

A Contribution to the Bryological Knowledge of Fraser's Hill Station (Malaysia)

BY P. TIXIER*

SUMMARY

The author gives the list of his own collections from Fraser's Hill (Pahang). It indexes 78 species of Mosses and 67 of Liverworts and four are new to Science: *Syrrhopodon fraserianus*, *Trichosteleum fruticolum*, *Cololejeunea pahangiana* and *Lejeunea pilifera*.

In the course of my monographic studies of the Liverwort genus *Cololejeunea*, I was struck by the paucity of herbarium collections and the small number of localities visited in Malaya. In the work of Benedix (1947) only 14 species were listed while the localities were confined to the Southern part of the Malayan Peninsula such as Mt. Ophir and to Singapore. His publication drew attention at once to Fraser's Hill as a hill station for the collection of Liverworts. As for the Malayan Mosses, the last publication is by Dixon and dates as far back as 1926. Subsequently few data has been published.

Fraser's Hill is a station situated 112 km from Kuala Lumpur, at an altitude of about 1,400 m on a ridge (of the Main Range) near the water parting between Pahang and Selangor, and has an annual rainfall between 3,000 and 4,000 mm. Discovered in 1916, the site was surveyed in 1919 and was soon developed by the Governments of Pahang and the Federated Malay States. The location and the vegetation resemble those observed in Bach Ma (Central Vietnam) in that Fraser's Hill also lies on top of a ridge and the vegetation is similarly an oak mountain forest. As is also the case in Bach Ma, *Cyathea* reaches 5-6 m high and also many palms such as *Caryota*, *Licuala*, and *Pinanga* occur. The Northern side may be wetter than the Southern, but nowhere was the elfin-woodland forest seen. The vegetation remains relatively disturbed and bushes of ferns represent the secondary vegetation. It was observed that practically all the collections in windy and sunny localities were made on the very various coniferous trees planted along the roads of the station and in the garden of Fraser's Hill Hotel. For the Mosses in my list, new species for Fraser's Hill are marked "*" and those for Malaya marked "***".

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Mosses

- * *Dicranoloma braunii* (C. Muell.) Par.
On coniferous barks, 25/XII/1969, nos 4611, 4763, 4762.
Indochina, Malesia, New Guinea, New Caledonia, Pacific Islands.
- * *Leucoloma molle* (C. Muell.) Mitt.
On trunks in evergreen forest, 26/XII/1969, no 4756.
Indochina, Malesia.
- ** *Campylopus caudatus* (C. Muell.) Mont.
On trunks, 28/XII/1969, no 4858.
Himalaya, Ceylon, Sumatra, Borneo, Moluccas, Luzon, Mindanao.
- Campylopus hemitrichus* (C. Muell.) Jaeg.
On trunks and rocks, 26/XII/1969, no 4764.
Luzon, Borneo, Sumatra.
- * *Leucobryum aduncum* Doz. & Molk.
On rotten logs in evergreen forest, 26/XII/1969, no 4750.
From Himalaya to New Caledonia.
- * *Leucobryum bowringii* Mitt.
On bark in evergreen forest, 28/XII/1969, no 4838.
Ceylon, Malesia, Indochina, China, Formosa, Japan.
- * *Leucobryum javense* (Brid.) Mitt.
Very common on trunks, grounds and banks, 25/XII/1969, no 4610.
India, Ceylon, Indochina, Malesia, China, New Guinea.
- Octoblepharum albidum* Hedw.
On trunks of coniferous trees, 25/XII/1969, no 4608.
Pantropical.
- Exodictyon blumii* (C. Muell.) Fleisch.
On trunks, in evergreen forest, 26/XII/1969, no 4739.
Java, Borneo, Luzon, Negros, Thailand, Cambodia, Vietnam.
- * *Syrrhopodon albidus* Thw. & Mitt.
On trunks, in evergreen forest, 26/XII/1969, no 4760.
Ceylon, Malaya.
- Syrrhopodon fraserianus* sp. nov.
On bark, in sunny position, 26/XII/1969, no 4769.
- Syrrhopodon tristichus* Nees
On bark in evergreen forest, 26/XII/1969, no 4740.
Ceylon, Sumatra, Java, Ambon, Borneo, Thailand, Luzon, Negros.
- * *Thyridium fasciculatum* (Hook. & Grev.) Mitt.
On twigs in sunny position, 25/XII/1969, nos 4719, 4775.
Nepal, Ceylon, Malaya, Thailand, Cambodia, Java, Sumatra, Moluccas, Mauritius, New Caledonia, Louisiade, Palau, Carolines, Samoa, Pitcairn.
- * *Thyridium undulatum* (Broth. & Ged.) Fleisch.
On trunks, in sunny station, 26/XII/1969, no 4757.
Sumatra, Java, Sulawesi, Borneo, New Guinea, Singapore.

- ** *Calymperopsis langbianensis* P. Tixier
On twigs of coniferous trees, 25/XII/1969, no 4721.
Thailand, Cambodia, Vietnam.
- ** *Calymperes nietnerii* C. Muell.
On trunks in evergreen forest, 26/XII/1969, no 4792.
Java, Ceylon, Thailand.
- * *Calymperes serratum* A. Braun
On rotten wood in evergreen forest, 26/XII/1969, no 4789.
Indochina, China, Malesia, New Caledonia, Micronesia.
- * *Hyophila involuta* (Hook.) Jaeg.
On wet banks, 26/XII/1969, no 4780.
Ceylon, Malesia, Indochina.
- * *Hydrogonium consanguineum* (Thw. & Mitt.) Hilp.
On wet banks, 28/XII/1969, no 4843.
Ceylon, Luzon, Singapore, Java.
- ** *Brachymenium exile* (Doz. & Molk.) Bosch. & Lac.
On wet banks, 26/XII/1969, no 4793.
India, Japan, Formosa, Korea, Ceylon, Java, Sumatra, Hawaii,
Vietnam.
- ** *Brachymenium nepalense* Hook.
Very common, on trunks, roofs etc., 28/XII/1969, no 4853.
Indochina, India, Malesia.
- * *Rhodobryum giganteum* (Schwaegr.) Par.
On banks, 25/XII/1969, no 4606.
Mascarchenas, India, Ceylon, Malesia, Indochina, China,
Japan.
Rhizogonium spiniforme (Hedw.) Bruch.
Very common, but weakly developed, 26/XII/1969, no 4773.
Pantropical.
- Mniodendron divaricatum* (Reinw. & Hornsch.) Lindb.
On ground in wet evergreen forest, 26/XII/1969, no 4796.
Sumatra, Java, Borneo, Sulawesi, Luzon, Negros, Mindanao,
Mindoro, Malaya.
- * *Philonotis hastata* (Duby) Wijk & Marg.
On wet banks, 27/XII/1969, nos 4821, 4823.
Madagascar, Thailand, Sumatra, Java, Malaya, Borneo, Luzon,
Laos, Hawaii.
- * *Macromitrium cumingii* C. Muell.
On coniferous bark, 26/XII/1969, no 4771.
Thailand, Java, Philippines, New Guinea, Carolines, Marshall,
Vietnam.
- ** *Macromitrium reinwardtii* Schwaegr.
On coniferous barks, in sunny position, 28/XII/1969, no 4836.
Java, Borneo, Sulawesi, Tahiti, Tasmania, Cambodia.
- * *Groutiella goniorrhyncha* (Doz. & Molk.) Wijk. & Marg.
On bark and branches of coniferous trees, 25/XII/1969,
no 4735.
India, Indochina, Malesia, New Guinea.

- * *Desmotheca apiculata* (Doz. & Molk.) Lindb.
On branches in sunny positions, 27/XII/1969, nos 4817, 4833.
Singapore, Sumatra, Java, Borneo, Ambon, Vietnam.
- ** *Racopilum schmidii* (C. Muell.) Mitt.
On trunks in evergreen forest, 27/XII/1969, no 4816.
Nilghiris, Philippines, Indochina.
Endotrichella elegans (Doz. & Molk.) Fleisch.
On banks mixed with *Aerobryopsis longissima*, 28/XII/1969, no 4851.
Sumatra, Java, Malesia, Vietnam, Formosa, Philippines, Carolines.
- ** *Garovaglia plicata* (Brid.) Bosch & Lac.
On coniferous bark, 28/XII/1969, no 4837.
Sikkim, Sumatra, Java, Ceram, Luzon, Mindanao.
- ** *Pterobryopsis crassicaulis* (C. Muell.) Fleisch.
On trunk of *Podocarpus* sp., 25/XII/1969, 4603, 4728.
Ceylon, Sumatra, Java, Philippines, Vietnam.
- ** *Pterobryopsis gedehensis* Fleisch.
On trunk in evergreen forest mixed with *Homaliodendron flabellatum*, 27/XII/1969, no 4801.
Java, Cambodia, Mindanao.
- ** *Symphysodontella cylindracea* (Mont.) Fleisch.
On trunk in evergreen forest, 27/XII/1969, no 4824.
Sumatra, Java, Mindanao, Ambon, New Caledonia, Samoa, Tahiti, Rarotonga, Cook Islands, Thailand, Fiji, Vietnam.
- * *Papillaria fuscescens* (Hook.) Jaeg.
On trunks and twigs in sunny stations, 25/XII/1969, no 4732.
Himalaya, India, Ceylon, Indochina, China, Malesia.
- ** *Aerobryidium filamentosum* (Hook.) Fleisch.
Pendulous on twigs in sunny stations, 26/XII/1969, no 4786.
India, Himalaya, China, Ceylon, Indochina, Malesia.
Aerobryopsis longissima (Doz. & Molk.) Fleisch.
On banks and on twigs in sunny stations, 25/XII/1969, nos 4605, 4718, 4737.
From Himalaya till Pacific Islands.
- * *Floribundaria floribunda* (Doz. & Molk.) Fleisch.
Common on twigs in sunny stations, 25/XII/1969, no 4720.
Madagascar, India, Himalaya, Indochina, Ceylon, Japan, New Guinea, Pacific Islands.
- ** *Floribundaria pseudofloribunda* Fleisch.
On branches in evergreen forest, 27/XII/1969, no 4815.
Northern Vietnam, Java, Luzon, New Guinea, New Hebrides, Queensland.
- ** *Trachyloma indicum* Mitt.
On coniferous trunks in sunny station, 27/XII/1969, no 4803.
Ceylon, Indochina, Malesia, New Guinea.

- * *Homaliiodendron flabellatum* (Smith) Fleisch.
On trunks in evergreen forest, 26/XII/1969, no 4752.
From India to Pacific Islands.
- * *Pinnatella kuehliana* (Bosch & Lac.) Fleisch.
On trunks in evergreen forest, 27/XII/1969, no 4814.
Sulawesi, Sumatra, Java, Malaya, Ceram, New Guinea.
- * *Pinnatella microptera* Fleisch.
On coniferous trunks in sunny stations, 28/XII/1969, no 4839.
Luzon, Borneo, Thailand, Singapore.
- * *Ephemeropsis tijbodensis* Goeb.
Epiphyllous in evergreen forest, 28/XII/1969, no 4666.
South East Asia from Laos to New Guinea.
Distichophyllum mittenii Bosch & Lac.
On rotten logs in evergreen forest, 26/XII/1969, no 4785.
Ceylon, Malaya, Java, Palawan, Cambodia, Formosa, Aneityum, New Caledonia.
- ** *Chaetomitrium torquescens* Bosch & Lac.
On twigs in sunny positions, 27/XII/1969, no 4809.
From Java to New Guinea.
- ** *Lopidium trichoclados* (Bosch & Lac.) Fleisch.
On trunks in forest and sunny positions, 27/XII/1969, no 4825.
Java, Moluccas, Thailand, Laos, Vietnam, Cambodia.
- ** *Cyathophorella tenera* (Bosch & Lac.) Fleisch.
On trunks in evergreen forest and in sunny positions, 27/XII/1969, no 4827.
Sumatra, Sumbawa.
- * *Thuidium meyenianum* (Hpe.) Doz. & Molk.
On ground mixed with *Pogonatum*, 26/XII/1969, no 4784.
Himalaya, Ceylon, Malesia, New Guinea, Melanesia.
- ** *Rhynchostegium celebicum* (Lac.) Jaeg.
On trunks in evergreen forest, 25/XII/1969, no 4615.
Luzon, Thailand, Vietnam, Sumatra, Java, Sulawesi, Hawaii.
- * *Campylodontium flavescens* (Hook.) Bosch & Lac.
(Syn.: *Cribrodontium wernerii* Herz.)
At the base of tree in sunny positions, c. fr., 27/XII/1969, no 4826.
From Himalaya to Luzon.
- * *Clastobryella asperrima* Dix.
On twigs, 25/XII/1969, nos 4722, 4800; 27/XII/1969, no 4835.
Malaya, New Caledonia, Aneityum.
- ** *Acanthocladium alboalare* P. Tixier.
On trunk in evergreen forest, 26/XII/1969, no 4772.
Vietnam.

- * *Trismegistia calderensis* (Sull.) Broth.
On rotten wood in evergreen forest, 26/XII/1969, nos 4738, 4768.
Sumatra, Java, Malaya.
- Trismegistia rigida* (Mitt.) Broth.
Same station, 26/XII/1969, nos 4739, 4741.
Indochina, Malesia, New Guinea, New Caledonia.
- ** *Meiothecium hamatum* (C. Muell.) Broth.
On twigs of coniferous trees, 25/XII/1969, no 4731. (cf)
Ceylon, Sumatra, Java, Fiji, Panay, Samoa, Vietnam, Cambodia.
- * *Acroporium aciphyllum* Dix.
On banks, 28/XII/1969, no 4848.
Malaya.
- * *Acroporium albidissimum* Dix.
On rotten wood in evergreen forest, 26/XII/1969, no 4751.
Thailand, Malaya.
- Acroporium diminutum* (Brid.) Fleisch.
On rotten wood in evergreen forest, 28/XII/1969, no 4855.
Java, Philippines, Moluccas, Malaya, Vietnam.
- * *Acroporium falcifolium* (Fleisch.) Fleisch.
On rotten wood in evergreen forest, 27/XII/1969, no 4799.
Sumatra, Java, Malaya, Sulawesi, Philippines.
- * *Acroporium hamulatum* (Fleisch.) Fleisch.
On trunks in evergreen forest, 26/XII/1969, nos 4732, 4770, 4781, 4782; 28/XII/1969, nos 4846, 4847.
Java, Luzon, Vietnam, Cambodia, Malaya.
- Acroporium longicuspis* Dix.
On rotten wood in evergreen forest, 27/XII/1969, no 4842.
Malaya.
- Acroporium secundum* (Reinw. & Hornsch.) Fleisch.
On banks, 28/XII/1969, nos 4837, 4847, 4776.
Sumatra, Java, Borneo, Sulawesi, Ceram.
- ** *Acroporium cf vincensianum* (Thér.) Broth.
Common on rotten logs in evergreen forest, c.fr., 26/XII/1969, nos 4738, 4758, 4798.
Vietnam, Cambodia.
- Trichosteleum boschii* (Doz. & Molk.) Jaeg.
On trunk in evergreen forest, 26/XII/1969, no 4769.
Indochina, Malesia.
- ** *Trichosteleum fruticolum* sp. nov.
Small collections on twigs, 28/XII/1969, no 4852.
Known from Bokor in Cambodia.
- Trichosteleum hamatum* (Doz. & Molk.) Jaeg.
On rotten wood in evergreen forest, 26/XII/1969, no 4787.
From South East Asia to the Pacific Islands.
- ** *Acanthorrhynchium papillatum* (Harv.) Fleisch.
On rotten wood in evergreen forest, 26/XII/1969, no 4742.
From South East Asia and Nepal to the Pacific Islands.

- * *Taxithelium kerianum* (Broth.) Broth.
On trunks in evergreen forest, 26/XII/1969, no 4765.
Australia, Malesia, Indochina, New Guinea.
- * *Taxithelium vernierii* (Duby) Besch.
On twigs in evergreen forest, 27/XII/1969, no 4819.
Indochina, Malesia.
- ** *Glossadelphus zollingerii* (C. Muell.) Fleisch.
On twigs, 27/XII/1969, no 4834.
Java, Sulawesi, Luzon, Fiji, Hawaii.
Ectropothecium buitenzorgii (Bel.) Mitt.
Very common, banks, base of trunks, twigs, 25/XII/1969,
nos 4725, 4774.
Indochina, Malesia.
- * *Ectropothecium ichnotocladium* (C. Muell.) Jaeg.
On rotten wood in evergreen forest, 27/XII/1969, no 4813.
Luzon, Sumatra, Java, Borneo, Sulawesi, Ambon, Vietnam.
- * *Isopterygium albescens* (Hook) Jaeg.
On wood near the ground in evergreen forest, 25/XII/1969,
no 4736; 26/XII/1969, no 4745; 27/XII/1969, no 4831.
From Nepal to Pacific Islands.
Isopterygium bancanum (Lac.) Jaeg.
On rotten wood in evergreen forest, 28/XII/1969, no 4839.
Java, Malaya, Banka, Luzon.
Pogonatum junghuhnianum (Doz. & Molk.) Doz. & Molk.
On banks in forest, 27/XII/1969, no 4830.
Java, Nilghiri, Indochina, Philippines.
Pogonatum macrophyllum Doz. & Molk.
On banks in forest, 26/XII/1969, nos 4790, 4791; 25/XII/
1969, no 4604; 27/XII/1969, no 4829; 28/XII/1969, no
4857.
Malaya, Sumatra, Java, Moluccas, Sulawesi, Luzon, Negros,
Mindanao, Cambodia.

Liverworts

- Anthoceros glandulosus* Lem. & Lindb.
On stones in the garden of the hotel, 27/XII/1969, no 4820.
Common in South East Asia.
- Marchantia acaulis* St.
On wet bank, 26/XII/1969, no 4794.
Perak.
- Metzgeria furcata* (L.) Dum.
Epiphyllous in evergreen forest, 27/XII/1969, no 4703.
Cosmopolitan.
- Chiloscyphus argutus* (Reinw. Blum Nees) Nees
On rotten wood in evergreen forest, 27/XII/1969, no 4849.
From Tropical Asia to Australia.

* Species new for Fraser's Hill.

** Species new for Malaya.

Chiloscyphus communis St.

On rotten wood in wet ground, 26/XII/1969, no 4776;
28/XII/1969, no 4849.

Himalaya, Indochina, Malesia, Japan, Queensland.

Bazzania calcarata **comb. nov.** (= *Mastigobryum calcaratum*
Sande Lacoste, Ann. Mus. Lugd. Bat. 1863 in Stephani
Spec. Hep. III, 1908, 498).

On rotten wood in evergreen forest, 26/XII/1969, no 4766.

Java, Malaya, Borneo.

Bazzania caudata **comb. nov.** (= *Mastigobryum caudatum*
St., Spec. Hep. III, 1908, p. 947).

On rotten wood in evergreen forest, 26/XII/1969.

Pulau Penang.

Bazzania commutata **comb. nov.** (= *Mastigobryum commuta-*
tum L. & G., Spec. Hep. 1839–1851, p. 97 et in Stephani,
Spec. Hep. III, 1908, p. 509).

On bark, 25/XII/1969, nos 4609, 4612.

Java.

Bazzania intermedia (G.) Lellorg.

On rotten wood in evergreen forest, 26/XII/1969, no 4783.

Ambon, Banda, Samoa, Philippines, Tonkin, Nilghiri, Ryu
Kiu.

Bazzania malaccensis **comb. nov.** (= *Mastigobryum malac-*
cense St., Species Hepaticarum, III, 1908, p. 494).

On rotten wood in evergreen forest, 26/XII/1969, no 4768.
Perak.

Bazzania pectinata **comb. nov.** (= *Mastigobryum pectinatum*
L. & G., Spec. Hep., p. 84 et Stephani, Spec. Hep., III,
1908, p. 445).

On bark in forest, 26/XII/1969, nos 4743, 4759.

Bazzania spiralis (Reinw. Bl. Nees) Meijer.

On rotten wood in evergreen forest, 26/XII/1969, no 4755.

Thailand, Malaya, Banka, Sumatra, Borneo, Cambodia.

Lepidozia cf quadridens (N. & E.) Lindb.

On rotten log in forest, 26/XII/1969, nos 4749, 4779.

Java, Indo Malesia, Brazil.

Herberta cf parisii (St.) Miller.

In low situation on trunk, 28/XII/1969, no 4859.

Plant between *H. parisii* and *H. ceylanica*. This genus seems
new for Malaya.

Mastigophora diclados (Brid.) Nees.

In clusters along the banks of the roads, 26/XII/1969, no
4767. On wood, in clear forest, 26/XII/1969, no 4754.

Pantropical.

Radula nymanii St.

On trunks, in sunny situations, 27/XII/1969, no 4810.

Epiphyllous on *Araucaria* leaves, 26/XII/1969, nos 4718, 4680.

Java, Samoa, Philippines, Vietnam, New Guinea.

Caudalejeunea stephanii (Spr.) St.

Epiphyllous in evergreen forest, 26/XII/1969, no 4718.

From Mascarenhas to Tropical Oceania.

Cheilolejeunea (Xenolejeunea) meyeniana Kachroo & Schuster

Epiphyllous in evergreen forest, 26/XII/1969, no 4664.

South East Asia.

Cheilolejeunea (Xenolejeunea) imbricata Schuster & Kachroo.

Bark of coniferous trees, 25/XII/1969, no 4729. Epiphyllous in evergreen forest, very common, 26/XII/1969, nos 4620, 4671; 27/XII/1969, nos 4685, 4716, 4718.

Tropical Asia and Oceania.

Cololejeunea (Cryptolejeunea) ciliatilobula Schiffn.

Epiphyllous in evergreen forest, 26/XII/1969, nos 4647, 4670.

Vietnam, Cambodia, Malaya, Java, Sumatra, Moluccas.

Cololejeunea (Taeniolejeunea) floccosa (L. & L.) St.

Epiphyllous in evergreen forest, 27/XII/1968, nos 4688, 4704.

Formosa, Japan, China, Philippines, Borneo, Java, Sumatra, Chittagong, Thailand, Cambodia, Laos, Vietnam, Sierra Leone.

Cololejeunea (Taeniolejeunea) falcatoides Benedix.

Epiphyllous in evergreen forest, 27/XII/1969, nos 4692, 4699, 4703, 4686; 26/XII/1969, nos 4673, 4668.

Sumatra, Java, Borneo, Thailand, Cambodia, Sulawesi, Philippines.

Cololejeunea (Taeniolejeunea) gynophthalma Benedix.

Epiphyllous on *Araucaria* leaves, 26/XII/1969, nos 4618, 4635, 4636, 4670.

Sumatra, Java, Vietnam, Thailand, Luzon, Cambodia.

Cololejeunea (Lasiolejeunea) jelinekii (St.) Benedix.

Epiphyllous in evergreen forest, 26/XII/1969, nos 4632, 4635, 4636, 4657; 27/XII/1969, no 4705.

Sumatra, Java, Nicobar.

Cololejeunea (Lasiolejeunea) karstenii (St.) Benedix.

Epiphyllous in evergreen forest, 26/XII/1969, no 4646; 27/XII/1969, no 4708.

Java, Vietnam (?).

Cololejeunea (Taeniolejeunea) leonidens Benedix.

Very common, epiphyllous on palms, 26/XII/1969, nos 4620, 4621, 4622, 4623, 4624, 4625, 4626, 4627, 4628, 4679, 4678; 27/XII/1969, nos 4680, 4692, 4698, 4700, 4718.

Sabah, Malaya, Java.

Cololejeunea pusilla P. Tixier.

Epiphyllous in evergreen forest, 27/XII/1969, no 4683.

Thailand, Cambodia.

Cololejeunea (Pedinolejeunea) pahangiana sp. nov.

Epiphyllous in evergreen forest, 27/XII/1969, no 4703.

Cololejeunea (Taeniolejeunea) oshimensis (Horik.) Benedix.

Epiphyllous in evergreen forest, 26/XII/1969, nos 4653, 4654, 4656, 4670, 4671, 4688, 4699; 27/XII/1969, nos 4703, 4714, 4715, 4716, 4718.

Japan, Formosa, Foukkien, Vietnam, Cambodia, Thailand, Malaya, Sumatra, Java, Sulawesi, Laos.

Cololejeunea (Pedinolejeunea) triapiculata **comb. nov.**

(= *Leptolejeunea triapiculata* Herz. Ann. Bryol. 1932, 5, 95)

Epiphyllous in evergreen forest, 26/XII/1969, no 4646, 27/XII/1969, no 4703.

Java, Sumatra.

Cololejeunea (Chlorocolea) sigmoidea S. Jovet-Ast & P. Tixier.

Epiphyllous in evergreen forest, 26/XII/1969, no 4620.

Java, Sabah, Thailand, Cambodia, Vietnam.

Cololejeunea wightii St.

Epiphyllous in evergreen forest, 27/XII/1969, no 4708.

Malaya, Thailand, Cambodia, Micronesia.

Colura acroloba (Mont.) S. Jovet-Ast

Epiphyllous in evergreen forest, 26/XII/1969, nos 4648, 4655, 4658, 4663; 27/XII/1969, nos 4689, 4715, 4716, 4718.

Ceylon, Cambodia, Sumatra, Java, Vietnam, Borneo, Philippines, New Caledonia.

Diplasiolejeunea brachyclada Ev.

Epiphyllous in evergreen forest, 26/XII/1969, no 4665; 27/XII/1969, no 4689.

Caribbean area and South East Asia.

Drepanolejeunea laevicornua St.

Epiphyllous in evergreen forest, 26/XII/1969, nos 4653, 4660. Java.

Drepanolejeunea tenera Goeb., forma *goebelii* Herz.

Epiphyllous in evergreen forest, 26/XII/1969, no 4674; 27/XII/1969, nos 4699, 4705.

Sumatra, Java, Borneo.

Drepanolejeunea tenuis (Nees) Schiffn.

On twigs of coniferous trees, 25/XII/1969, no 4612.

Sumatra, Java, Philippines, Vietnam.

Drepanolejeunea thwaitesiana (Mitt.) St.

Epiphyllous in evergreen forest, very common, 26/XII/1969, nos 4658, 4688; 27/XII/1969, nos 4706, 4718.

Ceylon, Sumatra, Java, Borneo, Philippines, New Guinea, Vietnam, Thailand, Cambodia.

Lejeunea pilifera **sp. nov.**

On trunks and twigs in sunny positions, 27/XII/1969, no 4811.

Lopholejeunea subfusca St.

On wood in evergreen forest, 27/XII/1969, nos 4802, 4828.

Ceylon, Cambodia, Thailand, Vietnam, Malaya, Sumatra, Krakatau, Java, Borneo, Philippines, Formosa, Ryu Kiu, New Guinea, New Caledonia, Samoa, Tahiti.

Leptolejeunea massartiana Herz. ex. Schiffn.

Epiphyllous in evergreen forest, 27/XII/1969, no 4714.
Java, Sumatra.

Leptolejeunea foliicola St.

Epiphyllous in evergreen forest, 27/XII/1969, no 4716.
Malaya, Sumatra, Java, Cambodia, Vietnam, Philippines.

Leptolejeunea subacuta St.

Epiphyllous in evergreen forest, 27/XII/1969, no 4716.
Ryu Kiu, Vietnam, Cambodia, Bonins, Japan, Malaya,
Sumatra, Borneo, Philippines, Botel Tobago.

Leptolejeunea vitrea (Nees) L.

Epiphyllous in evergreen forest, 26/XII/1969, no 4718.
Sumatra, Java, Borneo, Philippines, Malaya, Moluccas, Laos,
Cambodia, Vietnam.

Leucolejeunea xanthocarpa (L. & L.) Ev.

Epiphyllous in evergreen forest, 26/XII/1969, no 4665.
Pantropical.

Microlejeunea cucullata (Nees) St.

Bark of coniferous trees, 25/XII/1969, no 4724; epiphyllous
in evergreen forest, very common, 27/XII/1969, nos 4699,
4718.

Tropical Asia and Oceania.

Pycnolejeunea excisula St.

Epiphyllous in evergreen forest, 26/XII/1969, no 4665.
Java.

Pycnolejeunea cf. *gigantea* St.

Epiphyllous in evergreen forest, 26/XII/1969, no 4620.
Species between *Pycnolejeunea gigantea* St. (with smaller
lobuli) and *P. grandistipulata* (Gott.) St., South American
taxon with leaves slightly acuminate at the apex.

Pycnolejeunea cf. *punctata* St.

On bark of coniferous trees, 25/XII/1969, nos 4726, 4846.
Bismarck Archipelago.

Ptychantus striatus (L. & L.) St.

On bark, 28/XII/1969, no 4850.
Japan, Ryu Kiu, Formosa, Ambon, Malesia, Burma, Assam
India, Madagascar, Africa.

Stenolejeunea apiculata (Gott.) Schuster.

Epiphyllous in evergreen forest, 26/XII/1969, nos 4646,
4665, 4682; 27/XII/1969, nos 4702, 4705.
Java, Philippines, Formosa, Malaya, Cambodia, Vietnam,
New Caledonia.

Taxilejeunea compressiuscula (St.) Eifrig

On sunny bark, 28/XII/1969, no 4845.
Johore, Sumatra, Java, Philippines.

Taxilejeunea luteola (St.) Eifrig

On twigs of *Podocarpus*, 25/XII/1969, no 4607.
Java.

Thysananthus spathulistipus (Reinw. Bl. Nees) St.

On twigs, 26/XII/1969, no 4753.

Southern Africa, Madagascar, India, Ceylon, Malesia, Vietnam, Cambodia, Laos.

Tuyamaella angulistipa (St.) Hattori

Corticolous on twigs of coniferous trees, 25/XII/1969, no 4612, 4723

Epiphyllous 26/XII/1969, nos 4628, 4678; 27/XII/1969, no 4716.

Java, Perak, Borneo, Vietnam, Cambodia.

Frullania apiculata Auct. var. *goebelii* Schiffn.

Epiphyllous in evergreen forest, 27/XII/1969, nos 4685, 4718; corticolous 28/XII/1969, no 4841.

Ceylon, Vietnam, Malesia, Moluccas.

Frullania cf. *cochleata* St.

On trunk, 25/XII/1969, no 4734.

New Guinea.

Frullania grandistipula Lindenb.

On twigs, 28/XII/1969, no 4854.

Ceylon, Sumatra, Java.

Frullania meyeniana Lindenb.

On trunk in sunny station, 25/XII/1969, no 4733.

Java, Philippines, Vietnam, Thailand, Cambodia, Laos, Hawaii.

Frullania ternatensis Gott.

Pendulous, on trunks, 25/XII/1969, no 4730, 28/XII/1969, no 4818.

Malaya, Ceylon, Sumatra, Java, Borneo, Sulawesi, Ternate, Philippines, Vietnam, Laos, Cambodia.

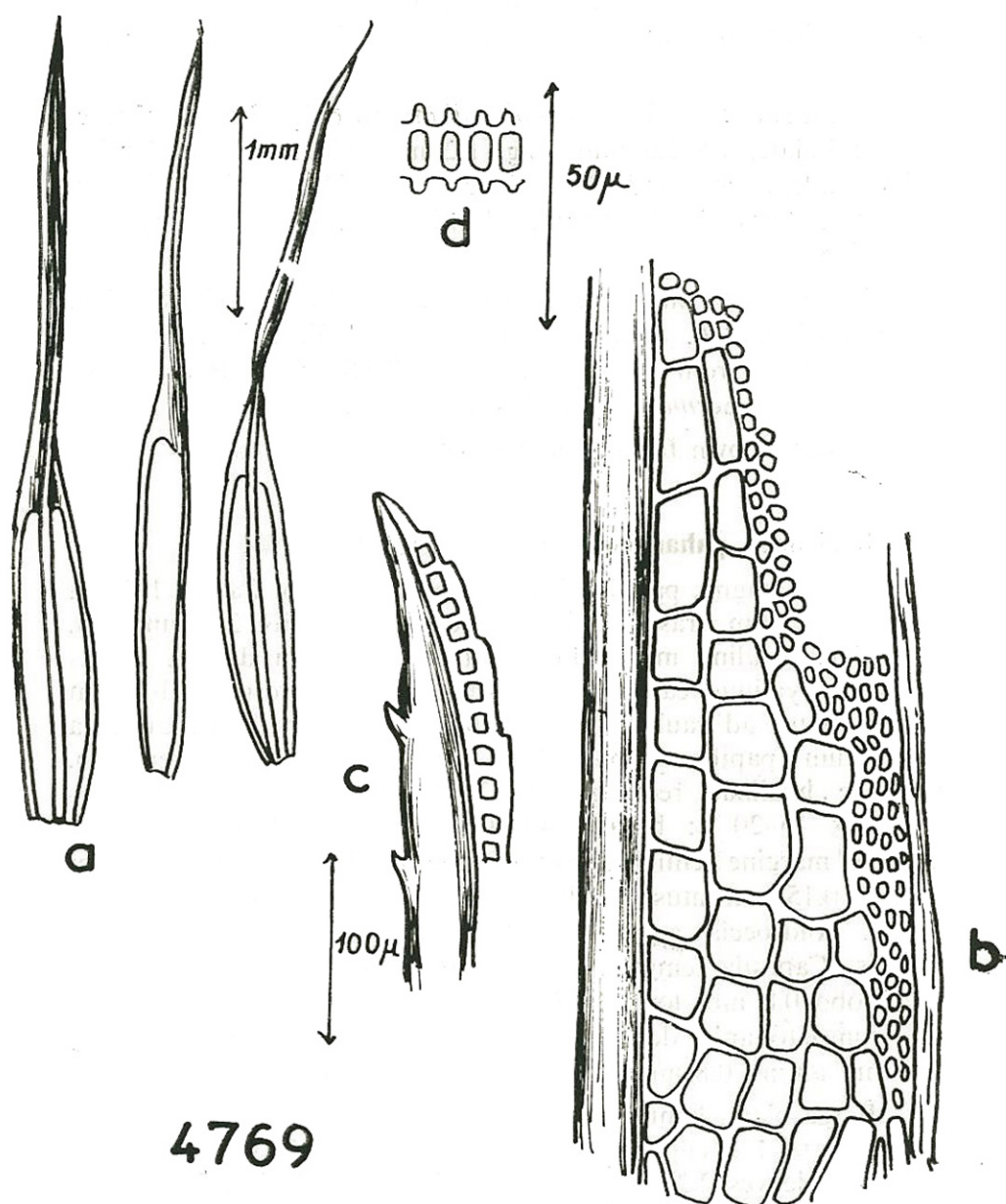
New Species

Syrrhopodon fraserianum sp. nov. Fig. 1

Planta parva, corticola, brevis, pallide viridis. Folia usque 3.5–4.0 mm longa, 0.4 mm lata ad partem vaginalem. Cancellinae 1.4 mm longae cum 5 ordinibus cellularum. Cellulis parietum crassis, 7–8 μ in diametro, unipapillosis. Apex folii cum margine denticulato, innervoque spinosus. Alia desunt.

Small corticolous plant, light green, stem short. Leaves 3.5–4.0 mm long, 0.4 mm wide near the sheath. Lattices 1.4 mm long, with 5 rows of cells. Cells of the lamina 7–8 μ in diameter, with thick walls and a papilla on both sides of the leaf. Apex with some teeth on the margin and spiniferous on the back of the nerve.

This little species is between *Syrrhopodon larminatii* Broth & Par. by the ornament of the cells, and, *S. leucophanoides* Card. & P. Vard. and *S. calymperoides* Card. & P. Vard. by the form of the leaf.



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Fig. 1. *Syrrhopodon fraserianum*:
a, Leaves; b, Cancellinae; c, Top of the leaf; d, Cells.

Trichosteleum fruticolum *sp. nov.* **Fig. 2**

Similis *T. subcucullifolium*; haec planta ramicola, breviter ramosa. Folia obtusa, in apice, marginibus recurvis, 1.8–2.0 mm longa, 1.2 mm lata. Cellulis alaribus, inflatis, pariete incrassatis, cellulis laminae 70 μ longis, 7 μ latis cum papillis crassis, 5 μ in diametro. Apex leviter crenulatus, brevis cum cellulis scutulatis. Cetera desunt.

In habit similar to *T. subcucullifolium*, on twigs. Leaves obtuse, apex tubulate, 1.8–2.0 mm long, 1.2 mm wide. Cells of lamina thick walled, elongated, 70 μ long, 7 μ wide. Papillae 5 μ in diameter. Apex lightly crenulated. Margin cells 70 μ long and 5 μ wide.

This species is near the following: *T. chaetomitriopsis* Dix. from Thailand, *T. montanum* P. Tix. and *T. subcucullifolium* Par. & Broth from Vietnam, *T. everettii* Dix. from Borneo and, finally *T. brongsermae* Zant. of New Guinea.

It is also known from Mount Bokor in Cambodia.

Cololejeunea pahangiana *sp. nov.* **Fig. 3**

Planta magna, pallide viridis, affixa substrato. Caules 1–2 cm longi, 0.06 mm crassi, leviter sinuosi, cum foliis 2.2 mm lati. Rhizoidea hyalina multa. Folia inter se 0.7 mm dissita. Lobus margine hyalinus cauli non contiguus, uno ordine cellularum lato, adnatus ad caulem, 1.2 mm longus, 0.9 mm latus. Cuticula cellularum papillosa, parietibus earum incrassatis intermedio. Cellulae hyalinae rectangulares 25–40 x 15–20 μ ; marginales 15–20 x 15–20 μ ; basales 40–60 x 15–25 μ . Lobulus planus erectus, margine semi hyalinus, divergens, lobo parallelus, 0.4 mm longus, 0.15 mm latus. Papilla hyalina ad partem proximam dentis medii. Androecia axiales vel lateralia, 0.6 mm alta, bracteis 2-jugis. Capitula feminea lateralis. Bractee florales marginatae, cum lobo 0.8 mm longo, 0.8 mm lato, et lobulo 0.4 mm longo, 0.15 mm lato, apice denticulatus. Perianthium plano-obrotundatum, 0.9 mm altum, 0.8 mm latum, valide rostratum.

Large plant, light green, autoicous applied to the substratum. Stem up to 1–2 cm long, 0.06 mm thick, lightly sinuous, width including leaves 2.2 mm. Numerous hyaline rhizoids. Leaves 0.7 mm apart. Lobe oval, with a hyaline margin, adnate to the stem, 1.2 mm long, 0.9 mm wide. Leaf cells with papillous cuticle and intermediary thickenings. Hyaline cells: 25–40 x 15–20 μ ; cells of the edge: 15–20 x 15–20 μ ; basal cells 40–60 x 15 x 25 μ . Lobule 0.4 mm long, 0.15 mm wide, divergent, erect, plane, parallel to the lobe; its distal edge has a row of semi hyaline cells. Male inflorescence lateral or axial, with 2 tiers of fertile bracts. Female inflorescence lateral, female bracts with a lobe of 0.8 mm long and 0.8 mm wide, lobule 0.4 mm high and 0.15 mm wide. Perianth plane, almost globoid, 0.9 mm high and 0.8 mm wide, with a strong beak.

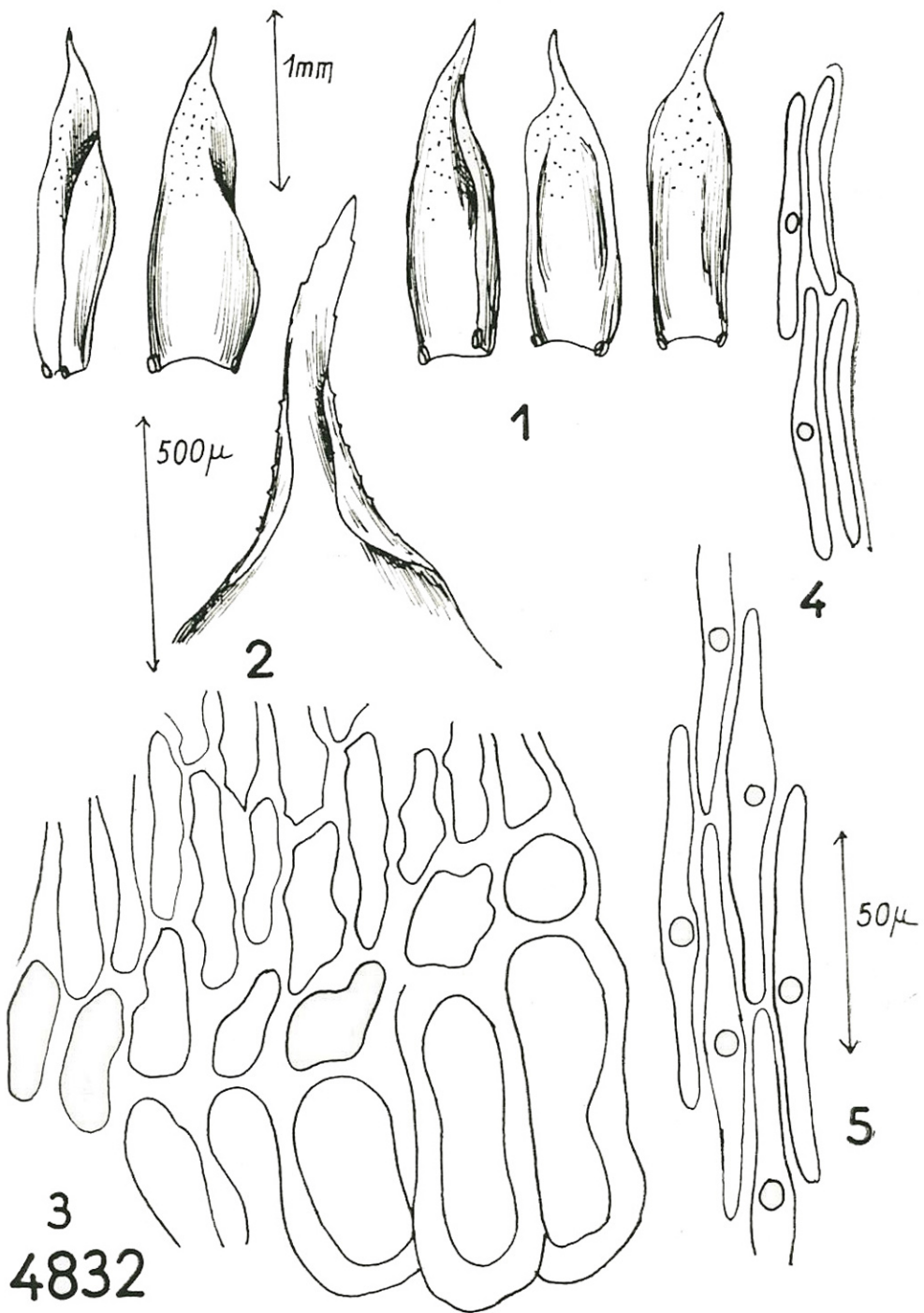


Fig. 2. *Trichosteleum fruticolum*:

1, Leaves; 2, Apex of the leaf; 3, Auricle; 4, Cells of the margin; 5, Cells of the lamina.

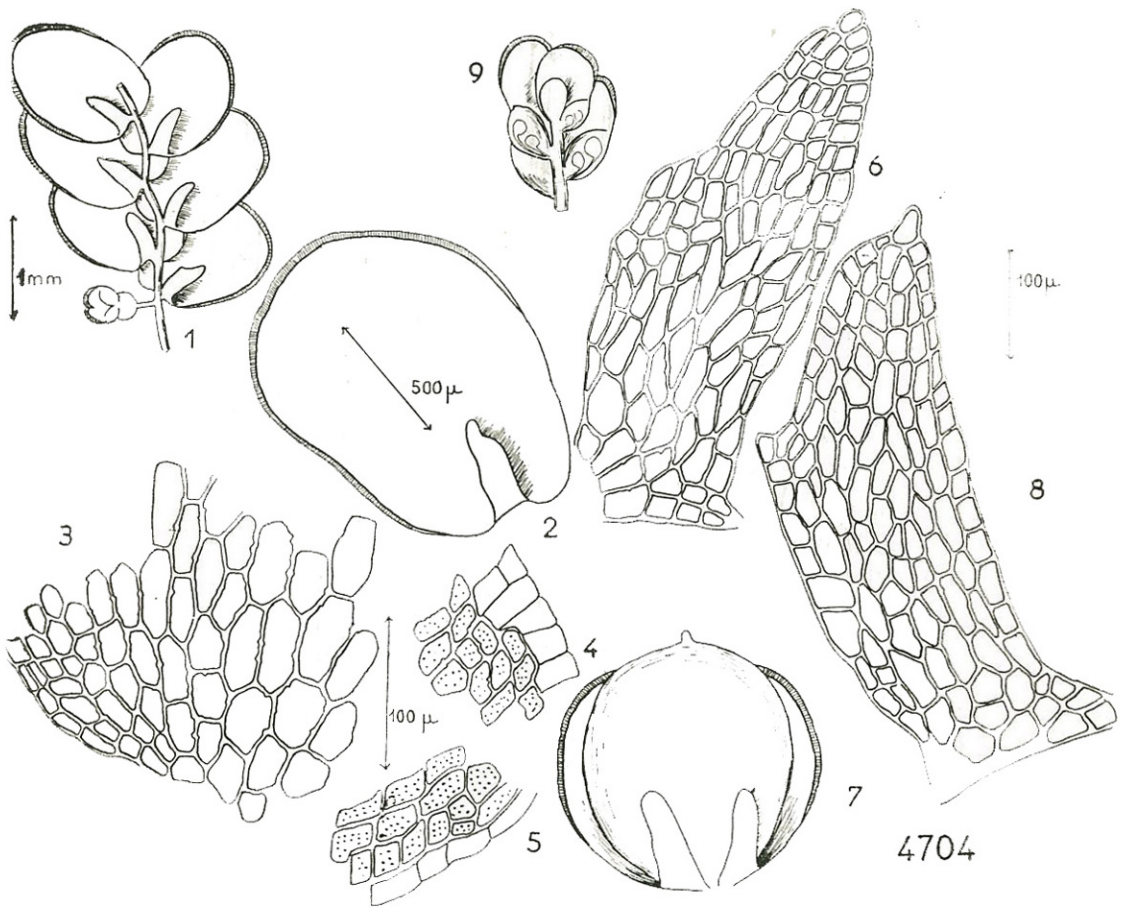


Fig. 3. *Cololejeunea pahangiana*:

1, Stem; 2, Leaf; 3, Base of the lobe; 4, Cells of the apex;
5, End of the hyaline margin; 6, Lobule; 7, Perianth; 8, Lobule
of bract leaf; 9, Male inflorescence.

***Lejeunea* (?) *pilifera* sp. nov. Fig. 4**

Planta parva, luteo virens, corticola follicolaque. Caules usque ad 5 cm longi, 0.06 mm crassi cum foliis 0.8 mm lati. Folia inter se 0.4 mm dissita. Lobus rotundatus 0.4 mm longus, 0.3 mm latus; lobulus $100\ \mu \times 100\ \mu$. Amphigastrium bifidum usque ad mediam partem. Cellulae lobi lobulique, pariete tenuae, isodiametricae $30 \times 40\ \mu$. Cellulae amphigastrii similes. Rhizoides ex cellulis marginalibus lobi.

Small plant, yellowish, corticolous or epiphyllous. Stems to 5 cm long 0.06 mm thick, width with leaves 0.8 mm. Leaves spaced at 0.4 mm; lobe rounded, 0.4 mm long, 0.3 mm wide. Under-leaves divided to the middle of the organ. Cells of lobe, lobule, and underleaf isodiametric with thin walls. Rhizoids springing up of the cells in the leaf margin. The presence of such organs is not reported for the genus *Lejeunea* in the paper of W. Degenkolbe (Brütorgane bei beblätterten Lebermoose. — *Ann. Bryol.*, 1937, X, pp. 43–96).

Conclusions**1. Interest of the collections**

The object is to find out if these gatherings bring an interesting contribution to the knowledge of Bryology in Malaya. In my lists most of the Liverworts are practically new for the region and for Mosses 31 species are now for Fraser's Hill, 25 for Malaya and 2 for Science.

2. Biogeographical connections

For the mosses, the community floristic coefficients between Fraser's Hill and the different countries are as follows:

Malesia (*)	C.F.C.: 90
Indochina	„ 70
Ceylon	„ 30
New Guinea	„ 20
Northern India	„ 20
Pacific Islands	„ 14
Southern India, New Caledonia	„ 10
China, Micronesia, Formose, Japan	„ under 10

We can see that the affinities of our bryological population go to the rest of Malesia, Indochina and Ceylon (between 90 and 30). From 20 to 10 we have India, New Guinea and New Caledonia. Few connections appear with the Northern Bryofloras. Fraser's Hill is found to have a good many Javanese species (Tjibodas) hitherto unknown for Malaya. Thus these collections establish a bridge between the Southern Indochina bryoflora and the Javanese. Yet, the Malayan Peninsula remains a "center of distribution" for species of the Sematophyllaceae and particularly of the genus

(*) Malesia as in Flora Malesiana.

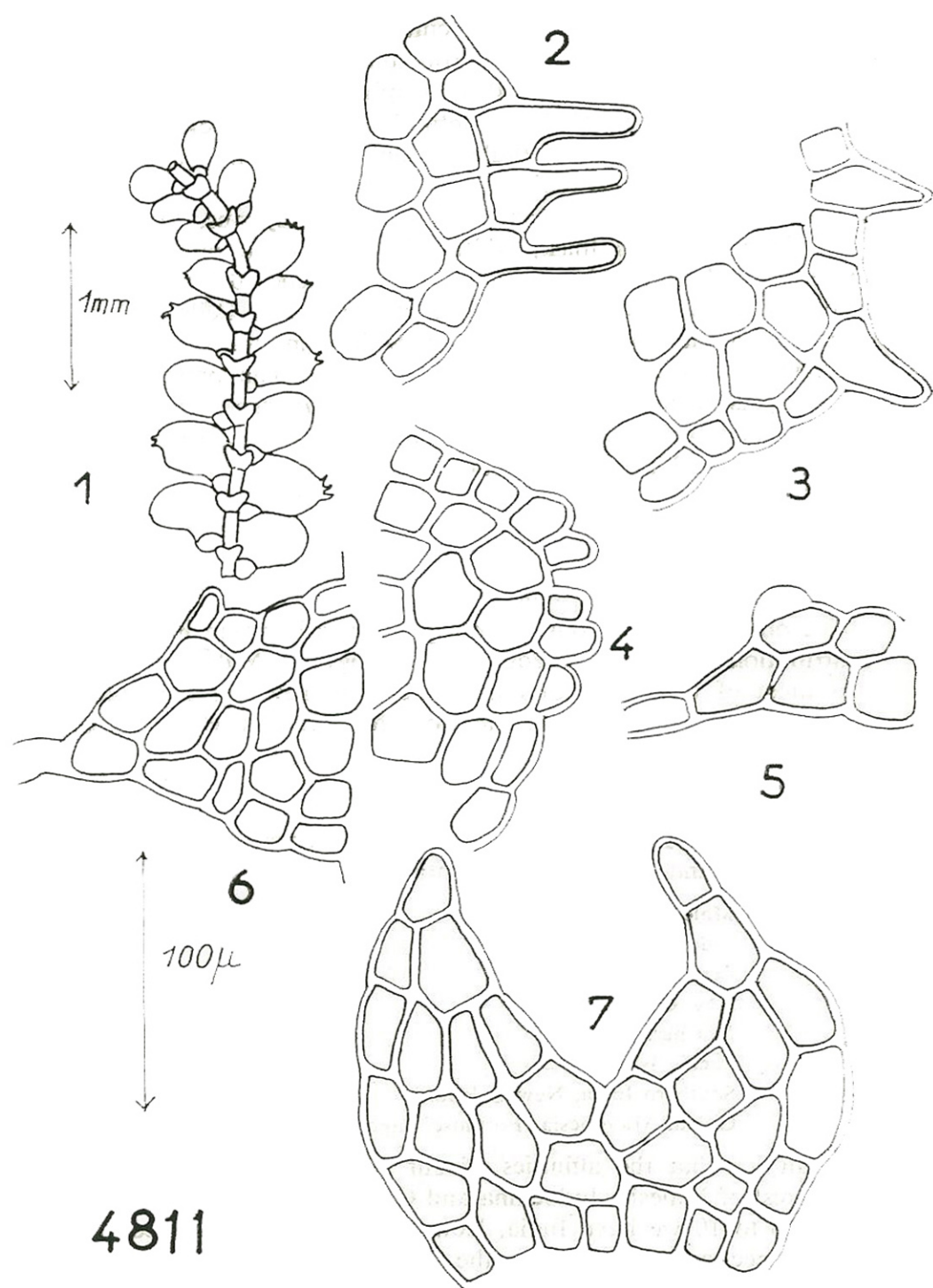


Fig. 4. *Lejeunea* (?) *pilifera*:

1, Stem; 2, 3, 4, Margin of the lobe with rhizoids; 5, 6, Lobules;
7, Underleaf.

Acroporium. Dixon, in 1926, gave 35 species of *Acroporium* for Malaya, let us remind ourselves that one can find only 12 species in Thailand and 9 in New Caledonia, for example.

Literature Cited

- Benedix, E. H. 1953. Indomalayische Cololejeuneen. *Feddes Rep.* 134: 1-88.
- Dixon, H. N. 1924. New Species of Mosses from Malay Peninsula. *Bull. Torrey Bot. Club*: 51, p. 225-229.
- 1926. A List of Mosses of the Malay Peninsula. *Gard. Bull. Str. Settle.* 4: 1-46.
- Froelich J. 1955. Die von Prof. Dr. V. Schiffner i, den Jahren 1893-94 in Ceylon, Penang, Singapore, Sumatra und Java gesammelten Laub und Torfmoose. *Ann. Nat. Mus. Wien*, 59; pp. 66-116.
- Johnson A. 1959. The Genus *Sphagnum* in Malaysia. *Gard. Bull. Singapore*, 17, 2: p 312-324.