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BURMA MOSSES¹

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During recent years Mr. F. G. Dickason has been collecting mosses in Burma in cooperation between the Arnold Arboretum of Harvard University and Judson College, Rangoon, Burma. No outline of the Burma moss flora has ever been published so these numerous collections supplemented by a small series from the Burma-Tibet Frontier made by Mr. F. Kingdon Ward with the C. Suydam Cutting Expedition of the Field Museum of Natural History and a few earlier collections of Mr. Dickason received from Mr. A. J. Sharp of the University of Tennessee form the basis for an important and significant study.

The area is an important one in relation to the geographical distribution of Indo-Malayan mosses and in some respects seems to represent a center in which a number of unusual types have originated. *Cleistostoma ambigua* (Hook.) Brid. and *Penzigiella cordata* (Harv., Hook.) Fleisch. are instances.

One of the especially interesting facts resulting from these studies is the occurrence in Burma of *Pseudosymblepharis pervaginata* Broth., *Pseudopohlia bulbifera* Williams, *Anomobryum gemmigerum* Broth. and *Calypothecium himantocladioides* Bartr. It is altogether probable that these four supposedly endemic Philippine species had their origin in Burma. Such instructive range extensions illustrate again the strong west to east trend of distribution extending from the Himalayas through Indo-Malaya, the Philippines and the Pacific Islands to Hawaii. The collections recorded here total 133 species and are probably broadly representative of the Burma moss flora as a whole. Of this total 74 species or well over half the number are known from the Philippines.

Types of the new species are deposited in the Farlow Herbarium of Harvard University and in the herbarium of the author.

Unless otherwise indicated in the following list the collector is Mr. F. G. Dickason.

¹ Contribution from the Laboratories of Cryptogamic Botany and the Farlow Herbarium, Harvard University, no. 160.

SPHAGNACEAE

Sphagnum subsecundum Nees.

Mt. Victoria, Chin Hills, wayside, 9000 ft., no. 8512.

Distribution: Europe, Asia, North America.

FISSIDENTACEAE

Fissidens sylvaticus Griff.

Taunggyi, F. S. S., damp open slope, no. 8787-C-1; Kamayut, Rangoon, damp shady ground, 60 ft., no. 9600.

Distribution: Siam, Sumatra, Celebes, Java, Borneo, Hongkong, Philippines.

Fissidens nobilis Griff.

Sin Lum Kaba, no. 117.

Distribution: Himalayas, Sumatra, Java, Hongkong, Philippines.

DITRICHACEAE

Garckea phascoides (Hook.) C. Müll.

Rangoon, along ditch during the rains, 20 ft., no. 6536; Tavoy, mountain side, 20 ft., no. 7983; Rangoon, shady area, 60 ft., no. 9602, 9603, 9604; Rangoon, Kamayut, damp ground, 30-40 ft., no. 8663, 8669.

Distribution: wide in southern Asia, Malaysia, Philippine Islands.

DICRANACEAE

Trematodon longicollis Michx.

Pyin Mana, Kyauk-Than-Ba, Pyin Ma Na, wet shady place, 1000 ft., no. 7122.

Distribution: eastern United States, Mexico, Cuba, Italy, Ceylon, Philippines.

Campylopus gracilis (Mitt.) Jaeg.

Loimwe, Kentung State, epiphytic, 6500 ft., no. 9741-3; Nataung, Kareni State, on tree, 5000 ft., no. 9421.

Distribution: Sikkim.

Campylopus laetus (Mitt.) Jaeg.

Mount Popa, on rock, 3500 ft., no. 6615.

Distribution: Khasia.

Campylopus umbellatus (W. Arn.) Bartr.

Sin Lum Kaba, 6000 ft., no. 109.

Distribution: wide and frequent through the Pacific Islands and Malaysia.

Dicranodontium uncinatum (Harv.) Jaeg.

Pang Yang, Manglon State, 5500 ft., no. 9689.2, 9694-A; Pang Yang,

Manglon State, epiphyte, 5000 ft., no. 9647; Saw Chaung, Chin Hills, on tree, 6000 ft., no. 8556.

Distribution: India, Siam, Java, Moluccas, Philippines.

Holomitrium Griffithianum Mitt.

Pang Yang, Manglon State, 5500 ft., no. 9689.3.

Distribution: Bhotan, Assam, Khasia, Formosa.

Dicranum gymnostomum Mitt.

Burma-Tibet Frontier, Adung Valley, 12000 ft., *Abies-Rhododendron* forest, *F. Kingdon Ward*, 1930-31.

Distribution: Himalayas, Yunnan.

Dicranoloma fragile (Hook.) Broth.

Loi Se, Manglon State, epiphyte, 4000 ft., no. 9650; Pang Yang, Manglon State, moist banks, 5000 ft., no. 9657, 9675; Mong Pawk, Kengtung State, epiphytic, 4000 ft., no. 9825.1.

Distribution: Himalayas, Annam, Philippines.

LEUCOBRYACEAE

Leucobryum Hollianum Doz. & Molk.

Zokhua (Haka), dry banks, 4800 ft., no. 7489.

Distribution: Java, Borneo.

Leucobryum scalare C. Müll.

Tavoy, 18 miles down, on trees, 1000 ft., no. 8012 in part; Mong Pawk, Kengtung State, on ground in woods, 4000 ft., no. 9824; Pang Yang, Manglon State, epiphytic, 5000 ft., no. 9673, 9659-C; Nataung, Kareni State, 9422-B.

Distribution: Nepal, Malacca, Siam, Java, Sumatra, Borneo, Philippines, Fiji.

Leucobryum neilgherrense C. Müll.

Loimwe, Kentung State, epiphytic, 6500 ft., no. 9741.2; Sin Lum Kaba, no. 108.

Distribution: India, Ceylon, Sumatra, Java, Celebes, Borneo, Philippines, China, Japan, Korea.

Octoblepharum albidum Hedw.

Rangoon, on trees, 30 ft., no. 6817.

Distribution: cosmopolitan at low altitudes in tropical regions.

CALYMPERACEAE

Calymperes peguense Besch.

Rangoon, Royal Lake, on palm tree, 30 ft., no. 8665; Rangoon, Royal Lake, on mango tree, 40 ft., no. 8668 in part.

Endemic.

Calymperes Hampei Bryol. Jav.

Toungoo, no. 101.

Distribution: Malay Archipelago.

POTTIACEAE

Molendoa burmensis Bartr. sp. nov.

Gracilis, dense caespitosus, caespitibus fusco-viridis, haud nitidis. Caules ca. 2 cm. longi, flexuosi, inferne parce radiculosi. Folia sicca arcte crispata, humida erecto-patentia, 2-2.4 mm. longa, lineari-lanceolata, breviter acuminata, integerrima; marginibus uno latere anguste recurvis; costa pervalida, inferne ad 80 μ lata, percurrente; cellulae superiores leniter papillosae, irregulariter subquadratae vel ovaes, parietibus pallidis, incrassatis, basilares rectangulares, pellucidae. Caetera ignota.

Goteik, Hsipaw, on rocks, 2800 ft., no. 9521 **type**, 9585.

This species differs from *M. Roylei* (Mitt.) Broth. in several noticeable particulars. The leaves are strongly crisped when dry, the margin often recurved on one side below the middle and the costa twice as wide toward the base. Without fruit its position in *Molendoa* is problematical.

Anoectangium Stracheyanum Mitt.

Taunggyi, F.S.S., on damp area, 5200 ft., no. 8788, 8779, 8787-C-2.

Distribution: Himalayas.

Trichostomum angustatum (Mitt.) Fleisch.

Taunggyi, F.S.S., damp ground, 4500 ft., no. 9071-A.

Distribution: India, Ceylon, Java, Celebes, Philippines, South China.

Pseudosymblepharis pervaginata Broth.

Pang Wai, Kentung State, 6000 ft., no. 9699.1.

Distribution: Philippines.

Timmiella anomala (Bry. Eur.) Limp.

Taunggyi, F.S.S., on rock, 5000 ft., no. 9359 in part.

Distribution: Europe, North America, Himalayas.

Tortella cyrtobasis Dix.

Taunggyi, F.S.S., on rock, 5000 ft., no. 9359a.

Distribution: Siam.

Hyophila involuta (Hook.) Jaeg.

Taunggyi, F.S.S., on rocks, 5200 ft., no. 8790, 8794; Taunggyi, F.S.S., on trees, 4500 ft., no. 9075; Taunggyi, F.S.S., open damp ground, 4500 ft., no. 9094.1; Rangoon, Kamayut, 40 ft., no. 8670; Rangoon, Mingaladon, on bricks, 60 ft., no. 9610.1; Rangoon, Inya Road, on rocks, 60 ft., no. 9598.

Distribution: India, East China, Philippines.

Barbula indica (Schwaegr.) Brid.

Rangoon, open damp earth, 40 ft., no. 8661.

Distribution: India, Ceylon, Java, Borneo, Philippines, East China.

***Barbula constricta* Mitt.**

Taunggyi, F.S.S., damp ground and open slopes, 4500–5200 ft., no. 8789, 9063, 9097.

Distribution: Himalayas, Philippines.

***Barbula consanguinea* (Thw. & Mitt.) Jaeg.**

Rangoon, Mingaladon, on bricks, 60 ft., no. 9601; Taunggyi, F.S.S., open damp ground, 4500–5200 ft., no. 8787-A, 9094, 9062, 9099.1.

Distribution: Ceylon, Singapore, Java, Philippines.

***Desmatodon involutus* Bartr. sp. nov.**

Pusillus, dense caespitosus, flavescenti-viridis, haud nitidulus. Caulis brevis, dense foliosus. Folia sicca leniter contorta, humida erecto-patentia, oblongo-ovata, concava, apice truncata vel rotundata, haud mucronata, inferiora minuta, superiora, ca. 1 mm. longa; marginibus integerrimis, superne late inflexis; costa 35–40 μ lata, infra apicem soluta; cellulae superiores rotundato-quadratae, mamillosae, dorso laeves, diam. 7–8 μ , basilares rectangulares, laevissimae, pellucidae. Folia perichaetialia caulinis similia, seta 6–7 mm. longa, aureo-rubella, laevissima; theca erecta, oblongo-ovalis, deoperculata 1–1.2 mm. longa; peristomii dentes 16, erecti, pallidi, papilloosi, ad 150 μ longi; operculum rubrum, conico-rostratum, ca. 0.5 mm. longum; annulus latus, calyptra cucullata, spori laeves, diam. 7–8 μ .

Taunggyi, F.S.S., damp open slope, 5200 ft., no. 8787-B, 8795 **type**.

In *Desmatodon* this species is unique in the broadly rounded or truncate leaves with the margins widely inflexed above. The costa in cross section shows the typical structure with a stereid band on the dorsal side only; the leaf cells are smooth on the back and mamilliose on the ventral side and there is nothing unusual in the peristome characters. On the whole it seems more appropriate to include the species in *Desmatodon* than to create a new monotypic genus.

FUNARIACEAE

***Entosthodon wichurae* (Broth.) Fleisch.**

Taunggyi, F.S.S., damp ground, 4500 ft., no. 9072, 9078, 9500. Nataung, Kareni State, open dry ground, 5000 ft., no. 9427.

Distribution: Java.

***Funaria hygrometrica* Hedw. var. *calvescens* (Schwaegr.) Bry. Eur.**

Mt. Nwalabo, Tavoy, on tree, 5000 ft., no. 8205; Nataung, Kareni State, open damp earth, 5000 ft., no. 9487; Wunba Taung, Chin Hills, on rocks, 7900 ft., no. 8481, 8491.

Distribution: cosmopolitan in warm regions.

SPLACHNACEAE

***Tayloria indica* Mitt.**

Haka, on trees and rocks, 5100–7000 ft., no. 7401, 7583.

Distribution: Himalayas, Philippines.

BRYACEAE

Pseudopohlia bulbifera R. S. Williams

Taungteik (Falam), damp banks, 4500 ft., no. 7548; Yetagone, along the damp, shady path, 4000 ft., no. 7801a.

Distribution: Philippines.

Brachymenium acuminatum Harv.

Taunggyi, F.S.S., damp ground, 4500 ft., no. 9071.B, 9083.1.

Distribution: East India, Philippines.

Brachymenium nepalense Hook.

Taunggyi, F.S.S., no. 7891; Nataung, Kareni State, on trees, 5000 ft., no. 9426-A; Pang Yang, Manglon State, on bank and epiphytic, 5000-5500 ft., no. 9686, 9689, 9693.1, 9815.2; 9814-A; Hopong, Hopong State, no. 8276b.

Distribution: East India, Siam, Sumatra, Java, Borneo, Philippines, Celebes.

Anomobryum gemmigerum Broth.

Taunggyi, F.S.S., open damp area, 4500 ft., no. 9083.

Distribution: Philippines.

Anomobryum cymbifolium (C. Müll.) Broth.

Taunggyi, F.S.S., damp ground, 4500 ft., no. 9066.

Distribution: Himalayas, South India, Khasia, Java, Philippines, Amboina.

Bryum argenteum Hedw. var. **lanatum** Bry. Eur.

Taunggyi, F.S.S., on damp ground, 4500 ft., no. 9079, 9089.

Distribution: cosmopolitan.

Bryum nitens Hook.

Taunggyi, F.S.S., on trees, 4500 ft., no. 9095.1.

Distribution: Nepal, Ceylon, Java.

Bryum coronatum Schwaegr.

Taunggyi, F.S.S., open damp slope, 4500 ft., no. 9088, 9099; Rangoon, Inya Road, on bricks, 60 ft., no. 9599.

Distribution: cosmopolitan in tropical and subtropical regions.

Bryum porphyroneuron C. Müll.

Taunggyi, F.S.S., damp ground, 4500 ft., no. 9503-A.

Distribution: India, Ceylon, Sumatra, Java.

Bryum ramosum (Hook.) Mitt.

Thandaung, usually found on rocks of cold places, 3500 ft., no. 6738.

Loimwe, Kentung State, epiphytic, 6500 ft., no. 9741.1.

Rhodobryum giganteum (Hook.) Schp.

Mong Yang, Kengtung State, damp soil in forest, 3500 ft., no. 9862; Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9863.A.1; Webula, along damp trails, no. 7786; Taungteik (Falam), damp shady banks, 4000 ft., no. 7756; Taunggyi, South Shan States, along the path, 5300 ft., no. 8398; Nataung, Kareni State, on damp areas, 5000 ft., no. 9435; Burma-Tibet Frontier, *F. Kingdon Ward*, Coll.

Distribution: Himalayas, Sumatra, Java, Borneo, Philippines, China, Japan, Hawaii.

MNIACEAE

Orthomnium trichomitrium Wils.

Nataung, Kareni State, shady forest, 6300 ft., on trees, no. 9448.1.

Distribution: Sikkim, Khasia.

Mnium Thomsoni Schp.

Burma-Tibet Frontier, *F. Kingdon Ward*, Coll. 1930-31.

Distribution: Sikkim, Yunnan, Japan.

Mnium rostratum Schrad.

Webula, rocky wet places, 4000 ft., no. 7788; Pang Wai, Kengtung State, 6000 ft., no. 9690, 9699.5; Pang Yang, Manglon State, epiphytic, 5000 ft., no. 9656; Loimwe, Kantung State, epiphytic, 6500 ft., no. 9741.

Distribution: cosmopolitan.

Mnium coriaceum Griff.

Haka, damp banks, 6200 ft., no. 7294.

Distribution: Himalayas, Khasia.

BARTRAMIACEAE

Bartramia Halleriana Hedw.

Wunba Taung, Chin Hill, no. 8482b.

Distribution: Europe, North America, South America, Himalayas, Yunnan, New Guinea, New Zealand.

Philonotis Griffithiana (Wils.) Mitt.

Nataung, Kareni State, on open damp earth, 5000 ft., no. 9485.

Distribution: Himalayas, Khasia.

Philonotis (*Philonotula*) **aristifolia** Bartr. sp. nov.

Dioica videtur. Densissime caespitosa, caespites superne laete viridi, intus fusci. Caules ad 4 cm. alti. Folia late patentia, saepe falcata, angustissime lineari-lanceolata, ca. 2 mm. longa, 0.3 mm. lata, sensim acuminata, longe aristata; margines leniter recurvi, denticulati; cellulae superiores lineares, papillosae, inferne sensim latiores; costa valida, in aristam denticulatam longe excurrens. Seta 3 cm. alta; theca magna, inclinata vel horizontalis, fortiter plicata; peristomium duplex.

Lagoon, Insein, on damp earth, no. 8158; Mt. Nwalabo, Tavoy, on damp earth, 5000 ft., no. 8203 **type**.

Differs radically from *P. angusta* Mitt. of Ceylon in the longer, narrower more widely spreading aristate leaves with longer cells. The type collection is richly fruited and is an unusually handsome little plant for the genus with a delicate silky appearance due to the slender spreading foliage.

***Philonotis imbricatula* Mitt.**

Taunggyi, F.S.S., open damp area, 4500 ft., no. 9494.

Distribution: Ceylon, Hongkong, Philippines, Fiji.

***Philonotis perlatifolia* Dix. ?**

Rangoon, Royal Lake, on mango tree, 30 ft., no. 8666.

Distribution: Siam.

As this collection is sterile the determination is open to doubt.

***Philonotis falcata* (Hook.) Mitt.**

Taungteik (Falam), wet bank, 4500 ft., no. 7237. Falam, damp bank, 6000 ft., no. 7324.

Distribution: North India, China, Japan, Philippines, Hawaii.

***Philonotis Turneriana* (Schwaegr.) Mitt.**

Taungteik, damp banks, 4500 ft., no. 7237.A; Naungkhio, Thibaw State, on rocks in moist localities, 2800 ft., no. 9536.

Distribution: Himalayas, Khasia, Java, Japan, China, Hawaii.

***Philonotis speciosa* (Griff.) Mitt.**

Yetagone, along the damp shady path, 4000 ft., no. 7801.

Distribution: Nepal, Khasia, Philippines.

***Fleischerobryum longicollis* (Hampe) Loeske**

Burma-Tibet frontier, *F. Kingdon Ward*, Coll.

Distribution: Himalayas, Java.

ORTHOTRICHACEAE

***Macromitrium nepalense* (Hook. & Grev.) Schwaegr.**

Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9816; Mong Pawk, Kentung State, epiphytic in woods, 4000 ft., no. 9823.

Distribution: Nepal, Sikkim, Siam, Malay Peninsula, China, Philippines.

***Macromitrium Dickasonii* Bartr. sp. nov.**

Caulis repens, ramis erectis, ca. 5 mm. altis, fusco-viridibus. Folia sicca arcte crispata, humida erecto-patentia, apice incurva, 2.5 mm. longa, oblongo-lanceolata, acuta, integerrima, profunde canaliculata; costa infra apicem evanida; cellulae superiores minutae, obscurae, papillosae, basillares magis incrassatae, laevissimae, marginales angustissime lineares, in costam versus breviores. Seta crassa, rubra, laevissima, 6-7 mm. longa; theca oblongo-ovalis, laevis, macrostoma, castanea,

2-2.5 mm. longa; peristomii simplicis, dentes ad 165 μ longi, obtusi, sordide albidi, papilloso; calyptra dense pilosa; spori minute papilloso, diam. ad 30 μ .

Mogok, Apr. 1934, no. 102, **type**.

Near *M. falcatulium* C. Müll. of the Philippines but with elongated basal cells, longer setae and longer capsules.

Macromitrium sulcatum (Hook.) Brid.

Nataung, Kareni State, on trees, 5000 ft., no. 9431; Nataung, Kareni State, on trees, shady forest, 6300 ft., no. 9447-B, 9448; Pang Yang, Manglon State, moist bank, 5000 ft., no. 9654; Pang Yang, Manglon State, 6000 ft., no. 9694-C; Haka, damp banks, 6200 ft., no. 7584.

Distribution: East India, Ceylon, Malay Peninsula, Borneo, Philippines.

Macromitrium goniorhynchum (Doz. & Molk.) Jaeg.

Kalaw, 5000 ft., no. 115.

Distribution: Khasia through Malaysia to the Philippines and New Guinea.

RHACOPILACEAE

Rhacopilum Schmidii (C. Müll.) Jaeg.

Hopong, Hopong State, on trees, no. 8276; Taunggyi, F.S.S., on trees, 5000 ft., no. 8775; Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9876.

Distribution: Nilghiri, Tonkin, Philippines.

HEDWIGIACEAE

Cleistostoma ambigua (Hook.) Brid.

Sin Lum Kaha, 6000 ft., no. 124; Taunggyi, F.S.S., on rocks, 6000 ft., no. 7848; Nataung, Kareni State, on trees, shady slope, 5000 ft., no. 9425; Pang Yang, Manglon State, on trees, 5500 ft., no. 9642-A.

Distribution: Himalayas, West China, Siam, Assam.

TRACHYPODACEAE

Diaphanodon thuidioides Ren. & Card.

Mt. Victoria, Chin Hills, on trees, 10000 ft., no. 8523a.

Distribution: Sikkim.

Trachypus bicolor Reinw. & Hornsch.

Pang Yang, Manglon State, damp soil, 5000 ft., no. 9659-A; Pang Yang, Manglon State, epiphytic, 5000 ft., no. 9815; Pang Yang, Manglon State, 6000 ft., no. 9713; Pang Wai, Kentung State, 6000 ft., no. 9699.4; Nataung, Kareni State, on trees, 5000 ft., no. 9431.1; Nataung, Kareni State, shady mountain slope on trees, 5000 ft., no. 9424; Mt. Victoria, Chin Hills, on trees, 10000 ft., no. 8529.

Distribution: North India, Ceylon, Siam, Java, Celebes, Philippines, China, Japan, Formosa, Hawaii.

Trachypodopsis crispatula (Hook.) Fleisch.

Haka, on trees and banks, 6200–6500 ft., no. 7293, 7427; Taungteik (Falam), mountain side, 5000 ft., no. 7262; Mt. Nwalabo, Tavoy, on rocks, 5000 ft., no. 8196; Mt. Victoria, Chin Hills, on trees, 10000 ft., no. 8523; Loi, Maing, Sampu, Namkhok State, epiphytic in mossy forest, 7500 ft., no. 8356, a robust form with coarsely toothed leaves; Pang Wai, Kentung State, 6000 ft., no. 9699.2; Pang Yang, Manglon State, 5500 ft., no. 9690.B.1; Namkham, no. 103.

Distribution: Himalayas, Yunnan, Ceylon, Andaman Islands, Philippines.

MYURIACEAE

Myurium rufescens (Reinw. & Hornsch.) Fleisch.

Pang Yang, Manglon State, 6000 ft., no. 9714; Pang Yang, Manglon State, epiphytic, 5000 ft., no. 9815.1; Nataung, Kareni State, on trees, shady forest, 6300 ft., no. 9447-C.

Distribution: Khasia, Ceylon, Siam, wide in Malaysia, Philippines, Australia, New Caledonia.

PTEROBRYACEAE

Penzigiella cordata (Harv.) Fleisch.

Haka, mossy forest, 7625 ft., no. 7500a; Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9818.

Distribution: Sikkim, Nepal, Khasia.

Endotrichella rigida Dix.

Nataung, Kareni State, on trees, shady forest, 6300 ft., no. 9446.

Distribution: Siam.

Pterobryopsis (Eupterobryopsis) **caudata** Bartr. sp. nov.

Dioica?, robusta, pallide virens, nitida. Caules secundarii ad 7 cm. alti, breviter stipitati, simplices, superne longe attenuati, arcuati. Folia humida late patentia, cochleariformia, ad 3 mm. longa, 2 mm. lata, e basi cordata late ovata, acuta; marginibus erectis, integris vel apice minutissime denticulatis; costa supra medium folii evanida; cellulae superiores lineari-rhomboidae, infimae laxiores, aurantiacae, alares nullae. Fructus ignotus.

Mt. Nwalabo, Tavoy, on trees, 5000 ft., no. 8202 **type**; Pang Yang, Manglon State, 5500 ft., no. 9693; Nataung, Kareni State, on trees, shady forest, 6300 ft., no. 9448.2.

A very unusual looking plant with the stems attenuate in a long, curved, microphyllous, proboscoid-like tip. Through the well defined costa it is probably nearest *P. crassicaulis* (C. Müll.) Fleisch. but the broad, short pointed leaves not inflexed on the margins above and without any well defined alar cells are thoroughly distinctive. I am not sure that nos. 9448.2 and 9693 belong here. In 9693 the stems are not caudate at the tips and in 9448.2 the habit is more slender. Both show the leaves more

slender than in the type collection and the upper margins are distinctly serrulate. Otherwise the form and structure of the leaves are very similar.

Pterobryopsis flexipes (Mitt.) Fleisch.

Nataung, Kareni State, on trees, shady forest, 6300 ft., no. 9446.1.

Distribution: Nilghiri, Ceylon.

Pterobryopsis acuminata (Harv.) Fleisch.

Sin Lum Kaba, no. 119.

Distribution: Sikkim, Nepal, Khasia, Nilghiri.

Pterobryopsis orientalis (C. Müll.) Fleisch.

Taunggyi, F.S.S., on rocks, 4700–5000 ft., no. 7872, 9021; Haka, on trees, 6400 ft., no. 7443; Pang Yang, Manglon State, 5500 ft., no. 9685, 9695-A; Mt. Popa, 4000 ft., no. 125.

Distribution: Himalayas, Nilghiri, Assam.

METEORIACEAE

Papillaria fuscescens (Hook.) Jaeg.

Haka, on trees, 6200–7625 ft., no. 7296, 7426, 7499a, 7503; Thandaung, Taungoo, on rocks, 4000 ft., no. 8180; Nawrig Heng, Yunnan, China, no. 123; Nataung, Kareni State, on trees, shady forest, 5800–6300 ft., no. 9436, 9447-A.

Distribution: Himalayas, Ceylon, Yunnan, Siam, Malaysia, Philippines.

Papillaria* (Eupapillaria) *lanosa Bartr. sp. nov.

Tenella, pallide lutescens vel subfusca, haud nitida. Caulis secundarius remote et irregulariter ramosus, ad 5 cm. longus, flexuosus. Folia sicca laxe adpressa, humida erecto-patentia, leniter plicatula, oblongo-ovata, plerumque raptim longissime piliformiter attenuata, 2.5 mm. longa, 0.8 mm. lata, canaliculato-concava; margines inferne late inflexi, superne erecti vel anguste incurvi, ubique remote et minute denticulati; cellulae lineares, obscurae, dense et humiliter papillosae, infimae solum laxiores, laevissimae, alares subquadratae, minutae, numerosae. Fructus unicus visus; seta brevis, 1 mm. longa, crassa; theca exserta, erecta, ovato-globosa, 1 mm. longa; operculum conico-rostratum, 1 mm. longum.

Pang Yang, Manglon State, epiphyte, 5500 ft., no. 9820, **type**.

In a general way this species is suggestive of *P. Deppei* (Hornsch.) Jaeg. of tropical America but the distinctions are obvious. Here the leaves are more abruptly narrowed to the capillary hair point and the leaf cells much more obscure with numerous small papillae. In *P. Deppei* the papillae are sharp and salient and average 3 or 4 to a cell while in *P. lanosa* the papillae are low and so numerous as to almost obscure the cell structure.

Aerobryopsis longissima (Doz. & Molk.) Fleisch.

Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9875, 9877.

Distribution: India, Ceylon, Malaysia, China, Philippines to Hawaii.

Aerobryidium aureo-nitens (Hook.) Broth.

Pang Wai, Kentung State, 6000 ft., no. 9699.3; Taunggyi, F.S.S., on rocks and trees, 4500–5000 ft., no. 9355, 9360, 9507-A; Pang Yang, Manglon State, 5500 ft., no. 9688; Mt. Victoria, Chin Hills, on trees, 10000 ft., no. 8586; Taungteik (Falam), mountain path side, 5000 ft., no. 7257; Namkham, 4000 ft., no. 113; Sin Lum Kaba, no. 104; Mt. Popa, 4000 ft., no. 118.

Distribution: Himalayas, Khasia, Nilghiri.

Floribundaria floribunda (Doz. & Molk.) Fleisch.

Haka, mossy forest, epiphytic, 7625 ft., no. 7495; Pang Yang, Manglon State, 5500 ft., no. 9694-B; N'Bapa, no. 111; Sin Lum Kaba, 6000 ft., no. 122.

Distribution: Africa, India, Malaysia, Japan, Tonkin, Philippines to Hawaii.

Floribundaria aurea (Griff.) Broth.

Burma-Tibet Frontier, Valley of Tamai River, 3000 ft., *F. Kingdon Ward*, Jan. 1931; Burma-Tibet frontier, Adung Valley, 12000 ft., uppermost Abies-Rhododendron forest, *F. Kingdon Ward*, 1930–31.

Distribution: Himalayas, Bhotan, Java, Celebes, Ceram, Japan.

Barbella enervis (Mitt.) Fleisch.

Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9874, 9869, 9863.B.1; Mong Yang, Kengtung State, damp soil, 3500 ft., no. 9867.

Distribution: Himalayas, Ceylon, Philippines, Australia, Lord Howe Island, New Caledonia.

Barbella Stevensii (Ren. & Card.) Fleisch.

Sin Lum Kaba, no. 112.

Distribution: Sikkim.

Barbella pendula (Sull.) Fleisch.

Mong Yang, Kengtung State, epiphytic, 3500 ft., no. 9860.

Distribution: Ceylon, Sumatra, Java, China, Japan, Formosa, Philippines, Southern United States.

Barbella (*Aerobryella*) **burmensis** Bartr. sp. nov.

Tenella, *lutescens*, *nitida*. *Caules secundarii elongati, tenues, flexuosi, remote ramosi, ramis brevibus, vix 1 cm. longis, complanatis, obtusis. Folia caulina ovato-lanceolata, acuminata, 1.3 mm. longa; margines plani, ubique denticulati; costa valida, supra medium folii evanida; cellulae lineares, unipapillati; folia ramea subsimilia, breviter acuminata, ad 1.8 mm. longa, 0.6 mm. lata, margines fortiter denticulati. Caetera ignota.*

Haka, mossy forest, 7625 ft., no. 7500d, **type**.

The branch leaves in this species are broader and shorter than in *B. javanica* (Bryol. Jav.) Broth. and smaller and more crowded than in *B. spiculata* (Mitt.) Broth.

Meteoriopsis ancistrodes (Ren. & Card.) Broth.

Mt. Popa, on trees, 4000 ft., no. 6616.

Distribution: Himalayas, Formosa.

Meteoriopsis squarrosa (Hook.) Fleisch.

Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9818.1; Namkham, no. 121.

Distribution: Himalayas, Ceylon, Malay Peninsula, Siam, Sumatra, Java, Philippines.

Meteoriopsis reclinata (Mitt.) Fleisch.

Taunggyi, F.S.S., on trees, 4500 ft., no. 9499; Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9661, 9664; Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9861-B, 9873.

Distribution: Nilghiri, Ceylon, Java, Celebes, Philippines, Formosa.

NECKERACEAE

Calypothecium burmense Bartr. sp. nov.

Caulis secundarius ad 7 cm. longus, cum foliis 5–6 mm. latus, parcissime ramosus, valde complanatus, luteo-viridis, nitidus. Folia fortiter complanata, horride patula, haud undulata, vix auriculata, concava, oblongo-ovata, breviter acuminata, ca. 3.5 mm. longa, 1.5 mm. lata, inferiora minora; margines erecti, superne denticulati; costa supra medium folii evanida; cellulae anguste rhomboideae, 7–8 μ latae, ca. 1 : 7, parietibus firmis, pellucidis, infimae laxiores, fuscae. Caetera ignota.

Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9803-B type, 9819.

In this species the stems are more strongly flattened and less branched than in *C. Ramosii* Broth. of the Philippines, the leaves are broader and the lamina cells wider. No. 9819 shows the leaves more or less auriculate and has scattered septate propagula in the upper leaf axils but otherwise agrees with the type collection.

Calypothecium himantocladoides Bartr.

Mt. Nwalabo, Tavoy, on rocks, 5000 ft., no. 8195.

Distribution: Philippines.

Calypothecium Urvilleanum (C. M.) Broth.

Haka, on trees, 7400 ft., no. 7448; Burma-Tibet Frontier, Valley of Tamai River, 3000 ft., *F. Kingdon Ward*, Coll., Jan. 1931.

Distribution: India, Malaysia, to Fiji, Caroline Islands, Samoa and Tahiti.

Neckera crenulata Harv.

Taungteik (Falam), open mountain side, 5000 ft., no. 7265; Pang Yang, Manglon State, 5500 ft., no. 9690-B.

Distribution: Himalayas, Khasia.

Neckera himalayana Mitt.

Haka, mossy forest, epiphyte, 7625 ft., no. 7502.

Distribution: Sikkim.

Homaliodendron exiguum (Bryol. Jav.) Fleisch.

Pang Yang, Manglon State, 5500 ft., no. 9687.

Distribution: Himalayas, Ceylon, Malay Peninsula, Sumatra, Java, Celebes, Philippines, Australia, New Guinea.

Homaliodendron microdendron (Mont.) Fleisch.

Haka, mossy forest, 7625 ft., no. 7500c.

Distribution: Sikkim, Khasia, Bhotan, Yunnan, Borneo, Philippines, Formosa.

Homaliodendron flabellatum (Sm.) Fleisch.

Loi Naing, Sampu, Namkhok State, epiphytic in mossy forest, 7500 ft., no. 8355; Sin Lum Kaba, no. 110. Haka, mossy forest, 7625 ft., no. 7500b.

Distribution: India and Ceylon to Malaysia and Japan and through the Pacific Islands to Hawaii.

Thamnium subseriatum (Hook.) Mitt.

Haka, mossy forest, 7625 ft., no. 7499, 7500.

Distribution: Himalayas, Ceylon, Philippines.

THUIDIACEAE

Claopodium nervosum (Harv.) Fleisch.

Mt. Popa, damp places, 3000 ft., no. 6632; Taunggyi, F.S.S., on damp ground, 5000 ft., no. 8781.1.

Distribution: Himalayas, Ceylon, Sumatra, Java, Celebes, Philippines, China, Korea, Japan.

Thuidium investe (Mitt.) Jaeg.

Ah-Shai-Myin, Ah-Naught-Myin, Lawk-Sawk State, no. 8701-A.

Distribution: Philippines.

Thuidium tamariscellum (C. Müll.) Bryol. Jav.

Taunggyi, F.S.S., on damp ground, 4500 ft., no. 9070, 9085.

Distribution: Nilghiri, Tonkin, Siam, Java, Philippines.

Thuidium Meyenianum (Hampe) Bryol. Jav.

Gotiek, on rocks, 2800 ft., no. 9524; Naungkhio, Hsipau, on rocks, 2800 ft., no. 9535; Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9674.

Distribution: Himalayas, Ceylon, Annam, Philippines, Sumatra, Java, New Guinea, Solomon Islands.

Thuidium glaucinoides Broth.

Mong Yang, Kengtung State, damp bank, 3500 ft., no. 9865.

Distribution: Tonkin, Malaysia, China, Formosa, Philippines, New Hebrides, Fiji, Samoa.

Thuidium cymbifolium (Doz. & Molk.) Bryol. Jav.

Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9803-A; Taungteik (Falam), open mountain side, 5000 ft., no. 7263; Haka, mossy forest, 7625 ft., no. 7498; Mt. Popa, epiphyte and on banks, 3500 ft., no. 6630; Pang Wai, Kengtung State, 6000 ft., no. 9699; Sin Lum Kaba, no. 116. Burma-Tibet Frontier, *F. Kingdon Ward*, 1930-31.

Distribution: wide in Malaysia, Formosa, Philippines, Lord Howe Island, New Guinea, China, Japan.

Actinothuidium Hookeri (Mitt.) Broth.

Mt. Victoria, 10000 ft., on tree, no. 8531.

BRACHYTHECIACEAE

Brachythecium Buchanani (Hook.) Par.

Taunggyi, F.S.S., on trees, rocks, and ground, 4500-5000 ft., no. 8773.I, 8781, 9081, 9090; Pang Wai, Kengtung State, 6000 ft., no. 9695-B; Nataung, Kareni State, no. 9426-B; Mt. Popa, Myin Gyan, on rocks, 3000 ft., no. 6632; Sin Khoa (Haka), on tree trunks, 4000 ft., no. 7617; Sin Lum Kaba, no. 120.

Distribution: Himalayas, Assam, Philippines, China, Japan.

The above collections are all sterile but probably belong here.

Brachythecium longicuspdatum (Mitt.) Jaeg.

Zokhua (Haka), 4800 ft., no. 7490a.

Distribution: Sikkim.

ENTODONTACEAE

Erythrodontium julaceum (Hook.) Par.

Taunggyi, F.S.S., on rocks, trees and banks, 4500-5200 ft., no. 8792, 9061, 9064, 9068, 9084, 9091, 9092, 9090.I, 9507-B; Namkok, on tree, 3000 ft., no. 9400.

Distribution: India, Assam, Tonkin, Yunnan, Ceylon, Sumatra, Java, Celebes, Philippines.

Trachyphyllum inflexum (Harv.) Gepp

Naunghkio, Hsipaw State, on tree trunk, 2800 ft., no. 9574 in part.

Distribution: India, Philippines, New Caledonia.

Campylodontium flavescens (Hook.) Bryol. Jav.

Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9817.

Distribution: India, Malay Peninsula, Ceylon, Annam, Sumatra, Java, Philippines, Celebes, Australia.

Rozea pterogonioides (Hook.) Jaeg.

Mt. Victoria, Chin Hills, on trees, 10000 ft., no. 8540.

Himalayas, Yunnan.

Entodon flavescens (Schwaegr.) Jaeg.

Taunggyi, F.S.S., on trees, 4500 ft., no. 9098.

Distribution: Nepal.

Much more slender than the plant illustrated in Schwaegrichen's plate but apparently not specifically distinct.

Entodon plicatus C. Müll.

Pang Yang, Manglon State, epiphyte, 4500–6000 ft., no. 9659-B, 9665, 9672, 9712; Mong Yang, Kengtung State, epiphyte and on soil, 3500 ft., 9861-a, 9871-A, 9871-B, 9872.1; Taunggyi, F.S.S., on trees, 4500 ft., no. 8780-A, 9095; Hopong, Hopong State, no. 8276a; Naungkhio, Thibaw, on rocks, 2800 ft., no. 9540.1; Zokhua (Haka), 4800 ft., dry banks, no. 7490.

Distribution: Himalayas, Ceylon, Celebes, Philippines.

PLAGIOTHECIACEAE

Stereophyllum tavoyense (Hook.) Jaeg.

Mt. Popa, on rocks, 3000 ft., no. 6654 in part; Mt. Popa, 4000 ft., no. 106.

Distribution: India.

SEMATOPHYLLACEAE

Clastobryum Dickasonii Bartr. sp. nov.

Dioicum? gracile, lutescenti-viride, nitidum. Caulis repens, irregulariter subpinnatus, ramis brevibus, ad 6–7 mm. longis, caudato-attenuatis. Folia erecto-patentia, oblongo-lanceolata, 1.2 mm. longa, 0.4 mm. lata, acuminata, integerrima, fortiter concava, ecostata; cellulae lineares, haud incrassatae, ca. 1 : 8, laevissimae, infimae fuscae, alares 3–4, magnae, oblongae. Fructus ignotus.

Saw Chaung, Chin Hills, on tree, 6000 ft., no. 8556a, **type**.

In this species the leaves are relatively broader and shorter acuminate than in *C. caudatum* (Bryol. Jav.) Fleisch. of Java, the cells are shorter and not incrassate and the reduced leaves of the caudate tips are short acuminate. *C. caudiforme* Dix. of India is described as having strongly denticulate leaves and very narrow cells.

Acanthocladium baculiferum Dix.

Nataung, Kareni State, open damp ground, 5000 ft., no. 9422-A; Nataung, Koreni State, on trees, shady slope, 5000 ft., no. 9428; Nataung, Kareni State, on trees, shady forest, 5300 ft., no. 9445; Pang Yang, Manglon State, on a rock, 5500 ft., no. 9813-B, 9814-B; Mong Pawk, Kengtung State, epiphytic and on ground in woods, 4000 ft., no. 9824.1, 9825.

Distribution: Assam.

As no. 9428 and 9445 in the above series are in fruit it is possible to add to the original description of this interesting species, previously known only from Assam, the following sporophyte characters. Perichaetial leaves erect, not strongly convolute, the inner lightly plicate,

oblong-ovate, rather abruptly acuminate, denticulate toward the extreme apex. Seta slender, smooth, reddish, strongly flexuose, to 3.5 cm. long. Capsule nodding, strongly asymmetrical, constricted under the oblique mouth when dry, urn about 2 mm. long, brown, gibbous on the upper side, abruptly constricted to a short neck. Peristome normal. Lid and calyptra not seen.

Acanthocladium benguetense Broth. var. **latifolium** Bartr. var. nov.

Ramis vix attenuatis. Folia caulina latiora, ad 0.75 mm. lata, abrupte acuminata, subintegra.

Nataung, Kareni State, on tree, shady forest, 5300 ft., no. 9444, **type**.

Although the differences between the Burma plants and those of the Philippines are quite marked the distinctions seem hardly wide enough to merit a new species. The Burma plant is more robust than the type from the Philippines and the branchlets are scarcely attenuate; the stem leaves are more broadly ovate, more abruptly acuminate and subentire.

Brotherella erythrocaulis (Mitt.) Fleisch.

Burma-Tibet Frontier, Adung Valley, uppermost Abies-Rhododendron forest, *F. Kingdon Ward*, 1930-31.

Distribution: Sikkim, Bhotan, Yunnan.

Sematophyllum tristichulum (Mitt.) Fleisch.

Pang Yang, Manglon State, rock, 5000 ft., no. 9822.

Distribution: Khasia, Assam, Ceylon, Siam, Java, Annam, Philippines.

Sematophyllum subhumile (C. Müll.) Fleisch.

Pang Yang, Manglon State, damp soil, 5000 ft., no. 9659-A.1.

Distribution: India.

Taxithelium nepalense (Schwaegr.) Broth.

Rangoon, Royal Lake, on damp earth, 40 ft., no. 8667.

Distribution: India, Ceylon, Sumatra, Java, Assam, Borneo, Philippines, Amboina.

HYPNACEAE

Hypnum plumaeforme Wils.

Mong Yang, Kengtung State, epiphyte and on damp soil, 3500 ft., no. 9863-A, 9863-B, 9866, 9870; Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9645.

Distribution: Korea, Japan, China, Formosa, Tonkin.

Ectropothecium dealbatum (Hornsch. & Reinw.) Jaeg.

Taunggyi, F.S.S., on tree, 5000 ft., no. 8780-A-1.

Distribution: Sumatra, Java, Borneo, Philippines.

Isopterygium Textori (Lac.) Mitt.

Wunba Taung, Chin Hill, no. 8482-A.

Distribution: South India, Malay Peninsula, Annam, Borneo, Philippines, Formosa, China, Japan.

Isopterygium albescens (Schwaegr.) Jaeg.

Tavoy (18 miles down), on trees, 1000 ft., no. 8012 in part.

Distribution: Himalayas, Sumatra, Java, Borneo, Philippines, Celebes, Pacific islands to Hawaii.

Ptilium crista-castrensis (Hedw.) DeNot.

Burma-Tibet frontier, Adung Valley, 12000 ft., *F. Kingdon Ward*, 1930-31.

Distribution: Europe, North America, Japan, Yunnan, Sikkim, Caucasus.

HYLOCOMIACEAE

Leptohymenium tenue (Hook.) Schwaegr.

Nataung, Kareni State, on trees, shady slope, 5000-6300 ft., no. 9429, 9446.2; Pang Yang, Manglon State, on trees, 5000-5500 ft., no. 9642-A.1, 9644; Falam-Haka, banks along paths, 6000 ft., no. 7292; Haka, mossy forest, epiphytic in shade, 7625 ft., no. 7501; Burma, without locality, no. 7427-A.

Distribution: North India, Khasia, Philippines.

Foreauella orthothecia (Schwaegr.) Dix.

Taunggyi, F.S.S., epiphytic, damp ground, and on dry slope, 4500 ft., no. 9060, 9067, 9498; Mong Yang, Kengtung State, epiphyte, 3500 ft., no. 9872; Naungkhio, Thibaw, on rocks, 2800 ft., no. 9540; Mt. Popa, 4000 ft., no. 105; N'Bapa, no. 107.

Distribution: Himalayas, South India, Siam, Philippines.

Macrothamnium macrocarpum (Hornsch. & Reinw.) Fleisch.

Ah-Shai-Hymin, Ah-Naught, Hymin Lawk Sawk State, on tree, 7600 ft., no. 8647, a slender form; Mt. Victoria, no. 8531-A; Taungteik (Falam), mountain path side, 5000 ft., no. 7258; Haka, on rocks and trees, 6200 ft., no. 7701; Taunggyi, F.S.S., open damp ground and on trees, 4500-5500 ft., no. 8102, 8773, 9076, 9082, 9087; Pang Yang, Manglon State, epiphyte, 5000 ft., no. 9646, slender form.

Distribution: East India, Ceylon, Sumatra, Java, Borneo, Philippines, Hawaii.

Macrothamnium submacrocarpum (Hampe) Fleisch.

Haka, mossy forest, epiphytic, shady, 7625 ft., no. 7497.

Distribution: Himalayas, Khasia.

POLYTRICHACEAE

Atrichum flavisetum Mitt.

Taunggyi, F.S.S., damp ground and rocks, 4500–5000 ft., no. 9065, 9080.1, 9093.

Distribution: Himalayas, Philippines, Japan.

Atrichum undulatum (Bry. Eur.) Limp.

Taunggyi, F.S.S., on damp ground and rocks, 5000 ft., no. 8782, 9359.
Distribution: wide in north temperate zone, Japan, China, Cochinchina.

Pogonatum Junghuhnianum (Doz. & Molk.) Bryol. Jav.

Taunggyi, F.S.S., on damp ground, 4500 ft., no. 9074, 9077, 9080, 9086; Nataung, Kareni State, damp open slope, 5000 ft., no. 9420.

Distribution: Sikkim, Siam, Java, Celebes, Borneo, Philippines.

Pogonatum inflexum Lindb.

Mt. Victoria, Chin Hills, on rock, 5000 ft., no. 8511; Thandaung, Taungoo, on rocks and damp places, 3400–4500 ft., no. 6730, 8167; Taungteik, (Falam), open mountain side, 5000 ft., no. 7264; Mt. Nwalabo, Tavoy, on rocks and shady dry slope, 5000 ft., no. 8203-A, 8204; Zokhua (Haka), banks, 4800 ft., no. 7687.A; Pang Yang, Manglon State, epiphyte, 5000–5500 ft., no. 9655, 9689.1.

Distribution: Japan, Formosa, China, Siam.

Pogonatum gymnophyllum Mitt.

Haka, mossy forest, 7600 ft., no. 7577.

Distribution: Himalayas, China, Tonkin, Formosa, Philippines, Celebes.

Pogonatum microstomum (R. Br.) Brid.

Wunba Taung, Chin Hill, on rocks, 7900 ft., no. 8482; Webula, along the path where there is damp and shade, no. 7785; Taungteik (Falam), damp banks, 4500 ft., no. 7549.

Distribution: Himalayas, Khasia, Nilghiri, Ceylon, West China, Philippines.

Polytrichum xanthopilum Wils.

Burma-Tibet Frontier, Adung Valley, 12000 ft., *F. Kingdon Ward*, Coll.
Distribution: Sikkim.

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