatt. a–b. Stem leaves,  $\times 20$ . c. Stem underleaf,  $\times 20$ . d. Vitta cells from base of stem leaf lobe,  $\times 440$ . e. Apex of stem leaf lobe,  $\times 440$ . f. Basal cells of stem leaf lobe,  $\times 440$ . g. Marginal cells from stem leaf disc,  $\times 440$ . Figs. all drawn from the type.

***Herberta Kurzii*** (Steph.) Chopra: Fl. E. Himal. 503 (1966).

Bhutan. Gasa–Chamsa, 2800–3750 m (May 14, 1967); Nala–Tzatogang, 3200–3400 m (May 26, 1967).

Distr. Himalaya, W. China, and Formosa.

Formerly I (1966) used Miller's (1965) combination, but Chopra (Journ. Indian Bot. Soc. 22: 247. 1943) already made the above combination.

***Herberta pseudoceylanica*** Hattori, sp. nov. [Fig. 21]

*Herberta ceylanica* H. A. Miller sensu Hatt. in Fl. E. Himal. 503 (1966).

A *Herberta ceylanica* (Steph.) H. A. Miller, species simillima, differt lobis foliorum sensim apicem attenuatis, apice piloso, 8–12 cellulis uniseriatis formante, rima angustissima, caule simplici.

Plants brown in herbaria (when wet more or less deep orange-tint); stems 2–3 cm long, almost simple; leaves and underleaves julaceous when dry,  $\pm$ oblique-spreading (and squarrose above) but not secund when moist, clasping stem strongly at base, almost symmetrical, ca. 1.7 mm long, ca. 3/4-bifid, sinus acute, often closed with imbricate lobe bases, lobes ca. 1.2 mm long, basal half comparatively wide (0.3–0.4 mm wide) whereas apical half narrow, terminating in a slender tip which is composed of a row of 8–12 uniseriate cells; disc  $\pm$ canaliculate, comparatively small with  $\pm$ narrow base, lateral margins of disc with 1–3 small teeth tipped with slime papilla; vitta grooved below, bifid almost to the base of disc, becoming weaker and disappearing beyond the lobe middle; cells with almost smooth or very weakly verrucose cuticle (vitta cells striolately so), walls thin with nodulose trigones, cells ca.  $25 \times 14 \mu$  at the lobe base, ca.  $14 \times 14 \mu$  along the disc margin; vitta cells ca.  $55 \times 17 \mu$  at the lobe base; underleaves similar to leaves, symmetrical.

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967); Nala–Tzatogang, 3200–3400 m (May 26, 1967–type in NICH 287458).



Distr. Sikkim and Bhutan.

**Herberta Sendtneri** (Nees) Evans: Fl. E. Himal. 504 (1966).

Bhutan. Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967).

Distr. Europe, Himalaya, and W. China.

#### BLEPHAROSTOMATACEAE

**Blepharostoma trichophyllum** (L.) Dum.: Fl. E. Himal. 504 (1966).

Bhutan. Ritang-Ratsoo, 2000-2600 m (Apr. 23, 1967); Gasa-Chamsa, 2800-3750 m (May 14, 1967); Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967).

Distr. E. Africa, Europe, Himalaya, China, Formosa, Japan, Korea, Siberia, and N. & C. America.

#### LEPIDOZIACEAE (by Masami Mizutani)

**Bazzania ovistipula** (Steph.) Abeywickrama in Ceylon Journ. Sci. (Biol.) 2 (1): 45 (1959).

*Mastigobryum ovistipulum* Steph., Spec. Hepat. 3: 444 (1908).

*Bazzania pusilla* (Steph.) Hatt.: Fl. E. Himal. 506 (1966).

Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Ceylon, India (S. India, W. Bengal, Assam), Nepal, and Japan.

**Bazzania tricrenata** (Wahlenb.) Trev.: Fl. E. Himal. 506 (1966).

Bhutan. Bhotokha-Rinchu, 1450-1500 m (May 8, 1967); Gasa-Chamsa, 2800-3750 m (May 14, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Europe, Himalaya, W. China, Formosa, Korea, Japan, and N. America.

*Bazzania lobulistipa* (Steph.) Hatt. in Fl. E. Himal. 505 (1966) and *B. pinniformis* (Steph.) Hatt. in Fl. E. Himal. 506 (1966) were both reduced to synonymy under *B. tridens* (Reinw. et al.) Trev. by Mizutani (Journ. Hattori Bot. Lab. 30: 72. 1967). *B. decurva* (Nees) Trev.: Fl. E. Himal. 505 (1966) was reduced to synonymy under *B. praerupta* (Reinw. et al.) Trev. by Mizutani (Journ. Hattori Bot. Lab. 30: 79 & 80. 1967).

**Lepidozia reptans** (L.) Dum.: Fl. E. Himal. 506 (1966).

Bhutan. Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967).

Distr. Europe, Kashmir, Himalaya, Japan, Saghalin, Siberia, and N. America.

**Lepidozia robusta** Steph.: Fl. E. Himal. 506 (1966).

Bhutan. Nala-Tzatogang, 3300 m, *Abies* forest (May 26, 1967).

Distr. Sikkim, Bhutan, Bengal, and China.

#### LOPHOZIACEAE

**Anastrepta orcadensis** (Hook.) Schiffn.: Fl. E. Himal. 507 (1966).

Bhutan. Ritang-Ratsoo, 2000-2600 m (Apr. 23, 1967); Gasa-Chamsa, 2800-3750 m (May 14, 1967); Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967); Chawa Gassar-Seanchu Passa, 3900-4700 m (May 20, 1967); Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967).

Distr. Europe (Atlantic coast and the Alps), Faeroes, Himalaya, W. China

(Yunnan, Szechuan), Formosa, Japan, ? Siberia, N. America (Pacific coast of Alaska), and ? Hawaii.

**Anastrophyllum assimile** (Mitt.) Steph.: Fl. E. Himal. 507 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100-5150 m (May 19, 1967).

Distr. Europe (Norway, Alps), Himalaya (Nepal to Bhutan), Korea, Japan, and N. W. America.

**Anastrophyllum bidens** (Nees) Steph., Spec. Hepat. 2: 115 (1901).

*Jungermannia bidens* Nees in Nova Acta Acad. Leop. 11: 208 (1823).

Bhutan. Bhotokha-Rinchu, 1450-1500 m (May 8, 1967).

Distr. Malaya, Java, Borneo, Philippines, Japan, and (?) Tahiti.

**Anastrophyllum Donianum** (Hook.) Steph.: Fl. E. Himal. 507 (1966).

Bhutan. Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967).

Distr. Europe, Himalaya, Bengal, and W. China (Yunnan).

**Anastrophyllum minutum** (Crantz) Schust.: Fl. E. Himal. 508 (1966).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967).

Distr. Europe, Siberia, Himalaya, Japan, N. America, and ? S. Africa.

**Chandonanthus filiformis** Steph.: Fl. E. Himal. 508 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100 m (May 19, 1967); Chawa Gassar-Seanchu Passa, 3900-4750 m (May 20, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. E. Himalaya, and China (Yunnan, Szechuan).

**Chandonanthus hirtellus** (Web.) Mitt.: Fl. E. Himal. 508 (1966).

Bhutan. Thimphu-Wangdu Phodrang, 1450-3250 m (Apr. 9, 1967); Neylong-Tashiling, 2300-2400 m (Apr. 15, 1967); Lingshi-Shodu, 4000 m (May 23, 1967); Nala-Tzatogang, 3200-3400 m, *Abies* forest (May 26, 1967).

Distr. Warm-temperate-subtropical regions of Asia (including Himalaya, Yunnan, and Szechuan), New Guinea, Formosa, Japan, Pacific Is. (incl. Tahiti), Madagascar, and Africa.

**Tritomaria exsecta** (Schmid.) Schiffn.: Fl. E. Himal. 509 (1966).

Bhutan. Nala-Tzatogang, 3300 m, *Abies* forest (May 26, 1967).

Distr. Europe, Madeira I., Himalaya, China, Formosa, Japan, Siberia, and N. America.

#### JUNGERMANNIACEAE (by Tairoku Amakawa)

**Jamesoniella nipponica** Hatt. in Journ. Jap. Bot. 19: 350 (1943).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967); Tamji-Gasa, 2200-2800 m (May 13, 1967). Determined by Dr. Riclef Grolle and S. Hattori.

Distr. Bhutan, and Japan.

**Jungermannia clavellata** (Mitt.) Amak. in Journ. Hattori Bot. Lab. 22: 69 (1960).

*Solenostoma clavellatum* Mitt. ex Steph., Spec. Hepat. 2: 53 (1901).

Bhutan. Nala-Tzatogang, 3300-3400 m, *Abies* forest (May 26, 1967).

Distr. E. Himalaya (Nepal, Sikkim, Bhutan), India, China, and Japan.

**Jungermannia Decolyana** Schiffn.: Fl. E. Himal. 510 (1966).



- Bhutan. Nala-Tzatogang, 3300 m, *Abies* forest (May 26, 1967).  
 var. **nigricans** Amak. in Journ. Hattori Bot. Lab. **30**: 185 (1967).  
 Darjeeling. Mt. Singalila, 3950 m (Jul. 17, 1969).  
 Distr. var. *Decolyana*: Nepal, Sikkim, India (Bengal), and Japan; var. *nigricans*: Nepal, and India (Bengal).  
**Jungermannia Hasskarliana** (Nees) Steph., Spec. Hepat. **2**: 76 (1901).  
*Alicularia hasskarliana* Nees in Gott. et al., Synop. Hepat. 12 (1844).  
 Sikkim. Phyang La, 1900 m (Jul. 1, 1969).  
 Distr. India (Himalaya, Bengal), Ceylon, Sumatra, Java, Celebes, Philippines, and New Guinea.  
**Jungermannia hyalina** Lyell in Hook., Brit. Jungerm. pl. 63 (1814).  
 Nepal. Dhunche-Thare, 2100–2200 m (Jun. 5, 1969).  
 Distr. Nepal, Japan, N. America, Europe, Azores, Caucasus, and Asia Minor.  
**Jungermannia limbatifolia** Amak. in Journ. Hattori Bot. Lab. **31**: 112 (1968).  
 var. **radicellosa** Amak., var. nov.  
 A typo recedit foliis et perianthiis radicellosis.  
 Bhutan. Nala-Tzatogang, 3400 m, *Abies* forest (May 26, 1967—type in NICH 287285).  
 Distr. var. *limbatifolia*: Himalaya (Darjeeling area).  
**Jungermannia pyriflora** Steph., Spec. Hepat. **6**: 90 (1917).  
 var. **gracillima** Amak., var. nov.  
 A typo recedit planta tenui gracillima, foliis remotis vel remotiusculis.  
 Darjeeling. Mt. Singalila, 3950 m (Jul. 17, 1969—type in NICH 301968).  
 Distr. var. *pyriflora*: Japan; var. *gracillima*: Singalila.  
**Mylia Taylori** (Hook.) S.F. Gray, Nat. Arr. Brit. Pl. **1**: 693 (1821).  
 Bhutan. Chamsa-Yabu Thang, 3200–3700 m (May 15, 1967). Determined by S. Hattori.  
 Distr. Europe, India, Nepal, Sikkim, Bhutan, China, Formosa, Japan, N. America, Greenland, and (?) Hawaii.  
**Nardia flagelliformis** Inoue in Journ. Jap. Bot. **46** (1): 1 (1971).  
 Darjeeling. Mt. Singalila, 3650 m (Jul. 17, 1969—type in NICH 301980); *ibid.*, 3800 m (Jul. 17, 1969).  
 Distr. Endemic.  
 There has been a single known species of the genus *Nardia*, *N. assamica* (Steph.) Amak., in the Himalayan region. The present species is very unique in its habit, and is clearly distinguished from *N. assamica* by the long, flagelliform caulids with very remote and small leaves. It seems to be closely related to *N. Arnelliana* Grolle known from a high mountain in Uganda, tropical Africa, but the latter is separable from *N. flagelliformis* in the bilobed leaves and poorly developed underleaves. However, both *N. Arnelliana* and *N. flagelliformis* have such important diagnostic characteristics mentioned above and are sharply defined as sect. Flagelliformes Inoue from other *Nardia* (H. Inoue).

## DELAVAYELLACEAE

**Delavayella serrata** Steph.: Fl. E. Himal. 513 (1966).

Bhutan. Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).  
Distr. E. Himalaya, and W. China (Yunnan, Szechuan).

PLAGIOCHILACEAE (by Hiroshi Inoue)

**Plagiochila alata** Inoue: Fl. E. Himal. 513 (1966).

Bhutan. Tongsa-Uto La Road, 2200-2950 m (Apr. 17, 1967).

Distr. Endemic.

**Plagiochila Duthiana** Steph., Spec. Hepat. 2: 331 (1903).

*Plagiochila seminuda* Inoue in Fl. E. Himal. 520 (1966).

Bhutan. Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Chawa Gassar-Seanchu Passa, 3900-4750 m (May 20, 1967); Barshong-Nala, 3700-3300 m (May 25, 1967); Nala-Tzatogang, 3300-3400 m, *Abies* forest (May 26, 1967).

Distr. Himalaya.

**Plagiochila firma** Mitt.: Fl. E. Himal. 515 (1966).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967); Nala-Tzatogang, 3200-3400 m (May 26, 1967).

Distr. Widely distributed from Asia to the Pacific coast of Alaska and Canada.

**Plagiochila Grollei** Inoue: Fl. E. Himal. 517 (1966).

*Plagiochila zongiensis* Inoue in Fl. E. Himal. 520 (1966).

Bhutan. Barshong-Nala, 3300-3700 m (May 25, 1967).

Distr. E. Himalaya. (E. Nepal, and Bhutan).

**Plagiochila oblonga** Inoue in Bull. Nat. Sci. Mus. 8 (3): 398 (1965).

Bhutan. Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

Distr. E. Himalaya (Nepal, and Bhutan).

**Plagiochila orientalis** Tayl.: Fl. E. Himal. 518 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967).

Distr. E. Himalaya (Nepal to Bhutan), and Assam.

**Plagiochila perserrata** Herz.: Fl. E. Himal. 518 (1966).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967); Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Nala-Tzatogang, 3200 m (May 26, 1967).

Distr. E. Himalaya, and W. China (Yunnan).

**Plagiochila simlana** Steph., Spec. Hepat. 2: 329 (1903).

Bhutan. Tamji-Gasa, 2200-2800 m (May 13, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967); Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

Distr. N.W. Himalaya (Punjab), Nepal, and Bhutan.

**Plagiochila subsymmetrica** Steph.: Fl. E. Himal. 520 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967).

Distr. E. Himalaya (E. Nepal to Bhutan).

**Plagiochila torquescens** Herz.: Fl. E. Himal. 520 (1966).

Bhutan. Tongsa-Uto La Road, 2200-2950 m (Apr. 17, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967); Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

Distr. E. Himalaya (Sikkim, Bhutan), and China (Yunnan).

**Plagiochila ventricosa** Steph., Spec. Hepat. 2: 379 (1903).



Bhutan. Rukubi-Neylong, 2400–2800 m (Apr. 14, 1967); Tongsa, 2200 m (Apr. 17, 1967); Chabecha-Lingshi, 3800–4100 m (May 22, 1967).

Distr. Himalaya, and Ceylon.

SCAPANIACEAE (by Tairoku Amakawa)

**Scapania bhutanensis** Amakawa, sp. nov.

[Fig. 22]

Sterilis. Caulis 1.5–2 cm longus, 0.3–0.4 mm in diametro, cum foliis 3–4 mm latus, simplex; sectione transversalis cellulis inaequimagnis, ipsis corticalibus 2–3 stratis, compressis, parietibus incrassatis, ipsis medullaribus majoribus, parietibus tenuibus. Folia caulina contigua vel leviter imbricata, late patula, profunde biloba;

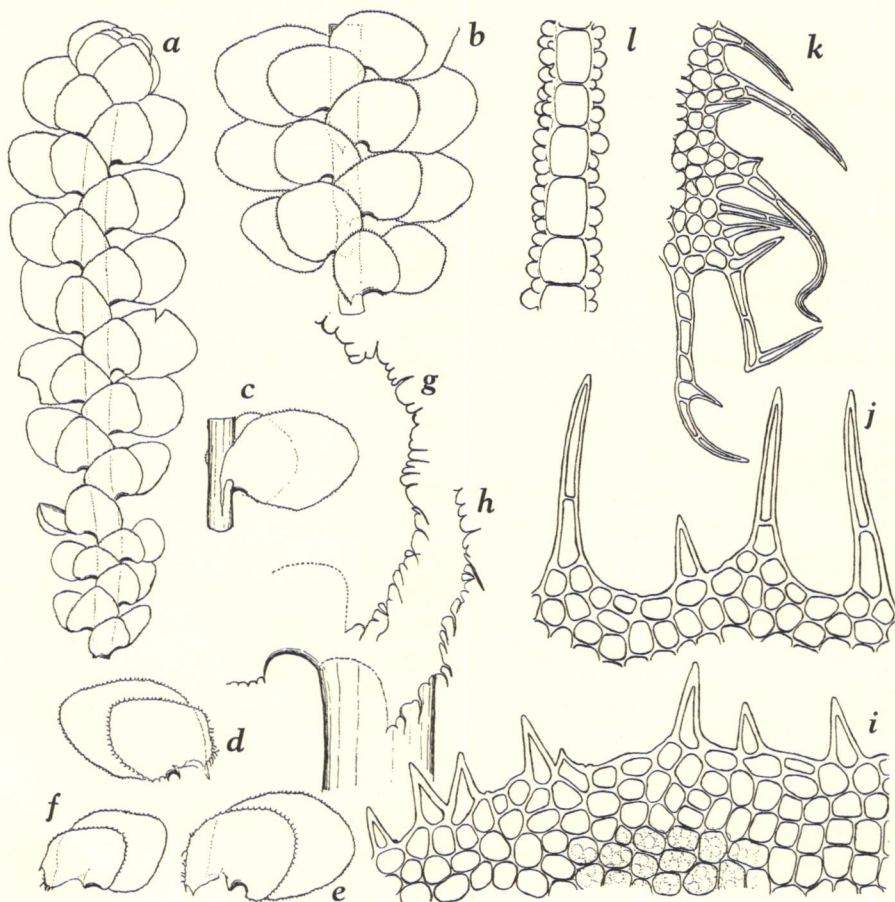


Fig. 22. *Scapania bhutanensis* Amakawa a. Sterile plant, dorsal view,  $\times 8$ . b. Part of stem, dorsal v.,  $\times 8$ . c. Do., ventral v.,  $\times 8$ . d-f. Leaves,  $\times 8$ . g, h. Basal parts of dorsal leaf-lobes,  $\times 40$ . i. Cells of apical part of ventral leaf-lobe,  $\times 320$ . j. Cells of apical part of dorsal leaf-lobe,  $\times 320$ . k. Cells of basal part of dorsal leaf-lobe,  $\times 320$ . l. Cross-section through leaf-lamina,  $\times 320$ . Drawn from the type.

carina brevissima, 0.2–0.3 mm longa, curvata, saepe semicircularis; lobus anticus ovatus,  $\pm$ cordatus, convexus, 1.3 mm longus, 1.3–1.5 mm latus, apice obtuso, basi breviter decurrente, ubique ciliato-dentata, ciliis superis bicellularibus, 50–100  $\mu$  longis, ipsis inferis longioribus, furcatis, complicatis; lobus posticus ovatus, decurvus, 2 mm longus, 1.5 mm latus, apice rotundato, basi longe decurrente, ubique ciliato-dentata, ciliis superis unicellularibus, ipsis inferis uni- vel bicellularibus; cellulae marginales 7–15  $\times$  7–12  $\mu$ , mediae 15–20  $\times$  12–15  $\mu$ , basales 25–30  $\times$  15  $\mu$ , trigonis indistinctis vel parvis; cuticula grosse denseque verrucosa. Gemmae bicellulares.

Bhutan. Nala-Tzatogang, 3300 m, *Abies* forest (May 26, 1967—type in NICH 287272).

This species belongs to sect. Gracilidae with its ciliate-dentate base of dorsal leaf-lobes, and is close to *S. ciliata* Sde. Lac. with its 1–2-celled marginal cilia of ventral leaf-lobes and densely verrucose cuticle of leaf-cells. However, this species has very short keels of leaves, and has furcate and complicate cilia at the base of dorsal leaf-lobes.

**Scapania Harae** Amak.: Fl. E. Himal. 522 (1966).

Bhutan. Gasa-Chamsa, 2800–3750 m (May 14, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967).

Distr. E. Himalaya (Sikkim, Bhutan).

**Scapania ornithopodioides** (With.) Pears.: Fl. E. Himal. 522 (1966).

Bhutan. Gasa-Chamsa, 2800–3750 m (May 14, 1967); Chamsa-Yabu Thang, 3200–3700 m (May 15, 1967); Nala-Tzatogang, 3300–3400 m, *Abies* forest (May 26, 1967); Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

Distr. N.W. Europe, Himalaya, W. China, Formosa, Japan, and Philippines.

Previously Alaska was included erroneously in the geographical area of this species (Fl. E. Himal. 523).

?**Scapania pseudoferruginea** Amak.: Fl. E. Himal. 523 (1966).

Bhutan. Nala-Tzatogang, 3400 m (May 26, 1967).

Distr. E. Himalaya (E. Nepal to Bhutan).

**Scapania Schiffneri** Grolle in Journ. Jap. Bot. 40: 215 (1965).

*Scapania ferruginea* (Lehm. & Lindenb.) Lehm. & Lindenb. var. *minor* Amak. in Journ. Hattori Bot. Lab. 27: 9 (1964)—Fl. E. Himal. 521 (1966).

Bhutan. Chawa Gassar-Seanchu Passa, 3900–4700 m (May 20, 1967).

Distr. Himalaya, Java, and Formosa.

#### MARSUPELLACEAE

**Gymnomitrium obtusum** (Lindb.) Pears. in Journ. Bot. 18: 337 (1880).

Bhutan. Laum Thang-Singke La-Chawa Gassar, 3900–4950 m (May 19, 1967).

Distr. Europe, Bhutan, and North America; f. *antarctica*: Chile.

The leaves of smaller shoots resemble those of *Gymnomitrium concinatum* (Lightf.) Corda, with triangular lobes whose apices are subacute–acute and with the acute and open sinus. The above-cited material may be an intermediate form between the two very closely related species, *G. concinatum* and *G. obtusum*. Form. *antarctica* Herz. is a little known taxon (and may possibly be a different species).



## ODONTOSCHISMACEAE

**Odontoschisma denudatum** (Nees) Dum., Rec. d'Obs. 19 (1835).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967).

Distr. Himalaya (Nepal, Bhutan), Siberia, China, Formosa, Japan, N. & S. America, Europe, S. Africa, and Azores.

## PORELLACEAE

**Porella caespitans** (Steph.) Hatt. in Journ. Hattori Bot. Lab. **33**: 50 (1970).

*Madotheca caespitans* Steph. in Mem. Soc. Sci. Nat. Cherbourg **29**: 218 (1894).

Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Bhutan, and W. China (Yunnan).

The plant of this specimen is a form between the type and var. *setigera* (Steph.) Hatt. in Journ. Hattori Bot. Lab. **33**: 53 (1970).

var. **nipponica** Hatt. in Journ. Hattori Bot. Lab. **33**: 57 (1970).

Bhutan. Neylong-Tashiling, 2300-2400 m (Apr. 15, 1967); Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967).

Distr. var. *nipponica*: Bhutan, India (Assam), W. China (Szechuan), Formosa, and Japan.

**Porella campylophylla** (Lehm. & Lindenb.) Trev.: Fl. E. Himal. 524 (1966).

Bhutan. Rukubi-Neylong, 2400-2800 m (Apr. 14, 1967); Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967); Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

var. **ligulifera** (Tayl.) Hatt. in Journ. Hattori Bot. Lab. **32**: 333 (1969).

*Madotheca ligulifera* Tayl. in Lehm., Pugillus **8**: 10 (1844).

Bhutan. Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967).

Distr. Himalaya, Bengal, Punjab Plain, Burma, and S. India; var. *ligulifera*: India (Mussoorie, W. Bengal, Assam), Nepal, and Bhutan.

**Porella densifolia** (Steph.) Hatt. in Journ. Jap. Bot. **20**: 109 (1944).

subsp. **appendiculata** (Steph.) Hatt. in Journ. Hattori Bot. Lab. **32**: 343 (1969).

*Porella appendiculata* (Steph.) Hatt.: Fl. E. Himal. 524 (1966).

Bhutan. Tzatogang-Dotanang, 2800 m, *Tsuga* forest (May 27, 1967).

Distr. Himalaya, Mussoorie, Punjab Plain, and China (Yunnan, Szechuan).

**Porella nitens** (Steph.) Hatt.: Fl. E. Himal. 525 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Rukubi-Neylong, 2400-2800 m (Apr. 14, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967).

Distr. E. Himalaya (E. Nepal, Bhutan), and W. China (Yunnan).

**Porella Perrottetiana** (Mont.) Trev. in Mem. Real. Istit. Lombardo ser. 3, **4**: 408 (1877).

Bhutan. Chimakhothi-Thimphu, 2200-2450 m (Apr. 5, 1967).

Distr. India, Ceylon, Burma, China, Korea, Japan, Formosa, and Philippines.

## FRULLANIACEAE

**Frullania bhutanensis** Hattori, sp. nov.

[Fig. 23]

A *F. ornithocephala* (Reinw. et al.) Nees et *F. teres* Sde.-Lac., spec. affinis, differt bracteolis et lobulis bractearum flor. fem. haud dentatis.

Plants in mats, dark to reddish brown in herbaria; stems 3–5 cm long, loosely prostrate, bipinnately branched, branches rather numerous, to 1.5 cm long, obliquely spreading; rhizoids scarce. Stem leaves imbricate: lobe concave with

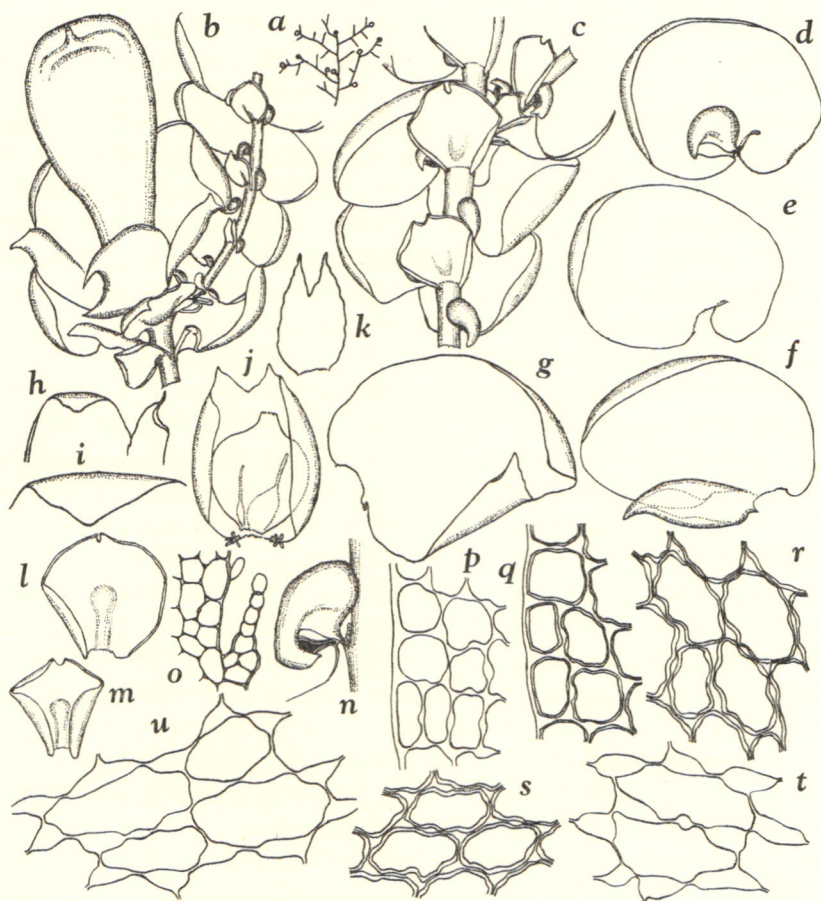


Fig. 23. *Frullania bhutanensis* Hatt. a. Branching, solid circles showing mature gynoecia (with well-developed perianths), open circles, young ones (with perianths not well-developed as shown in fig. j),  $\times 1/2$ . b. Stem apex with perianth and innovation, ventral view,  $\times 12.5$ . c. Part of stem, ventral v.,  $\times 17.5$ . d–f. Stem leaves (fig. e, lacking lobule; fig. f, leaf neighboring gynoecium),  $\times 17.5$ . g. Female bract,  $\times 17$ . h. Upper portion of female bract,  $\times 17$ . i. Apex of fem. bract lobe,  $\times 45$ . j. Female bracteole and young perianth including 2 archegonia (one fertile),  $\times 17$ . k. Outer fem. bracteole,  $\times 17$ . l–m. Stem underleaves,  $\times 17.5$ . n. Leaf lobule (and minute stylus) from stem,  $\times 47$ . o. Stylus (with hyaline papilla at tip) and basal portion of fem. bract lobule (with hyaline papilla),  $\times 183$ . p–q. Marginal cells of leaf lobes; fig. p,  $\times 385$ ; fig. q,  $\times 365$ . r–s. Median cells of leaf lobe,  $\times 365$ . t–u. Basal cells of leaf lobes; fig. t,  $\times 385$ ; fig. u,  $\times 365$ . Figs. all drawn from the type.



strongly incurved apex, when flattened obovate-oblong with dorsal margin arching ca. stem width (or more) beyond the farther edge of stem and with large, rounded-subquadrate basal appendage, ca. 1.2 mm long and wide; lobule almost touching stem, saccate, when appressed helmet-shaped, the distal end incurved, long rostrate, and with flat, triangular, acute tip; stylus minute, composed of a row of ca. 3 cells (uniseriate) and a disc 1 or 2 cells high and 2 cells wide. Marginal cells of lobe of stem leaf  $14-16 \times 10-12 \mu$  and with more or less flexuose walls and large trigones, median cells  $27-34 \times 13-22 \mu$  and with flexuose walls and trigones, basal cells  $30-50 \times 16-22 \mu$  and thin-walled with large, triangular to more or less nodulose and confluent trigones and occasionally with medium-sized, nodulose or confluent intermediate thickenings; walls and trigones usually hyaline whereas cell lumina mostly brownish red. Stem underleaves distant, subtransversely inserted, with strongly incurved lateral margins and small, rounded basal appendages, when flattened subrotund, 0.7–1 mm long and wide, apex shortly incised, sinus narrow but not acute, lobes triangular, acute. Branch leaves and underleaves similar to, but smaller than, the stem leaves and underleaves. Dioicous (androecia not seen); gynoeceia terminal on stems or branches; perichaetial leaves in 2–3 pairs; lobe of the innermost bract larger than that of stem leaves, ovate-oblong without basal appendage, apex obtuse to subacute, mostly incurved, lobule long united with the lobe, keel indistinct, apex triangular, acute to acuminate, free margin without any dentation, stylus minute; innermost bracteole much larger than stem underleaves, ovate with incurved, non-toothed lateral margins, ca. 1/6-bilobed, sinus acute to subacute, rectangular (or less), lobes triangular, acute to acuminate, the secondary bracteole almost equal in size to stem underleaves, oblong, ca. 1/3-bilobed, sinus acute and narrow, lobes lanceolate, attenuate toward spinose apices. New shoot of the *Frullania*-type branching innovating from the lower bract and again floriferous (thus female flower becoming "pseudolateral"). Perianths long exerted, entirely smooth, clavate-cylindrical, inflated and not plicate (rarely broad ventral keel recognizable above), suddenly contracted to mouth and thus rounded-truncate at tip, mouth small, tubular; archeogonia 2 each perianth.

Bhutan. Thimphu–Wangdu Phodrang, 1450–3200 m (Apr. 9, 1967–type in NICH 287339); Rukubi–Neylong, 2400–2800 m (Apr. 14, 1967).

Distr. Endemic.

***Frullania Delavayi*** Steph.: Fl. E. Himal. 525 (1966).

Bhutan. Laum Thang–Chawa Gassar, 4000 m (May 19, 1967); Barshong–Nala, 3300–3700 m (May 25, 1967).

Distr. E. Himalaya (E. Nepal to Bhutan), W. China, and Japan.

***Frullania Duthiana*** Steph., Spec. Hepat. 4: 351 (1910).

var. ***appendiculata*** Hatt., var. nov.

[Fig. 24]

*Frullania Duthiana* Steph. sensu Hatt. in Fl. E. Himal. 525 (1966).

?*Frullania Horikawana* Verd. in Handel-Mazzetti, Symb. Sin. 5: 36, fig. 14, 4–7 (1930).

A typo recedit lobis foliorum cum appendiculis basalibus bene distinctis, subquadratis, lobulis rostratis, rostro plus minusve elongato.

Plants small to medium-sized, red-brown in herbaria; stems 3–4.5 cm long, pin-

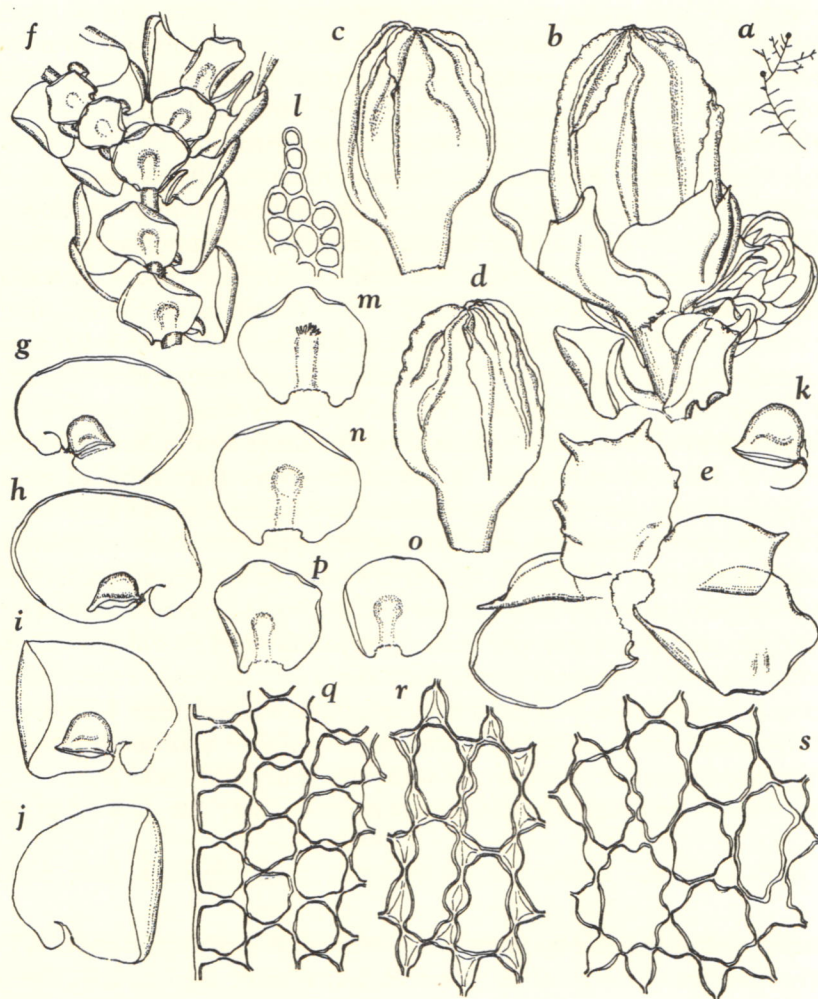


Fig. 24. *Frullania Duthiana* Steph. var. *appendiculata* Hatt. a. Branching,  $\times 1/2$ . b. Stem apex with gynoecium, ventral view,  $\times 22$ . c. Perianth, dorsal v.,  $\times 15.5$ . d. Do., ventral v.,  $\times 15.5$ . e. Inner pair of female bracts and bracteole,  $\times 15.5$ . f. Part of stem, ventral v.,  $\times 15.5$ . g-j. Stem leaves,  $\times 22$ . k. Lobule of stem leaf,  $\times 30$ . l. Stylus of stem leaf,  $\times 230$ . m-p. Stem underleaves,  $\times 22$ . q. Marginal cells of stem leaf lobe,  $\times 455$ . r. Median cell of stem leaf lobe,  $\times 455$ . s. Basal cells of stem leaf lobe,  $\times 455$ . All figs. drawn from the type.

nately branched, branches obliquely or widely spreading, 4–7 mm long, but occasionally elongate and similar to the stem; rhizoids scarce, in a bundle at the protruding underleaf middle. Stem leaves imbricate: lobe widely spreading, concave ventrally with involute apex, when flattened obovate-oblong with dorsal margin arching beyond the farther edge of stem and with large, subquadrate basal appendage, 0.8–1 mm long, ca. 8 mm wide, apex rounded (or more or less obtuse);



lobule nearly parallel with, and almost touching, the stem, mostly saccate and helmet-shaped, mouth wide and truncate with more or less long-rostrate proboscis; rarely, lobule not saccate but canaliculate-lanceolate with obtuse apex; stylus small, composed of a row of ca. 3 uniseriate cells and of a subquadrate disc 3–4 cells high and 3 cells wide. Marginal cells of stem leaf lobe quadrate,  $14\text{--}16 \times 13\text{--}16 \mu$ , and with large, triangular or subnodulose trigones, median cells rectangular,  $27\text{--}34 \times 14\text{--}16 \mu$ , and with large, subnodulose trigones and intermediate thickenings of walls, basal cells  $18\text{--}32 \times 18\text{--}22 \mu$  and with large, nodulose trigones and, occasionally, also similar intermediate thickenings; cell lumina brownish red, walls and trigones nearly the same in color (to subhyaline). Stem underleaves contiguous, margin mostly recurved, when flattened rotund, 0.55–0.65 mm long, 0.65–0.85 mm wide, slightly rounded-appendaged at base, insertion subtransverse or more or less sinuate. Dioicous (androecia not seen); gynoecia terminal on stems or leading branches, with a single subfloral innovation (often below the inner pair of bracts); perichaetial leaves in ca. 2 pairs, lobes of inner bracts much larger than those of stem leaves, ovate, margins mostly slightly incurved, absolutely entire, apices obtuse to rounded; lobules long connate with lobes, ovate-triangular, margins almost absolutely entire (but toothed at the very base where spinose styli also occur), mostly recurved, apices elongate-triangular, subacute or narrowly obtuse; inner bracteole much larger than stem underleaf, connate at one side with bract lobule, widely oblong, margin more or less recurved and crispate-repand, apex shallowly bilobed, sinus wide, lunate, lobes triangular, subacute. Perianths exerted, obovoid, ca. 2 mm long and 1.3 mm wide, ca. 8-plicate (or ca. 10-plicate with much smaller additional plicae), plicae sharp, angulate-repand or -crispate, mouth very short and indistinct.

Bhutan. Shodu-Barshong, ca. 3600 m, *Abies* forest (May 24, 1967—type in NICH 287259).

Distr. var. *Duthiana*: Himalaya (Kidarkanta); var. *appendiculata*: Sikkim and Bhutan.

**Frullania ericoides** (Nees) Nees in Gottsche et al., Synop. Hepat. 417 (1845).

*Frullania squarrosa* (Reinw. et al.) Nees in Gottsche et al., l.c. 416 (1845)—Fl. E. Himal. 527 (1966).

Bhutan. Tongsa-Uto La Road, 2200–2950 m (Apr. 17, 1967); Bhotokha-Rinchu, 1450–1500 m (May 8, 1967).

Distr. Widely distributed in Asia, Pacific Is., Australia, N. & S. America, and Africa.

**Frullania Giraldiviana** Massal.: Fl. E. Himal. 525 (1966).

Bhutan. Tongsa-Uto La Road, 2200–2950 m (Apr. 17, 1967).

Distr. E. Himalaya (E. Nepal, Bhutan), and China (Shensi, Szechuan).

**Frullania Grevilleana** Tayl.: Fl. E. Himal. 526 (1966).

Bhutan. Ritang-Rukubi, 2600–3400 m (Apr. 13, 1967); Rukubi-Neylong, 2400–2800 m (Apr. 14, 1967); Neylong-Tashiling, 2300–2400 m (Apr. 15, 1967); Tashiling-Tongsa, 1900–2300 m (Apr. 16, 1967); Tongsa, 2200 m (Apr. 17, 1967); Tashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967); Tamji-Gasa, 2200–2800 m (May 13, 1967); Gasa-Chamsa, 2800–3750 m (May 14, 1967); Yabu Thang-Laya, 3400–3850 m (May 16, 1967); Chawa Gassar-Seanchu Passa, 3900–4750 m (May 20, 1967); Seanchu Passa-Chabecha, 3800–4400 m (May 21, 1967); Lingshi-Shodu, 4000–4800 m (May 23,

1967); Barshong-Nala, 3700-3300 m (May 25, 1967); Nala-Tzatogang, 3200-3400 m, *Abies* forest (May 26, 1967).

Distr. E. Himalaya.

***Frullania neurota*** Tayl.: Fl. E. Himal. 526 (1966).

Bhutan. Tinlegang, 1950 m (May 4, 1967).

Distr. E. Himalaya (Nepal, Sikkim, Bhutan), India, Ceylon, Java, China, Hawaii, and ?Mexico.

***Frullania physantha*** Mitt.: Fl. E. Himal. 527 (1966).

Bhutan. Chamsa-Yabu Thang, 3200-3700 m (May 15, 1967).

Distr. E. Himalaya, Bengal, Khasia, and China (Hunan).

?***Frullania retusa*** Mitt.: Fl. E. Himal. 527 (1966).

Bhutan. Barshong-Nala, 3300-3700 m (May 25, 1967).

Distr. Himalaya.

***Frullania rhystocolea*** Herz. in Hand.-Mazzetti, Symb. Sin. 5: 39, fig. 4: 1-9 (1930).

var. ***parva*** Hattori, var. nov.

[Fig. 25]

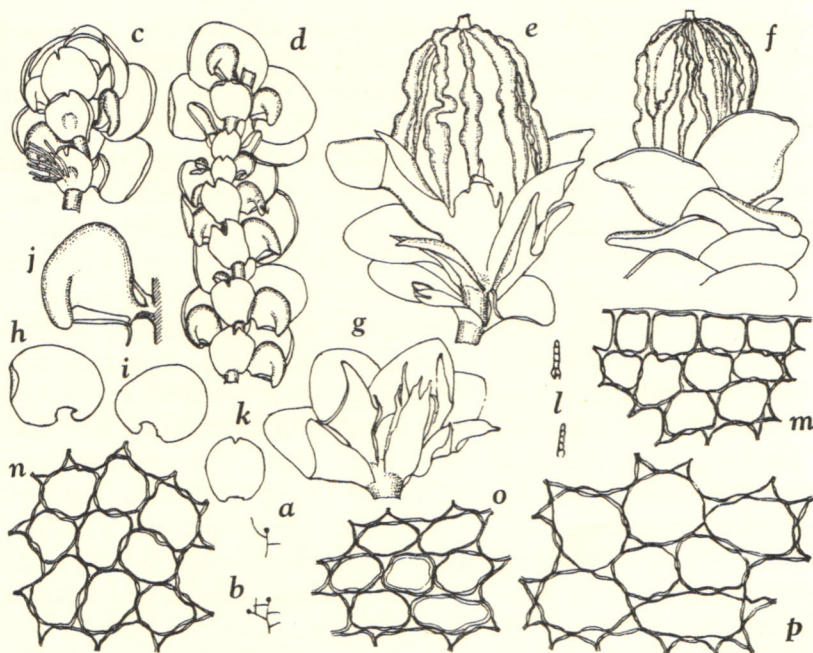


Fig. 25. *Frullania rhystocolea* Herz. var. *parva* Hatt. a-b. Branching,  $\times 1.3$ . c. Apical part of stem, ventral view,  $\times 30$ . d. Middle part of stem, ventral v.,  $\times 30$ . e. Perianth and perichaetial leaves, ventral v.,  $\times 22$ . f. Do., dorsal v.,  $\times 22$ . g. Young female inflorescence, slight-appressed, ventral v.,  $\times 30$ . h-i. Lobes of stem leaves,  $\times 30$ . j. Lobule of stem leaf,  $\times 75$ . k. Stem underleaf,  $\times 30$ . l. Styli,  $\times 100$ . m. Marginal cells of stem leaf lobe,  $\times 455$ . n-o. Median cells of stem leaf lobe,  $\times 455$ . p. Basal cells of stem leaf lobe,  $\times 455$ . Figs. all drawn from the type.



A typo differt plicis perianthiorum tenuioribus, minus ruguloso-inflatis, bracteis fem. flor. intimis fere obtusis, planta minore, amphigastriis haud latioribus quam longioribus, rima angusta, lobis fere acutis.

Plants small, reddish to dark brown in herbaria; stem creeping on branches and bark of trees and shrubs, ca. 1 cm long, rather irregularly and remotely branched, branches mostly short and ca. 2 mm long, but occasionally elongate and similar to the stem; rhizoids scarce, almost in bundles. Stem leaves loosely imbricate: lobe more or less concave ventrally with narrowly incurved apex, obovate-rotund, ca. 0.3 mm long and wide, dorsal margin arching ca. stem width beyond the farther edge of stem, basal appendage rounded; lobule variable in size and shape, usually saccate and helmet-shaped, comparatively large, nearly parallel with stem (nearly touching it or a little separated from it), mouth truncate to more or less concave with beaked distal end; lobule rarely not saccate but canaliculate-lanceolate with obtuse apex; stylus minute, composed of a row of 4–5 uniseriate cells and a disc 1 cell high and 1–2 cells wide. Marginal cells of lobe of stem leaf  $10\text{--}13 \times 10\text{--}11 \mu$  and rather thin-walled with small to medium-sized trigones and frequently with smaller intermediate thickenings, median cells  $13\text{--}21 \times 11\text{--}14 \mu$  and thin-walled with medium-sized trigones and frequently with smaller intermediate thickenings, basal cells  $20\text{--}30 \times 13\text{--}20 \mu$  and thin-walled with medium-sized to large trigones and frequently with smaller intermediate thickenings; cell walls and trigones hyaline to faintly red, cell lumina more or less red-brown. Stem underleaves contiguous or a little distant, nearly flat, obovate-rotund, 0.2–0.25 mm long and wide, apex shortly incised (ca. 1/10-lobed), sinus acute or subacute and narrow, lobes acute (rarely subacute). Branch leaves and underleaves similar to, but mostly smaller than, the stem leaves and underleaves. Dioicous (androecia not seen); gynoecia terminal on stems or leading branches, bearing below the gynoecium a new shoot of the *Frullania*-type branching which may become elongate and again floriferous. Perichaetial leaves in 3 pairs: dorsal lobe of the innermost bract much larger than stem leaves, lacking basal appendage, ovate-oblong, apex obtuse (rarely shortly subacute), margin absolutely entire; lobule long connate with lobe, lanceolate, free margin without dentation, apex triangular, acuminate, acute; innermost bracteole much larger than stem underleaves, oblong, highly conjugated at one side with bract lobule, lateral margins often with 1 or 2 spinose teeth, apex ca. 1/5-bilobed, sinus acute and narrow, lobes spinose. Perianths exerted, obovoid, 1–1.2 mm long, 0.7–1 mm wide, densely plicate, plicae 12–14, irregularly inflated and crooked, mouth short-tubular.

Bhutan. Tongsa, 2200 m (Apr. 17, 1967); Tongsa–Uto La Road, 2200–2950 m (Apr. 17, 1967); Bhotokha–Rinchu, 1450–1500 m (May 8, 1967 – type in NICH 287397).

Distr. var. *rhystocolea*: W. China (Yunnan); var. *parva*: Bhutan.

**Frullania schensiana** Massal.: Fl. E. Himal. 527 (1966).

Bhutan. Tongsa–Uto La Road, 2200–2950 m (Apr. 17, 1967); Tongsa, 2200 m (Apr. 17, 1967); Chabecha–Lingshi, 3800–4100 m (May 22, 1967).

Distr. E. Himalaya (Nepal, Sikkim, Bhutan), China (Shensi et al.), Formosa, Korea, and Japan.

**Frullania yunnanensis** Steph.: Fl. E. Himal. 528 (1966).

Bhutan. Thimphu–Wangdu Phodrang, 1450–3250 m (Apr. 9, 1967); Rukubi–Neylong, 2400–2800 m (Apr. 14, 1967); Neylong–Tashiling, 2300–2400 m (Apr. 15, 1967); Tashiling–Tongsa, 1900–2300 m (Apr. 16, 1967); Tongsa–Uto La Road, 2200–2950 m (Apr. 17, 1967); Tongsa, 2200 m (Apr. 17, 1967); Tongsa–Tashiling, 1900–2300 m (Apr. 19, 1967); Tamji–Gasa, 2200–2800 m (May 13, 1967); Chamsa–Yabu Thang, 3200–3700 m (May 15, 1967); Laya–Laum Thang, 3850–4100 m (May 18, 1967); Chawa Gassar–Seanchu Passa, 3900–4750 m (May 20, 1967); Seanchu Passa–Chabecha, 3800–4400 m (May 21, 1967); Chabecha–Lingshi, 3800–4100 m (May 22, 1967); Lingshi–Shodu, 4000 m (May 23, 1967); Shodu–Barshong, 3700–4000 m (May 24, 1967); Barshong–Nala, 3300–3700 m (May 25, 1967); Nala–Tzatogang, 3200–3400 m, *Abies* forest (May 26, 1967); Tzatogang–Dotanang, 2700–3200 m (May 27, 1967).

Distr. Himalaya, and China (Yunnan).

#### JUBULACEAE (by Masami Mizutani)

**Jubula Hutchinsiae** (Hook.) Dum. subsp. **javanica** (Steph.) Verd.: Fl. E. Himal. 529 (1966).

Bhutan. Rukubi–Neylong, 2400–2800 m (Apr. 14, 1967).

Distr. ?Asia Minor to Caucasus, India, Malaysia, Philippines, New Guinea, Samoa, Formosa, and Japan.

**Cheilelejeunea subopaca** (Mitt.) Mizut.: Fl. E. Himal. 529 (1966).

Bhutan. Gasa–Chamsa, 2800–3750 m (May 14, 1967).

Distr. E. Himalaya (Nepal, Sikkim, Bhutan), and Khasia.

**Lejeunea appendiculata** Mitt.: Fl. E. Himal. 530 (1966).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967).

Distr. E. Himalaya (E. Nepal, Sikkim, Bhutan).

**Lejeunea flava** (Swartz) Nees, Naturgesch. Eur. Leberm. 3: 277 (1838).

Bhutan. Rukubi–Neylong, 2400–2800 m (Apr. 14, 1967).

Distr. E. Himalaya, India, China, Formosa, Japan, Malaysia, N. and S. America, Europe, Africa, Australia, New Zealand, and Pacific Is.

**Lejeunea Mittenii** Mizt.: Fl. E. Himal. 530 (1966).

Bhutan. Neylong–Tashiling, 2300–2400 m (Apr. 15, 1967); Nala–Tzatogang, 3400–3200 m (May 26, 1967).

Distr. E. Himalaya, Bengal, Assam, and Burma.

**Ptychanthus striatus** (Lehm. & Lindenb.) Nees: Fl. E. Himal. 531 (1966).

This species was recorded from Bhutan by Schiffner (1899) as *Ptychanthus Nietneri* (Steph.) Schiffn. which is now considered as a synonym of *Ptychanthus striatus*. This species was found in 11 collections made in 1967 in Bhutan.

**Spruceanthus semirepandus** (Nees) Verd.: Fl. E. Himal. 532 (1966).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967); Neylong–Tashiling, 2300–2400 m (Apr. 15, 1967); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967); Bhotokha–Rinchu, 1450–1500 m (May 8, 1967); Tamji–Gasa, 2200–2800 m (May 13, 1967); Seanchu Passa–Chabecha, 3800–4400 m (May 21, 1967).

Distr. E. Himalaya, Khasia, Ceylon, Malaysia, extending to Borneo and the Philippines, China, Formosa, and Japan.

**Trocholejeunea infuscata** (Mitt.) Verd.: Fl. E. Himal. 533 (1966).



Reported by Schiffner from Bhutan as *Homalolejeunea levieri* Steph. which is now a synonym of the present species. It was found in 3 collections made in 1967.

Distr. E. Himalaya, Khasia, Ceylon, Burma, and S. W. China.

#### METZGERIACEAE (by Yukinobu Kuwahara)

**Metzgeria Kanaii** Kuwahara, sp. nov.

Dioica (rami masculi haud visa); frons dichotoma, 1–2 mm lata, 1.5 cm longa. Alae 16–29 cellulas latae; cellulae alarum mediae 40–65–(75) × 30–53  $\mu$ . Costa tenuis, cellulis corticalibus antice 2, postice (3)–4–(5) seriatis. Gemmae marginales.

Bhutan. Chawa Gassar–Seanchu Passa, 4100 m (May 20, 1967 – type in NICH 287255).

Distr. Endemic.

**Metzgeria macrospora** Kuwahara in Journ. Hattori Bot. Lab. **32**: 17 (1969).

*Metzgeria consanguinea* auct. non Schiffn.: Hatt. in Fl. E. Himal. 534 (1966).

Distr. Endemic in Sikkim.

#### MARCHANTIACEAE (by Tairoku Amakawa)

**Marchantia paleacea** Bertol.: Fl. E. Himal. 535 (1966).

Bhutan. Wangdu Phodrang, 1450–2100 m (Apr. 10, 1967).

Distr. Europe, Himalaya, India to Japan, N. & C. America, and Africa.

**Marchantia palmata** Reinw. et al. in Nova Acta Acad. Caes. Leop. **12**: 193 (1824).

Sikkim. Middle Camp–Papung, 500–800 m (Jun. 28, 1969); Singhik, 1500 m (Jun. 30, 1969).

Distr. India (Himalaya, Punjab, S. India, Assam, Bengal), Ceylon, Java, Philippines, New Guinea, Vietnam, and China (Kwantung).

#### REBOULIACEAE

**Reboulia hemisphaerica** (L.) Raddi, Opus. Sci. Bologna **2**: 357 (1818).

Bhutan. Gasa–Chamsa, 2800–3750 m (May 14, 1967).

Distr. India, Nepal, Java, New Guinea, China, Korea, Japan, Bonins, Siberia, N. and S. America, Europe, Caucasus, Asia minor, Africa, Australia, and New Zealand.

#### CONOCEPHALACEAE

**Conocephalum conicum** (L.) Dum., Com. Bot. 115 (1822).

Bhutan. Rukubi–Neylong, 2400–2800 m (Apr. 14, 1967); Tongsa–Uto La Road, 2200–2950 m (Apr. 17, 1967); Nala–Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Europe, Himalaya, Tibet, China, Korea, Japan, Siberia, Kuriles, N. America, Algeria, Madeira, and Azores.

#### RICCIACEAE

**Riccia fluitans** L.: Fl. E. Himal. 536 (1966).

Bhutan. Samtengang–Ritang, 2000–2800 m (Apr. 11, 1967).

Distr. Cosmopolitan.

MUSCI (compiled by Akira Noguchi)<sup>1)</sup>

SPHAGNACEAE (by Hyoji Suzuki)

**Sphagnum Girgensohnii** Russ.: Fl. E. Himal. 538 (1966).

Bhutan. Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Lingshi-Shodu, 4100-4000 m (May 23, 1967).

Distr. Widely distributed in the Northern Hemisphere.

POLYTRICHACEAE

**Oligotrichum aligerum** Mitt. in Journ. Linn. Soc. **8**: 48 (1864).

Bhutan. Tinlegang, 1950 m (May 4, 1967, c. fr.); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.).

Distr. Bhutan, Formosa, Japan, and N. America (British Columbia, Rocky Mountains, Washington, Oregon).

This species is a new record from the Himalayan region, together with the next species, *O. hercynicum*.

**Oligotrichum hercynicum** (Hedw.) Lam. et Card., Fl. Franc. ed. 2, **2**: 492 (1805).

Bhutan. Laya-Laum Thang, 3850-4100 m (May 18, 1967, c. fr.).

Distr. Europe, Greenland, Bhutan, Japan, and Alaska.

**Pogonatum fastigiatum** Mitt.: Fl. E. Himal. 543 (1966).

Bhutan. Ritang-Ratsoo, 2400-1850 m (Apr. 23, 1967, c. fr.).

Distr. E. Himalaya (Nepal to Bhutan), S. W. China (Yunnan, Szechuan), and Formosa.

**Pogonatum Junghuhnianum** (Doz. et Molk.) Doz. et Molk.: Fl. E. Himal. 543 (1966).

Bhutan. Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967, c. fr.).

Distr. E. Himalaya (Sikkim, Bhutan), Indonesia, Philippines, and Formosa.

**Pogonatum microstomum** (Schwaegr.) Brid.: Fl. E. Himal. 543 (1966).

Bhutan. Tashiling-Tongsa, 1900-2300 m (Apr. 16, 1967).

Distr. Himalaya, S. W. China (Yunnan, Szechuan), Philippines, and Formosa.

**Pogonatum perichaetiale** (Mont.) Jaeg.: Fl. E. Himal. 543 (1966).

Bhutan. Ritang-Rukubi, 3400-2600 m (Apr. 13, 1967); Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967, c. fr.).

Distr. Himalaya, and S. W. China (Yunnan, Szechuan).

**Pogonatum rufisetum** Mitt.: Fl. E. Himal. 544 (1966).

Bhutan. Timphu-Wangdu Phodrang, 1450-3200 m (Apr. 9, 1967).

Distr. E. Himalaya (Sikkim, Bhutan).

**Polytrichum alpinum** Hedw., Spec. Musc. 92 (1801).

1) I was much indebted to the following authorities for the identification of the families or genera of Musci shown in parentheses: Drs. Hyoji Suzuki of Hiroshima University (Sphagnaceae), Zennoske Iwatsuki of the Hattori Botanical Laboratory (*Fissidens*, Plagiotheciaceae), Noriwo Takaki of Nagoya University (Dicranaceae, Brachytheciaceae), Harumi Ochi of Tottori University (Bryaceae, Bartramiaceae), and Hisatsugu Ando of Hiroshima University (*Orontobryum*, *Brotherella*, *Gollania*, *Hypnum*, *Pylaisia*).



Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.); Dochu La, 3200 m (May 30, 1967).

Distr. Almost cosmopolitan.

#### FISSIDENTACEAE (by Zennoske Iwatsuki)

**Fissidens grandifrons** Brid.: Fl. E. Himal. 544 (1966).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967).

Distr. Widely distributed in the Northern Hemisphere.

#### DITRICHACEAE

**Distichium capillaceum** (Hedw.) B. S. G., Bryol. Eur. 2: 156 (1846).

Bhutan. Lingshi-Shodu, 4000-4800 m (May 23, 1967); Shodu-Barshong, 3700-4000 m (May 24, 1967, + *Dicranodontium denudatum* + *Symblepharis helicophylla*); Barshong-Nala, 3700-3300 m (May 25, 1967); Nala-Tzatogang, 3400-32 m (May 26, 1967).

Distr. Almost cosmopolitan.

#### DICRANACEAE (by Noriwo Takaki)

**Campylopus alpigena** var. **lamellatus** Broth.: Fl. E. Himal. 545 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967, c. fr.).

Distr. E. Himalaya, and S. W. China (Yunnan).

**Campylopus nilghiriensis** (Mitt.) Jaeg.: Fl. E. Himal. 546 (1966).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967).

Distr. Bhutan, and E. India.

**Dichodontium pellucidum** (Hedw.) Schimp., Coroll. 12 (1856).

Darjeeling. Sandakphu, 3800-3970 m (July 20, 1969).

Distr. Europe, Caucasus, Pakistan, Sikkim, S. W. China (Yunnan), and N. America.

**Dicranella heteromalla** (Hedw.) Schimp.: Fl. E. Himal. 547 (1966).

Bhutan. Lingshi-Shodu, 4800-4000 m (May 23, 1967).

Distr. Almost cosmopolitan.

**Dicranodontium denudatum** (Brid.) Britt.: Fl. E. Himal. 548 (1966).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967); Chawa Gassar-Seanchu Passa, 4750-3900 m (May 20, 1967); Shodu-Barshong, 3700-4000 m (May 24, 1967, + *Symblepharis helicophylla* + *Distichium capillaceum*).

Distr. Europe, Caucasus, Himalaya, Siberia, Japan, and N. America.

**Dicranum crispifolium** C. Müll.: Fl. E. Himal. 550 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967); Tashiling-Tongsa, 2300-1900 m (Apr. 16, 1967); Tongsa, 2200 m (Apr. 17, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Chawa Gassar-Seanchu Passa, 4200-3900 m (May 20, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. E. Himalaya (Nepal to Bhutan), Bengal, S. India, and S. W. China (Yunnan).

**Dicranum flagellare** Hedw., Spec. Musc. 130 (1801).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967, + *Oreoweisia laxifolia*).

Distr. Europe, Canary Isl., Caucasus, Bhutan, Siberia, Japan, and N. America.

**Dicranum scoparium** Hedw.: Fl. E. Himal. 550 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967).

Distr. Almost cosmopolitan.

**Dicranum setschwanicum** Broth., Symb. Sin. 4: 26 (1929).

Bhutan. Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967, +*Calliergonella schreberi*); Barshong-Nala, 3700-3300 m (May 25, 1967).

Distr. Bhutan, and S. W. China (Szechuan).

**Oncophorus Wahlenbergii** Brit.: Fl. E. Himal. 550 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967, c. fr.); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.).

Distr. Europe, Kashmir, E. Himalaya (Sikkim, Bhutan), S. W. China (Yunnan), and N. E. Asia.

**Oreoweisia laxifolia** (Hook. f.) Kindb.: Fl. E. Himal. 551 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967, c. fr. + *Dicranum flagellare*); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Kashmir, Himalaya, S. India, S. W. China (Yunnan), and Japan.

**Symblepharis helicophylla** Mont.: Fl. E. Himal. 551 (1966).

Bhutan. Laya-Laum Thang, 3850-4100 m (May 18, 1967, c. fr.); Chawa Gassar-Seanchu Passa, 4750-3900 m (May 20, 1967); Shodu-Barshong, 4000-3700 m (May 24, 1967, c. fr. + *Dicranodontium denudatum* + *Distichium capillaceum*); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.).

Distr. Himalaya, Assam, Bengal, S. W. China (Yunnan, Szechuan), Formosa, and Mexico to Panama.

#### POTTIACEAE

**Gymnostomum recurvirostre** Hedw.: Fl. E. Himal. 552 (1966).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967).

Distr. Almost cosmopolitan.

**Leptodontium squarrosus** (Hook.) Par.: Fl. E. Himal. 553 (1966).

Bhutan. Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967, c. fr.); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967, c. fr.).

Distr. Widely distributed in tropics.

**Pseudosymblepharis** cf. **angustata** (Mitt.) Hilp. in Beih. Bot. Centralbl. 50: 670 (1933).

Bhutan. Shodu-Barshong, 3700-4000 m (May 24, 1967).

Distr. Bhutan, Ceylon, Thailand, and Java.

#### GRIMMIACEAE

**Ptychomitrium tortula** (Harv.) Jaeg.: Fl. E. Himal. 553 (1966).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967, c. fr.); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967).

Distr. Himalaya, Nilgiri, and S. W. China (Yunnan, Szechuan).

**Rhacomitrium crispulum** (Hook. f. et Wils.) Dix.: Fl. E. Himal. 554 (1966).

Bhutan. Numerous collections.

Distr. Himalaya, Indonesia, E. Australia, New Zealand, and C. & S. America.



## SPLACHNACEAE

**Tayloria indica** Mitt.: Fl. E. Himal. 555 (1966).

Bhutan. Thimphu–Tinlegang, 3200–1950 m (May 3, 1967, c. fr.); Tzatogang–Dotanang, 3200–2700 m (May 27, 1967, c. fr.); Dotanang–Thimphu, 2700–2450 m (May 28, 1967, c. fr.).

Distr. Himalaya, India, Ceylon, Assam, Burma, Thailand, Philippines, and Japan.

**Tayloria subglabra** (Griff.) Mitt.: Fl. E. Himal. 555 (1966).

Bhutan. Rukubi–Neylong, 2800–2400 m (Apr. 14, 1967, c. fr.); Tongsa–Tashiling, 1900–2300 m (Apr. 19, 1967, c. fr.); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967, c. fr.).

Distr. Himalaya, Assam, Thailand, and S. W. China (Yunnan).

**Tetraplodon mnioides** (Hedw.) B. S. G., Bryol. Eur. **3**: 215 (1844).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967, c. fr.).

Distr. Europe, C. Africa, E. Himalaya (Nepal to Bhutan), S. W. China (Yunnan, Szechuan), New Guinea, Siberia, Japan, and northern part of N. America.

## BRYACEAE (by Harumi Ochi)

**Brachymenium contortum** Hamp. ex Ochi in Journ. Jap. Bot. **43**: 109 (1968).

Bhutan. Tongsa–Uto La, 2200–2700 m (Apr. 17, 1967).

Distr. E. Himalaya (Nepal to Bhutan).

**Brachymenium** cf. **nepalense** Hook.: Fl. E. Himal. 556 (1966).

Bhutan. Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967); Bhotokha–Rinchu, 1450–1500 m (May 8, 1967).

Distr. E. Himalaya (Nepal to Bhutan), India, Burma, Vietnam, Indonesia, China, Philippines, Formosa, and Japan.

**Bryum Billardieri** Schwaegr., Spec. Musc. Suppl. **1** (2): 115 (1816).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967).

Distr. Bhutan, Australia, New Zealand, and southern part of South America.

**Bryum caespiticium** Hedw., Spec. Musc. 180 (1801).

Bhutan. Tongsa–Uto La, 2200–2700 m (Apr. 17, 1967); Gasa–Chamsa, 2800–3750 m (May 14, 1967); Laya–Laum Thang, 3850–4100 m (May 18, 1967); Laum Thang–Chawa Gassar, 4100–5000 m (May 19, 1967).

Distr. Almost cosmopolitan.

**Bryum** cf. **capillare** Hedw.: Fl. E. Himal. 557 (1966).

Bhutan. Laum Thang–Chawa Gassar, 4100–5000 m (May 19, 1967).

Distr. Cosmopolitan.

**Bryum coronatum** Schwaegr., Spec. Musc. Suppl. **1** (2): 103 (1816).

Sikkim. Singhik, 1500 m (Jul. 1969).

Distr. Widely distributed in tropics.

**Bryum filiforme** Dicks.: Fl. E. Himal. 557 (1966).

Bhutan. Nala–Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Widely distributed in the Northern Hemisphere.

**Bryum laxe-limbatum** Hamp. ex Ochi in Journ. Jap. Bot. **43**: 112 (1968).

Sikkim. Damthang–Tendong, 2150–2900 m (Jun. 29, 1969).

Distr. E. Himalaya (Nepal to Bhutan).

**Bryum pseudotriquetrum** (Hedw.) Schwaegr., Spec. Musc. Suppl. **1** (2): 110 (1816).

Bhutan. Lingshi-Shodu, 4000–4800 m (May 23, 1967).

Distr. Widely distributed in the Northern Hemisphere.

**Bryum recurvulum** Mitt.: Fl. E. Himal. 558 (1966).

Bhutan. Lingshi-Shodu, 4000–4800 m (May 23, 1967); Barshong-Nala, 3700–3300 m (May 25, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Himalaya, India, China, Formosa, and Japan.

**Bryum salakense** Card. in Ann. Cons. Jard. Bot. Genève **15–16**: 166 (1912).

Bhutan. Ritang-Ratsoo, 2600–2000 m (Apr. 23, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967).

Distr. Bhutan, Java, and Formosa.

**Pohlia acuminata** Hopp. ex Hornsh.: Fl. E. Himal. 559 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100–5000 m (May 19, 1967); Laya-Laum Thang, 3850–4100 m (May 18, 1967).

Distr. Circumboreal.

**Pohlia elongata** Hedw.: Fl. E. Himal. 559 (1966).

Bhutan. Gasa-Chamsa, 2800–3750 m (May 14, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967, + *Bartramia ithyphylla*).

Distr. Widely distributed in the Northern Hemisphere, and Africa.

**Pohlia** cf. **flexuosa** Hook.: Fl. E. Himal. 559 (1966).

Bhutan. Dochu La, 3200 m (May 30, 1967).

Distr. Himalaya, India, Ceylon, Sumatra, China, Formosa, Japan, Central America, and northwestern part of South America.

**Pohlia longicolla** (Hedw.) Lindb.: Fl. E. Himal. 559 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100–5000 m (May 19, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Circumboreal.

#### MNIACEAE

**Mnium confertidens** (Lindb. et Arn.) Kindb.: Fl. E. Himal. 559 (1966).

Bhutan. Ritang-Ratsoo, 2600–2000 m (Apr. 23, 1967); Barshong-Nala, 3700–3300 m (May 25, 1967).

Distr. E. Himalaya (Nepal, Bhutan), N. E. China, Siberia, N. Korea, and Japan.

**Mnium cuspidatum** Hedw., Spec. Musc. 192 (1801).

Bhutan. Ritang-Rukubi, 3400–2600 m (Apr. 13, 1967, c. fr.).

Distr. Widely distributed in the Northern Hemisphere.

**Mnium heterophyllum** (Hook.) Schwaegr., Spec. Musc. Suppl. **2**: 22 (1826).

Bhutan. Dotanang-Thimphu, 2700–2450 m (May 28, 1967).

Distr. Pakistan, Himalaya, Assam, N. China, and Japan.

**Mnium laevinerve** Card.: Fl. E. Himal. 561 (1966).

Bhutan. Nala-Tzatogang, 3400–300 m (May 26, 1967, c. fr.); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967).

Distr. Himalaya, India, China, Formosa, and Japan.

**Mnium longirostre** Brid.: Fl. E. Himal. 561 (1966).



Bhutan. Ritang-Rukubi, 3400-2600 m (Apr. 13, 1967); Tongsa-Tratang, 2200-2700 m (Apr. 17, 1967); Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967, c. fr.); Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967, c. fr.); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967, c. fr.).

Distr. Cosmopolitan.

**Mnium medium** B. S. G., Bryol. Eur. 4: 196 (1838).

Bhutan. Rukubi-Neylong, 2600-2400 m (Apr. 14, 1967).

Distr. Widely distributed in the Northern Hemisphere.

**Mnium punctatum** Schreb. ex Hedw.: Fl. E. Himal. 562 (1966).

Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Widely distributed in the Northern Hemisphere.

var. **Horikawae** (Nog.) Nog.: Fl. E. Himal. 562 (1966).

Bhutan. Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. var. E. Himalaya (Nepal to Bhutan), and Formosa.

**Mnium striatulum** Mitt.: Fl. E. Himal. 563 (1966).

Bhutan. Chamsa-Yabu Thang, 3700-3400 m (May 15, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. E. Himalaya (Darjeeling, Sikkim, Bhutan), and Japan.

**Mnium** cf. **Thomsonii** Schimp., Syn. ed. 2, 485 (1876).

Bhutan. Rukubi-Neylong, 2800-2400 m (Apr. 14, 1967, c. fr.); Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967, c. fr.).

Distr. Bhutan, Assam, Burma, and S. W. China (Yunnan).

**Orthomnium bryoides** (Griff.) Norkett: Fl. E. Himal. 563 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Tashiling-Tongsa, 2300-1900 m (Apr. 16, 1967).

Distr. Himalaya, Burma, Thailand, Laos, S. W. China (Yunnan, Szechuan), and Philippines.

#### AULACOMNIACEAE

**Aulacomnium turgidum** (Wahlenb.) Schwaegr., Spec. Musc. Suppl. 3 (1): 7 (1827).

Bhutan. Laya-Laum Thang, 3850-4100 m (May 18, 1967).

Distr. Europe, Bhutan, Siberia, Manchuria, Japan, and North America.

#### BARTRAMIACEAE (by Harumi Ochi)

**Bartramia Halleriana** Hedw.: Fl. E. Himal. 565 (1966).

Bhutan. Tzatogang-Dotanang, 3200-2700 m (May 27, 1967).

Distr. Almost cosmopolitan.

**Bartramia ithyphylla** Brid.: Fl. E. Himal. 566 (1966).

Bhutan. Rukubi-Neylong, 2800-2400 m (Apr. 14, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Circumboreal.

**Philonotis falcata** (Hook.) Mitt. in Journ. Linn. Soc. Suppl. 1: 62 (1859).

Bhutan. Tongsa-Uto La, 2200-2700 m (Apr. 17, 1967); Mishichen-Khosa, 1800-1600 m (May 10, 1967).

Distr. E. Himalaya (Nepal, Bhutan), N. India, Tibet, Burma, Vietnam, China, Philippines, Korea, Japan, and Hawaii.

**Philonotis mollis** (Doz. et Molk.) Mitt. in Journ. Linn. Soc. Suppl. **1**: 60 (1859).  
Sikkim. Middle Camp-Papung, 800-500 m (Jul. 1969).

Distr. E. Himalaya (Sikkim, Bhutan), S. India, Andaman Isl., Vietnam, Java, Formosa, and Japan.

**Plagiopus Oederi** (Brid.) Limpr., Laubm. Deutschl. **2**: 548 (1895).

Bhutan. Shozu-Barshong, 4000-3700 m (May 24, 1967).

Distr. Kashmir, N. W. Himalaya, Pakistan, Bhutan, China, Korea, Japan, and North America.

#### TIMMIACEAE

**Timmia megapolitana** Hedw., Spec. Musc. 176 (1801).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967, c. fr.); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967, c. fr.).

Distr. Europe, Siberia, Bhutan, Japan, and North America.

The genus *Timmia* is a new record from the Himalayan region.

#### ORTHOTRICHACEAE

**Macromitrium hymenostomum** Mont. in Ann. Sci. Nat. Bot. ser. **3**, **4**: 120 (1845).

Bhutan. Tamji-Gasa, 2200-2800 m (May 13, 1967); Barshong-Nala, 3700-3300 m (May 25, 1967, + *Diaphanodon blandus* + *Sphaerotherciella sphaerocarpa*); Rukubi-Neylong, 2800-2400 m (Apr. 14, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967, c. fr.).

Distr. China (Yunnan, Szechuan, Kweichow), Formosa, Korea, Japan, and North America.

**Orthotrichum Hookeri** Wils.: Fl. E. Himal. 567 (1966).

Bhutan. Rukubi-Neylong, 2800-2400 m (Apr. 14, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Shodu-Barshong, 4000-3700 m (May 24, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Himalaya, and S. W. China (Yunnan, Szechuan).

**Zygodon viridissimus** (Dicks.) Brid., Bryol. Univ. **1**: 592 (1826).

Patria Singalila. Mt. Singalila, 3950 m (Jul. 17, 1969).

Distr. Europe, Bhutan, Japan, and North America.

#### CRYPHAEACEAE

**Acrocryphaea concavifolia** (Griff.) Bosch et Lac.: Fl. E. Himal. 567 (1966).

Bhutan. Tinlegang, 1950 m (May 4, 1967); Bhotokha-Rinchu, 1450-1500 m (May 8, 1967, c. fr.); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967, c. fr.).

Distr. Himalaya, India, Ceylon, Burma, Indonesia, and Philippines.

**Sphaerotherciella sphaerocarpa** (Hook.) Fleisch.: Fl. E. Himal. 567 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967, c. fr., + *Papillaria fuscescens*); Tongsa, 2200 m (Apr. 17, 1967, c. fr.); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967, c. fr.); Barshong-Nala, 3700-3300 m (May 25, 1967, c. fr., + *Macromitrium*



*hymenostomum* + *Diaphanodon blandus*); Nala-Tzatogang, 3400–3200 m (May 26, 1967).

Distr. E. Himalaya (Nepal to Bhutan), and S. W. China (Yunnan, Szechuan).

#### LEUCODONTACEAE

**Leucodon sinensis** Thér. in Bull. Acad. Int. Geogr. Bot. **18**: 252 (1908).

Bhutan. Rukubi-Neylong, 2800–2400 m (Apr. 14, 1967); Neylong-Tashiling, 2400–2300 m (Apr. 15, 1967); Gasa-Chamsa, 2800–3750 m (May 14, 1967).

Distr. Bhutan, and S. W. China (Kweichow, Yunnan).

#### TRACHYPODACEAE

**Diaphanodon blandus** (Harv.) Ren. et Card.: Fl. E. Himal. 567 (1966).

Bhutan. Ritang-Rukubi, 2600–3400 m (Apr. 13, 1967); Ritang-Ratsoo, 2600–2000 m (Apr. 23, 1967); Chamsa-Yabu Thang, 3700–3200 m (May 15, 1967); Barshong-Nala, 3700–3300 m (May 25, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967, + *Leptohymenium tenue* + *Macrothamnium macrocarpum*).

Distr. Himalaya, India, Ceylon, Burma, S. W. China (Yunnan), Indonesia, and Formosa.

**Trachypodopsis serrulata** var. **crispatula** (Hook.) Zant.: Fl. E. Himal. 568 (1966).

Bhutan. Ritang-Rukubi, 3400–2600 m (Apr. 13, 1967, + *Meteorium helminthocladum*); Neylong-Tashiling, 2400–2300 m (Apr. 15, 1967); Tashiling-Tongsa Bridge, 2300–1900 m (Apr. 16, 1967); Tashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967); Ritang-Ratsoo, 2600–2000 m (Apr. 23, 1967); Chamsa-Yabu Thang, 3700–3200 m (May 15, 1967); Chawa-Seanchu Passa, 4750–3900 m (May 20, 1967); Tzatogang-Dotanang, 3700–2700 m (May 27, 1967); Dotanang-Thimphu, 2700–2450 m (May 28, 1967, + *Leptohymenium tenue*).

Distr. Tropical Asia, Halmahera, Mexico, and Guatemala.

var. **Guibertii** (Thér. et P. de la Vard.) Zant.: Fl. E. Himal. 569 (1966).

Bhutan. Dotanang-Thimphu, 2700–2450 m (May 28, 1967).

Distr. var. E. Himalaya, and Cambodia.

#### PTEROBRYACEAE

**Calypothecium Hookeri** (Mitt.) Broth.: Fl. E. Himal. 569 (1966).

Bhutan. Chimakhothi-Thimphu, 2200–2450 m (Apr. 5, 1967); Thashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967, + *Aerobryum speciosum* + *Neckera crenulata* + *Floribundaria sparsa*).

Distr. E. Himalaya, Khasia, Burma, Formosa, and Japan.

**Meteoriella soluta** (Mitt.) Okam. in Journ. Coll. Sci. Univ. Tokyo **36** (7): 18 (1915).

Bhutan. Neylong-Tashiling, 2400–2300 m (Apr. 15, 1967).

Distr. E. Himalaya (Sikkim, Bhutan), S. W. China (Yunnan, Hunan), Formosa, and Japan.

**Penzigiella cordata** (Harv. ex Hook.) Fleisch.: Fl. E. Himal. 570 (1966).

Bhutan. Chimakhothi-Thimphu, 2450–2250 m (Apr. 5, 1967).

Distr. Himalaya, Burma, and Thailand.

## METEORIACEAE

**Aerobryidium filamentosum** (Hook.) Fleisch.: Fl. E. Himal. 570 (1966).

Bhutan. Ritang–Pele La, 2600–3400 m (Apr. 13, 1967); Neylong–Tashiling, 2400–2300 m (Apr. 15, 1967); Tashiling–Neylong–Charikhachor, 2300–2250 m (Apr. 20, 1967); Nala–Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Himalaya, India, and S. W. China (Yunnan, Szechuan).

**Aerobryum speciosum** (Doz. et Molk.) Doz. et Molk.: Fl. E. Himal. 570 (1966).

Bhutan. Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967, + *Calyptothecium Hookeri* + *Neckera crenulata* + *Floribundaria sparsa*).

Distr. Tropical Asia, and Japan.

**Chrysocladium flammeum** (Mitt.) Fleisch.: Fl. E. Himal. 572 (1966).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967); Chabecha–Lingshi, 3800–4100 m (May 22, 1967); Lingshi–Shodu, 4800–4000 m (May 23, 1967).

Distr. Himalaya.

**Floribundaria floribunda** (Doz. et Molk.) Fleisch.: Fl. E. Himal. 572 (1966).

Bhutan. Rukubi–Neylong, 2800–2400 m (Apr. 14, 1967); Ritang–Ratsoo, 2600–2000 m (Apr. 23, 1967, + *Leptohymenium tenue*).

Distr. Africa, Asia, Oceania, and Australia.

**Floribundaria sparsa** (Mitt.) Broth.: Fl. E. Himal. 572 (1966).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967); Neylong–Tashiling, 2400–2300 m (Apr. 15, 1967); Tashiling–Tongsa, 2300–1900 m (Apr. 16, 1967); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967); Gasa–Chamsa, 2800–3750 m (May 14, 1967).

Distr. Himalaya, India, and Formosa.

var. **pilifera** (Nog.) Nog.: Fl. E. Himal. 573 (1966).

Bhutan. Ritang–Rukubi, 3400–2600 m (Apr. 13, 1967); Tongsa–Tratang, 2200 m (Apr. 17, 1967); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967); Yabu Thang–Laya, 3400–3850 m (May 16, 1967); Tzatogang–Dotanang, 2800 m (May 27, 1967).

Distr. of variety. Himalaya, and India.

**Meteoriopsis reclinata** (C. Müll.) Fleisch.: Fl. E. Himal. 573 (1966).

Bhutan. Chimakhothi–Timphe, 2200–2450 m (Apr. 5, 1967); Neylong–Tashiling, 2400–2300 m (Apr. 15, 1967); Tongsa–Uto La, 2200–2700 m (Apr. 17, 1967); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967); Chawa Gassar–Seanchu Passa, 4750–3900 m (May 20, 1967); Tzatogang–Dotanang, 3200–2700 m (May 27, 1967).

Distr. Tropical Asia, and Japan.

**Meteoriopsis squarrosa** (Hook.) Fleisch.: Fl. E. Himal. 573 (1966).

Bhutan. Chimakhothi–Thimphe, 2450–2200 m (Apr. 5, 1967); Chabecha–Lingshi, 3800–4100 m (May 22, 1967).

Distr. Tropical Asia, including Yunnan, and Formosa.

**Meteorium Buchanani** (Brid.) Broth.: Fl. E. Himal. 573 (1966).

Bhutan. Bhotokha–Rinchi, 1450–1500 m (May 8, 1967).

Distr. Himalaya, India, and S. W. China (Yunnan).

**Meteorium helminthocladum** (C. Müll.) Fleisch.: Fl. E. Himal. 573 (1966).

Bhutan. Ritang–Rukubi, 3400–2600 m (Apr. 13, 1967, + *Trachypodopsis serrulata* var. *crispatula*); Rukubi–Neylong, 2800–2400 m (Apr. 14, 1967); Neylong–Tashiling, 2400–



2300 m (Apr. 15, 1967); Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967); Tinlegang, 1950 m (May 4, 1967); Tamji-Gasa, 2200-2800 m (May 13, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Yabu Thang-Laya, 3400-3850 m (May 16, 1967); Chabecha-Lingshi, 3800-4100 m (May 22, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967).

Distr. Tropical Asia, including Yunnan, and Japan.

**Papillaria chrysoclada** (C. Müll.) Jaeg. in Ber. S. Gall. Naturw. Ges. **1875-76**: 270 (1877).

E. Nepal. Phulchauki, Kathmandu, 2800 m (May 1969).

Distr. E. Himalaya (Nepal, Sikkim), and Ceylon.

**Papillaria Feae** C. Müll. ex Fleisch., Musci Fl. Buitenzorg **3**: 761 (1908).

Bhutan. Timphu-Wangdu Phodrang, 3200-1450 m (Apr. 9, 1967); Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Gasa-Chamsa, 2800-3750 m (May 14, 1967); Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967); Tashiling-Tongsa, 2300-1900 m (Apr. 16, 1967); Yabu Thang-Laya, 3400-3850 m (May 16, 1967); Chawa Gassar-Seanchu Passa, 4750-3900 m (May 20, 1967).

Distr. E. Himalaya (Sikkim, Bhutan), Ceylon, and Burma.

**Papillaria fuscescens** (Hook.) Jaeg.: Fl. E. Himal. 574 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967, + *Sphaerotheciella sphaerocarpa*); Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967).

Distr. Himalaya, Assam, Nilgiri, Ceylon, Indo-China, S. W. China (Yunnan), Borneo, and Celebes.

**Papillaria semitorta** (C. Müll.) Jaeg.: Fl. E. Himal. 574 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967); Chawa Gassar-Seanchu Passa, 4750-3900 m (May 20, 1967).

Distr. E. Himalaya, Ceylon, Vietnam, Indonesia, S. W. China (Yunnan), Philippines, and Formosa.

**Pseudobarbella nitakayamensis** Nog. in Journ. Hattori Bot. Lab. **3**: 90 (1948).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967); Tongsa-Tashiling, 2300-1900 m (Apr. 19, 1967); Chamsa-Yabu Thang, 3700-3200 m (May 15, 1967); Chawa Gassar-Seanchu Passa, 4750-3900 m (May 20, 1967); Seanchu Passa-Chabecha, 4400-3800 m (May 21, 1967); Barshong-Nala, 3700-3300 m (May 25, 1967); Nala-Tzatogang, 3400-3200 m (May, 26, 1967).

Distr. E. Himalaya (Bhutan), and Formosa.

#### NECKERACEAE

**Homaliodendron flabellatum** (Sm.) Fleisch. in Hedwigia **45**: 74 (1906).

Sikkim. Damthang-Tendong, 2200-2900 m (Jun. 29, 1969).

Bhutan. Chimakhothi-Thimphu, 2450-2200 m (Apr. 5, 1967, c. fr.); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967).

Distr. Widely distributed in tropical Asia, Queensland, and New Caledonia.

**Homaliodendron Montagneanum** (C. Müll.) Fleisch.: Fl. E. Himal. 576 (1966).

Bhutan. Chamsa–Yabu Thang, 3700–3200 m (May 15, 1967); Tzatogang–Dotanang, 2800 m (May 27, 1967).

Distr. Himalaya, Assam, Indonesia, and S. W. China (Yunnan, Szechuan).

**Homaliodendron sphaerocarpum** Nog.: Fl. E. Himal. 576 (1966).

Bhutan. Tashiling–Charikhachor, 2400–2450 m (Apr. 20, 1967).

Distr. E. Himalaya (Darjeeling, Bhutan), and Thailand.

**Neckera crenulata** Harv.: Fl. E. Himal. 576 (1966).

Bhutan. Tashiling–Charkhachor, 2300–2450 m (Apr. 20, 1967, + *Aerobryum speciosum* + *Calyptothecium Hookeri* + *Floribundaria sparsa*); Chawa Gassar–Seanchu Passa, 4750–3900 m (May 20, 1967); Tzatogang–Dotanang, 3000 m (May 27, 1967, c. fr.).

Distr. E. Himalaya (Nepal to Bhutan), Burma, S. W. China (Yunnan), Philippines, and Formosa.

**Neckera himalayana** Mitt.: Fl. E. Himal. 577 (1966).

Bhutan. Rukubi–Neylong, 2800–2400 m (Apr. 14, 1967).

Distr. E. Himalaya, Assam, Ceylon, Burma, and Thailand.

**Neckera bhutanensis** Noguchi, sp. nov.

[Fig. 26]

Caulis primarius elongatus, repens. Caules secundarii ascendentes ad 6 cm longi sicco recurvati, dense et complanate foliosi, cum foliis ca 4 mm lati, laxe pinnatim ramosi; pseudoparaphyllia lanceolata vel filiformia; ramis complanato-erecto-

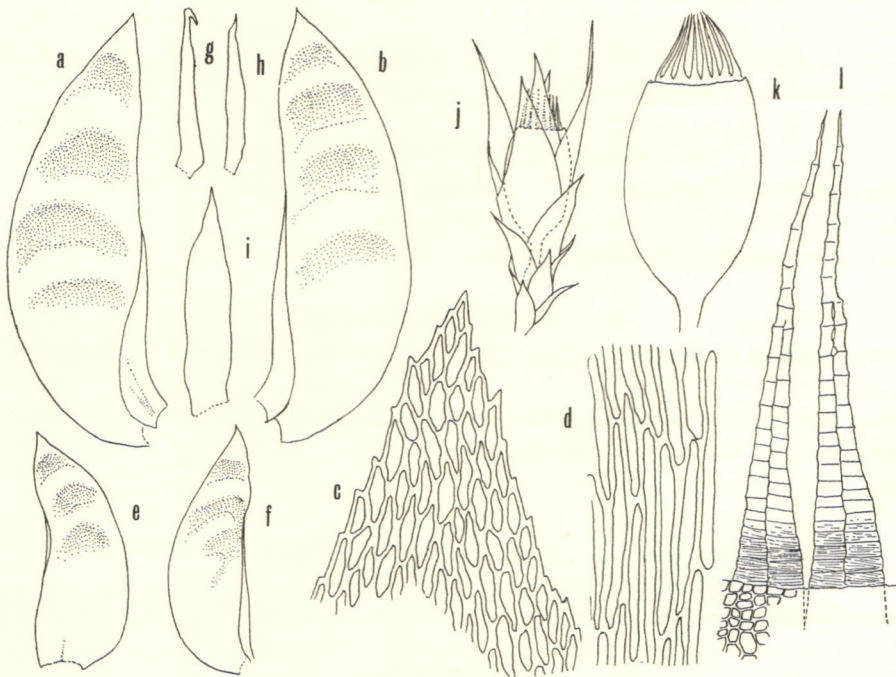


Fig. 26. *Neckera bhutanensis* Noguchi. a, b. Stem leaves,  $\times 20$ . c. Apical part of leaf,  $\times 250$ . d. Cells from middle of leaf,  $\times 385$ . e, f. Branch leaves,  $\times 20$ . g–i. Pseudoparaphyllia,  $\times 40$ . j. Sporophyte,  $\times 10$ . k. Deoperculate capsule,  $\times 20$ . l. Peristome,  $\times 135$ .



patentibus, simplicibus, ad 15 mm longis, obtusis. Folia caulina anguste ovato-oblonga vel lingulata, acuta,  $\pm$ arcuata,  $2.5-2.8 \times 0.8-0.9$  mm; marginibus planis, superne serrulatis; costa brevior, simplici vel divisa, sed obsoleta; cellulis medianis, linearibus,  $45-70 \times 4.5-6.5 \mu$ , parietibus potius tenuibus, parum incrassatis, haud porosis, superioribus brevioribus, basilaribus  $\pm$ laxioribus, alaribus non divisis, linearibus. Folia ramea foliis caulinis similia sed multo minora. Dioica? Perichaetia in caulibus secundariis obsita, saepe gemina; bracteae perichaetii internae majores, oblongae, in acumen lanceolato-subulatum attenuatae, ad 3.5 mm longae; paraphysibus paucis. Theca in pedicello brevissimo immersa, oblonga, ca  $1.5 \times 0.8$  mm, lutescenti-fusca. Peristomium simplex videtur; exostomii dentes lanceolato-subulati, pellucidi, laeves, inferne indistincte striolati, ad 0.45 mm longi. Sporae globosae vel ovatae,  $17-22 \mu$  in diam., fuscae.

Bhutan. Chimakhothi-Thimphu, 2150-2250 m (Apr. 5, 1967 - type in NICH + *Isotheciopsis comes*); Tzatogang-Dotanang, 2800 m (May 27, 1967).

The present species is allied to *N. setschwanica* Broth. from Szechuan, China, but is distinguished by its serrulate and complanate leaf-margins, and shorter costa.

#### LEMBOPHYLLACEAE

***Isotheciopsis comes*** (Griff.) Nog. in Bryologist **73**: 134 (1970).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967, + *Leptohyemium tenue* + *Floribundaria floribunda*); Chimakhothi-Thimphu, 2450-2200 m (Apr. 5, 1967, + *Neckera bhutanensis*).

Distr. E. Himalaya (Sikkim, Bhutan), Khasia, India, Ceylon, Sumatra, Java, China (Yunnan), Philippines, Formosa, and Japan.

#### HOOKERIAACEAE (by Hisatsugu Ando)

***Orontobryum Hookeri*** (Mitt.) Fleisch.: Fl. E. Himal. 577 (1966).

Bhutan. Dochu La, 3050 m (May 30, 1967, c. fr.).

Distr. E. Himalaya (Sikkim, Bhutan).

#### SYMPHYODONTACEAE

***Symphyodon erinaceus*** (Mitt.) Jaeg. in Ber. S. Gall. Naturw. Ges. **1876-77**: 296 (1878).

Sikkim. Damthang-Tendong, 2150-2900 m (Jun. 29, 1969).

Distr. Sikkim, Khasia, and Thailand.

#### LESKEACEAE

***Okamuraea hakoniensis*** (Mitt.) Broth., Nat. Pfl. **1** (3): 1133 (1908).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967).

Distr. Bhutan, Formosa, and Japan.

#### THUIDIACEAE

***Abietinella abietina*** (Hedw.) Fleisch., Musci Fl. Buitenzorg **4**: 1497 (1923).

Darjeeling. Sandakphu-Phalut, 3970-3930 m (Jul. 1969).

Bhutan. Lingshi-Shodu, 4000-4800 m (May 23, 1967).

Distr. Europe, Caucasus, Gilgit, Kashmir, Sikkim, Bhutan, C. Asia, Siberia,

Amur, Manchuria, Japan, and northern part of North America.

The genus *Abietinella* is a new record from Himalaya.

**Actinothuidium Hookeri** (Mitt.) Broth.: Fl. E. Himal. 578 (1966).

Bhutan. Laya-Laum Thang, 3850–4100 m (May 18, 1967); Chawa Gassar-Seanchu Passa, 4750–3900 m (May 20, 1967); Shodu-Barshong, 4000–3700 m (May 24, 1967); Barshong-Nala, 3700–3300 m (May 25, 1967, + *Macrothamnium submacrocarpum*); Nala-Tzatogang, 3400–3200 m (May 26, 1967).

Distr. E. Himalaya, Assam, Burma, S. W. China (Yunnan), and Formosa.

**Anomodon acutifolius** Mitt. in Journ. Linn. Soc. Suppl. 1: 126 (1859).

C. Nepal. Foot of Gosainkund, 2100–2200 m (Jun. 5, 1969); Dhunche-Thare, 2100–2200 m (Jun. 5, 1969).

Bhutan. Tamji-Gasa, 2200–2800 m (May 13, 1967).

Distr. Himalaya, and Japan.

**Anomodon minor** subsp. **integerrimus** (Mitt.) Iwats.: Fl. E. Himal. 578 (1966).

Bhutan. Tashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967).

Distr. Himalaya, Burma, China, Korea, Japan, and E. Siberia.

**Haplocladium angustifolium** (Hamp. ex C. Müll.) Broth., Nat. Pfl. 1 (3): 1008 (1907).

Nepal. Dhunche-Thare, 2100–2200 m (Jun. 5, 1969).

Bhutan. Tashiling, 2100 m (Apr. 1967); Bhotokha-Rinchu, 1450–1500 m (May 8, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967).

Distr. Europe, Africa, Himalaya, Assam, Burma, China, Korea, Japan, and Mexico.

**Thuidium brachymerium** Herz.: Fl. E. Himal. 579 (1966).

Bhutan. Seanchu Passa-Chabecha, 3900–4400 m (May 21, 1967); Tzatogang-Dotanang, 2800 m (May 27, 1967, + *Thuidium cymbifolium*).

Distr. E. Himalaya (Nepal, Bhutan), and S. W. China (Yunnan).

**Thuidium cymbifolium** (Doz. et Molk.) Doz. et Molk.: Fl. E. Himal. 579 (1966).

Bhutan. Numerous collections.

Distr. Tropical and subtropical Asia, including Bhutan.

**Thuidium glaucinum** (Mitt.) Bosch et Lac.: Fl. E. Himal. 579 (1966).

Bhutan. Tashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967, + *Macrothamnium submacrocarpum*); Thimphu-Tinlegang, 2450–1950 m (May 3, 1967).

Distr. Tropical and subtropical Asia, including Bhutan.

**Thuidium Tamarisciellum** (C. Müll.) Bosch et Lac.: Fl. E. Himal. 579 (1966).

Bhutan. Rinchu-Mishichen, 1500–1600 m (May 9, 1967, c. fr.).

Distr. Himalaya, tropical Asia, and S. W. China (Yunnan).

#### AMBLYSTEGIACEAE

**Cratoneuron commutatum** (Hedw.) Roth in Hedwigia 38, Beibl. 1: 6 (1899).

Bhutan. Tongsa-Tratang, 2200 m (Apr. 17, 1967).

Distr. Europe, W. & C. Asia, Kamchatka, Japan, and N. America.



The genus *Cratoneuron* is a new record from the Himalayan region.

**Cratoneuron filicinum** (Hedw.) Spruc., Cat. Musc. Amaz. And. 21 (1867).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967, c. fr., + *Eurhynchium riparioides*); Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967); Lingshi-Shodu, 3900-4800 m (May 23, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.).

Distr. Widely distributed in the Northern Hemisphere, and New Zealand.

**Drepanocladus uncinatus** (Hedw.) Warnst. in Beih. Bot. Centralbl. **13**: 402 (1903).

Bhutan. Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967).

Distr. Almost cosmopolitan.

#### BRACHYTHECIACEAE (by Noriwo Takaki)

**Brachythecium Buchanani** (Hook.) Jaeg.: Fl. E. Himal. 579 (1966).

Bhutan. Barshong-Nala, 3700-3300 m (May 25, 1967, c. fr.).

Distr. Himalaya, Assam, S. India, Burma, Indo-China, Philippines, China, Korea, and Japan.

**Brachythecium plumosum** (Hedw.) B. S. G.: Fl. E. Himl. 579 (1966).

Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967, c. fr.).

Distr. Widely distributed in the Northern Hemisphere, and New Zealand.

**Brachythecium populeum** (Hedw.) B. S. G.: Fl. E. Himal. 580 (1966).

Bhutan. Tashiling, 2300 m (Apr. 16, 1967, c. fr.).

Distr. Widely distributed in the Northern Hemisphere.

**Eurhynchium riparioides** (Hedw.) Richards: Fl. E. Himal. 580 (1966).

Bhutan. Laum Thang-Chawa Gassar, 4100-5000 m (May 19, 1967).

Distr. Widely distributed in the Northern Hemisphere.

#### ENTODONTACEAE

**Entodon laetus** (Griff.) Jaeg.: Fl. E. Himal. 583 (1966).

Bhutan. Neylong-Tashiling, 2400-2300 m (Apr. 15, 1967).

Distr. E. Himalaya, and Assam.

**Entodon plicatus** C. Müll.: Fl. E. Himal. 584 (1966).

Bhutan. Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967, c. fr.); Tzatogang-Dotanang, 3200-2700 m (May 27, 1967, c. fr.).

Distr. E. Himalaya, Assam, India, Ceylon, Burma, Thailand, China (Hunan), Celebes, and Philippines.

**Entodon prorepens** (Mitt.) Jaeg.: Fl. E. Himal. 586 (1966).

Bhutan. Tongsa, 2200 m (Apr. 17, 1967, c. fr.); Dotanang-Thimphu, 2700-2450 m (May 28, 1967, c. fr.).

Distr. Himalaya, India, Burma, and S. W. China (Yunnan).

**Entodon rubicundus** (Mitt.) Jaeg.: Fl. E. Himal. 586 (1966).

Bhutan. Tongsa-Tashiling, 1900-2300 m (Apr. 19, 1967); Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967, + *Leptohyemium tenue* + *Trachypodopsis serrulata* var. *crispatula*); Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967); Timphu-Tinlegang, 3200-1950 m (May 3, 1967); Laya-Laum Thang, 3850-4100 m (May 18, 1967).

Distr. E. Himalaya, Assam, S. India, Andaman Isl., Vietnam, China, Philippines, Formosa, Japan, and Soviet Far East.

**Erythrodonium julaceum** (Schwaegr.) Par.: Fl. E. Himal. 587 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967).

Distr. E. Himalaya (Bhutan), and tropical Asia.

**Rozea pterogonioides** (Hook.) Jaeg.: Fl. E. Himal. 588 (1966).

Bhutan. Ritang-Ratsoo, 2600-2000 m (Apr. 23, 1967); Barshong-Nala, 3700-3300 m (May 25, 1967, c. fr.); Nala-Tzatogang, 3400-3200 m (May 26, 1967, c. fr.).

Distr. E. Himalaya, India, Burma, Cambodia, and S. W. China (Yunnan).

#### PLAGIOTHECIACEAE (by Zenoske Iwatsuki)

**Isopterygiopsis Muelleriana** (Schimp.) Iwats. in Journ. Hattori Bot. Lab. **33**: 379 (1970).

Bhutan. Shodu-Barshong, 4000-3700 m (May 24, 1967); Nala-Tzatogang, 3400-3200 (May 26, 1967).

Distr. Europe, E. Himalaya (Darjeeling, Bhutan), S. W. China (Szechuan), Japan, and Soviet Far East.

**Isopterygium bancanum** (Lac.) Jaeg. in Ber. S. Gall. Naturw. Ges. **1876-77**: 442 (1878).

Bhutan. Gasa-Chamsa, 2800-3750 m (May 14, 1967, + *Thuidium cymbifolium*).

Distr. Bhutan, Banka, Vietnam, Java, and Philippines.

**Plagiothecium cavifolium** (Brid.) Iwats. in Journ. Hattori Bot. Lab. **33**: 360 (1970).

Bhutan. Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. Europe, Himalaya, Korea, Japan, Soviet Far East, and North America.

**Plagiothecium neckeroideum** B. S. G.: Fl. E. Himal. 589 (1966).

Bhutan. Lingshi-Shodu, 4000-4800 m (May 23, 1967).

Distr. Europe, E. Himalaya, Java, New Guinea, Philippines, Formosa, and Japan.

var. **sikkimense** Ren. et Card. in Bull. Soc. Bot. Belg. **41** (1): 108 (1905).

Darjeeling. Mt. Singalila, 3950 m (Jul. 17, 1969).

Bhutan. Shodu-Barshong, 4000-3700 m (May 24, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. var. E. Himalaya (Sikkim, Bhutan).

#### SEMATOPHYLLACEAE

**Acanthocladium tanytrichum** (Mont.) Broth.: Fl. E. Himal. 589 (1966).

Bhutan. Tashiling-Charikhachor, 2300-2450 m (Apr. 20, 1967); Nala-Tzatogang, 3400-3200 m (May 26, 1967).

Distr. E. Himalaya, Sumatra, and Java.

**Aptychella planula** (Mitt.) Fleisch.: Fl. E. Himal. 589 (1966).

Bhutan. Ritang-Rukubi, 2600-3400 m (Apr. 13, 1967); Seanchu Passa-Chabecha, 4400-3800 m (May 21, 1967).

Distr. E. Himalaya.

**Struckia argentata** (Mitt.) C. Müll.: Fl. E. Himal. 589 (1966).



Bhutan. Laum Thang–Chawa Gassar, 4100–5000 m (May 19, 1967, + *Rhacomitrium crispulum*); Nala–Tzatogang, 3400–3200 m (May 26, 1967).

Distr. Himalaya, and S. W. China (Yunnan).

HYPNACEAE (by Hisatsugu Ando and Akira Noguchi)

**Brotherella** cf. **perpinnata** (Broth.) Fleisch., Nov. Guinea **12** (2): 120 (1914).

Bhutan. Barshong–Nala, 3700–3300 m (May 25, 1967); Nala–Tzatogang, 3400–3200 m (May 26, 1967, c. fr.).

Distr. Himalaya.

**Brotherella propinqua** (Harv.) Fleisch., Musci Fl. Buitenz. **4**: 1245 (1923).

Bhutan. Ritang–Rukubi, 3400–2600 m (Apr. 13, 1967); Tashiling–Charikhachor, 2300–2450 m (Apr. 20, 1967).

Distr. E. Himalaya.

**Calliergonella cuspidata** (Hedw.) Loesk.: Fl. E. Himal. 590 (1966).

Bhutan. Tongsa–Tratang, 2200–2700 m (Apr. 17, 1967); Barshong–Nala, 3700–3300 m (May 25, 1967).

Distr. Cosmopolitan.

**Calliergonella Schreberi** (Brid.) Grout: Fl. E. Himal. 590 (1966).

Bhutan. Chamsa–Yabu Thang, 3700–3200 m (May 15, 1967); Laum Thang–Chawa Gassar, 4100–5000 m (May 19, 1967, + *Dicranum setschwanicum*); Lingshi–Shodu, 4000–4800 m (May 23, 1967); Nala–Tzatogang, 3400–3200 m (May 26, 1967, + *Leptocliadiella psilura*, + *Actinotuidium Hookeri*, + *Pohlia elongata*, + *Dicranodontium denudatum*).

Distr. Cosmopolitan.

**Gollania clarescens** (Mitt.) Broth., Nat. Pfl. **1** (3): 1055 (1908).

Bhutan. Nala–Tzatogang, 3400–3200 m (May 26, 1967); Dotanang–Thimphu, 2700–2450 m (May 28, 1967, c. fr.).

Distr. Himalaya.

**Gollania cylindricarpa** Broth., Nat. Pfl. **1** (3): 1055 (1908).

Bhutan. Chawa Gassar–Seanchu Passa, 4700–3900 m (May 20, 1967, c. fr.).

Distr. Bhutan.

**Hypnum crista-castrensis** Hedw., Spec. Musc. 287 (1801).

Bhutan. Chamsa–Yabu Thang, 3700–3200 m (May 15, 1967).

Distr. Widely distributed in the Northern Hemisphere.

**Hypnum flaccens** Besch., Ann. Sci. Nat. Bot. ser 7, **15**: 92 (1892).

Sikkim. Mt. Singalila, 3950 m (Jul. 17, 1969).

Bhutan. Dochu La, 3050 m (Apr. 9, 1967); Rukubi–Neylong, 2800–2400 m (Apr. 14, 1967); Neylong–Tashiling 2400–2300 m (Apr. 15, 1967); Tashiling–Tongsa, 2300–1900 m (Apr. 16, 1967); Laya–Laum Thang, 3850–4100 m (May 18, 1967); Laum Thang–Chawa Gassar, 4100–5000 m (May 19, 1967); Seanchu Passa–Chabecha, 3900–3800 m (May 21, 1967); Barshong–Nala, 3700–3300 m (May 25, 1967); Tzatogang–Dotanang, 3200–2700 m (May 27, 1967).

Distr. E. Himalaya, and S. W. China (Yunnan).

This species is a new record from the Himalayan region.

**Hypnum sikkimense** Ando in Journ. Jap. Bot. **43**: 171 (1968).

Bhutan. Ritang–Rukubi, 2600–3400 m (Apr. 13, 1967).

Distr. E. Himalaya (Sikkim, Bhutan).

**Hypnum subimponens** subsp. **ulophyllum** (C. Müll.) Ando in Bot. Mag. Tokyo **79**: 766 (1966).

Bhutan. Nala-Tzatogang, 3400–3200 m (May 26, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967, c. fr.).

Distr. Bhutan, Assam, and China (Shensi).

**Hypnum submolluscum** Besch. in Ann. Sci. Nat. Bot. ser. 7, **15**: 93 (1892).

Bhutan. Barshong-Nala, 3700–3300 m (May 25, 1967, c. fr.); Nala-Tzatogang, 3400–3200 m (May 26, 1967, c. fr., + *Calliergonella cuspidata*).

Distr. Bhutan, and S. W. China (Yunnan, Szechuan).

**Leptocliadiella psilura** (Mitt.) Fleisch., Musci Fl. Buitenz. **4**: 1205 (1923).

Bhutan. Barshong-Nala, 3700–3300 m (May 25, 1967); Nala-Tzatogang, 3400–3200 m (May 26, 1967, + *Pohlia elongata* + *Dicranodontium denudatum* + *Calliergonella Schreberi*); Tzatogang-Dotanang, 3000 m (May 27, 1967, + *Macrothamnium submacrocarpum*).

Distr. E. Himalaya, and S. W. China (Yunnan).

**Leptohymenium tenue** (Hook.) Schwaegr.: Fl. E. Himal. 590 (1966).

Bhutan. Tashiling-Tongsa, 2300–1900 m (Apr. 16, 1967); Tongsa-Uto La, 2200–2700 m (Apr. 17, 1967, c. fr., + *Thuidium cymbifolium*); Tashiling-Charikhachor, 2300–2450 m (Apr. 20, 1967, c. fr., + *Meteoriopsis reclinata* + *Trachypodopsis serrulata* var. *crispatula* + *Entodon rubicundus* + *Papillaria fuscescens*); Ritang-Ratsoo, 2600–2000 m (Apr. 23, 1967, c. fr., + *Isotheciopsis comes* + *Floribundaria floribunda*); Thimphu-Tinlegang, 3250–1950 m (May 3, 1967); Tzatogang-Dotanang, 2800 m (May 27, 1967, c. fr., + *Diaphanodon blandus*); Dotanang-Thimphu, 2450 m (May 28, 1967, + *Trachypodopsis serrulata* var. *crispatula*).

Distr. E. Himalaya, Burma, and S. W. China (Yunnan).

**Macrothamnium macrocarpum** (Reinw. et Hornsch.) Fleisch.: Fl. E. Himal. 590 (1966).

Bhutan. Chamsa-Yabu Thang, 3700–3200 m (May 15, 1967); Tzatogang-Dotanang, 3200–2700 m (May 27, 1967, + *Diaphanodon blandus*).

Distr. Himalaya, Assam, India, Ceylon, Burma, Indo-China, Java, Philippines, Formosa, and Japan.

**Macrothamnium submacrocarpum** (Ren. et Card.) Fleisch.: Fl. E. Himal. 590 (1966).

Bhutan. Numerous collections.

Distr. Himalaya, Burma, and Thailand.

**Neodolichomitra robusta** (Broth.) Nog. in Bryologist **69**: 232 (1966).

Bhutan. Nala-Tzatogang, 3400–3200 m (May 26, 1967, + *Thuidium cymbifolium*).

Distr. Bhutan, China (Hunan), and Formosa.

**Pylaisia falcata** B. S. G., Bryol. Eur. **5**: 89 (1851).

Bhutan. Shodu-Barshong, 4000–3700 m (May 24, 1967, c. fr.); Barshong-Nala, 3700–3300 m (May 25, 1967, c. fr.).

Distr. Bhutan, and Central America.

This species is a new record from Asia.

**Rhytidiadelphus triquetrus** (Hedw.) Warnst., Krypt. Fl. Brandenburg **920**: 996 (1906).

Bhutan. Chamsa-Yabu Thang, 3700–3200 m (May 15, 1967); Barshong-Nala, 3700–3300 m (May 25, 1967).

Distr. Widely distributed in the Northern Hemisphere.



**Rhytidium rugosum** (Hedw.) Kindb. in Bih. K. Svensk. Vet. Ak. Handl. 7 (9): 15 (1883).

Bhutan. Chamsa-Yabu Thang, 3700-3400 m (May 15, 1967); Laya-Laum Thang, 3850-4100 m (May 18, 1967); Chabecha-Lingshi, 3800-4100 m (May 22, 1967); Lingshi-Shodu, 4800-4000 m (May 23, 1967).

Distr. Europe, Morokko, Caucasus, C. & N. Asia, E. Himalaya (Nepal, Bhutan), S. W. China (Yunnan, Szechuan), Japan, and northern part of North America.

#### HYLOCOMIACEAE

**Hylocomium splendens** (Hedw.) B. S. G., Bryol. Eur. 5: 173 (1852).

Bhutan. Barshong-Nala, 3700-3300 m (May 25, 1967).

Distr. Almost cosmopolitan.