

## The Mossflora of Xishuangbanna, Southern Yunnan, China<sup>1</sup>

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**Abstract.** This is the first contribution on the moss flora of Xishuangbanna, southern Yunnan Province, one of the main tropical areas in China. This rich moss flora shows a similarity to that of Southeast Asia and the Himalayas.

### Introduction

Xishuangbanna, Tai Autonomy State, the Chinese "Kingdom of Plants" is located at 21 10'-22 40'N, 99 55' - 101 50'E. Its area is 19,220 km<sup>2</sup> with elevations ranging from 420-2400 m above the sea level. The forests of Xishuangbanna, dominated by *Antiaris*, *Pometia*, *Pouteria*, *Knema*, *Hovsfieldia* and *Terminalia*, are the northern extension of the rain forests of southeast Asia.

In 1936, C. W. Wang organized the first bryological exploration in Xishuangbanna (C. W. Wang, 1939). In 1957, a Sino-Soviet Botanical Expedition, including members from Yunnan University, also collected the bryophytes there. In the 1960's P.C. Chen and P.C. Wu extracted specimens of the epiphyllous liverworts from the above collections, and published 27 species of the epiphyllous liverworts from Xishuangbanna (Chen & Wu, 1964). The largest bryological exploration was the 1986-87 Sino-American Expedition to Xishuangbanna (Wu, 1989), when about three thousands packages of bryophytes were collected. Members of the expedition were Marshall R. Crosby, Jian-Xing Luo, Robert E. Magill, Paul L. Redfearn, Mei-zhi Wang and Pan-cheng Wu.

In the present paper, 33 families, 81 genera and 149 species of the mosses, collected by W. S. Hsu, P. C. Wu, J. X. Luo and M. Z. Wang in Xishuangbanna, are listed along with a preliminary analysis of the mossflora of Xishuangbanna. All of the collections are new records in Xishuangbanna. The taxonomy used here is mainly adapted from Brotherus (1924-25).

### The main characteristics of the mossflora of Xishuangbanna

A preliminary analysis of the specimens shows that the mossflora of Xishuangbanna consists of Southeast Asia elements (56 spp., 40%), East Asia elements (43 spp., 31%) and Himalayan elements (36 spp., 26%; about 2/3 of them (16%) recorded in East Himalaya and 1/3 (9%) recorded in West Himalaya).

The similarities between Xishuangbanna and India, Oceania, New Guinea and Pantropical regions are 12 spp. (8%), 12 spp. (8%), 6 spp. (4%) and 5 spp. (3%) respectively. The bryological relationships of Xishuangbanna to Africa and

South America are very low, 2% only (see Chart 1).

Chart 1. The similarities of the moss flora of Xishuangbanna.

| element          | number of species* |
|------------------|--------------------|
| Pantropic        | 5                  |
| SE Asia          | 56                 |
| E Asia           | 43                 |
| C Asia           | 1                  |
| Himalaya         | 36                 |
| India            | 15                 |
| N Temperate      | 10                 |
| Endemic in China | 3                  |
| Fiji             | 1                  |
| Oceania          | 12                 |
| New Guinea       | 6                  |
| S & N America    | 3                  |
| Brazil           | 1                  |
| Madagascar       | 2                  |
| C. Africa        | 3                  |
| Cosmopolitan     | 10                 |

\* The number of cosmopolitan species have not been calculated in the percentage

The occurrence in Xishuangbanna of the genera *Groutiella*, *Foreauella* and *Campylo-dontium* distributed in the Himalayas, East Nepal, India (including Darjeeling), Sikkim, Tailand, Central Africa and South America (Redfearn etc., 1989) is particularly interesting.

Mosses growing on the bark of trees or branches and rotten logs make up more than 60% of the specimens of bryophytes collected in Xishuangbanna.

### Discussion

Xishuangbanna, a Tai Autonomy Region, combined with Hainan Island and southern Taiwan, are the tropical regions of China. Buttress roots and epiphyllous habitats provided by evergreen leaved vascular plants are characteristic tropical bryophyte habitats of Xishuangbanna. The tropical forests in this region rely on summer

moonson rains since Xishuangbanna experiences long dry winters.

Geographically, Xishuangbanna is close to the Tropics of Cancer, and is strongly influenced by the warm and moist air currents from the Indian Ocean. Xishuangbanna is, however, situated north of the Sino-Indian Peninsula, and the influence of the uplift of the Himalayas and the cold air currents from there can reach Xishuangbanna during the winter.

The mossflora of Xishuangbanna may be recognized as an individual subregion of that of Yunnan, Southwestern China. Its tropical moss element is poorer in species than in neighbouring regions of Southeast Asia. Only 4 species (*Racopilum orthocarpum*, *Pinnatella ambigua*, *Glossadelphus bilobatus* and *G. glossoides*) are known to be restricted to Xishuangbanna and Southeast Asia. On the other hand 6 species (*Pterobryopsis auriculata*, *Neckeropsis exserta*, *Syrhropodon paraditicus*, *Tayloria indica*, *Physcomitrium coorgense*, *Brachymenium skkkimense*) are known to occur only in Xishuangbanna and the

Himalayas. Six species (*Dicranella setifera*, *Groutiella tomentosa*, *Pinnatella mariei*, *Campylo-dontium flavescens*, *Stereophyllum tavoyense* and *Zygodon obtusifolium*) are pantropical or disjunct tropical species and also occur in Xishuangbanna.

### Acknowledgements.

The Mossflora of Xishuangbanna project is supported by the National Natural Science Foundation of China and the Missouri Botanical Garden, St. Louis, U.S.A. The authors deeply thank the other colleagues who collected with us in Xishuangbanna, and Prof. Shen-ji Pei, former director of the Yunnan Tropical Institute of Botany, Academia Sinica and Prof. Zai-fu Xu, Director of the Yunnan Tropical Institute of Botany, Academia Sinica, and all their colleagues, who gave us important help during our there from December 1986 to January 1987. As well, the author would like to express his sincere thanks to Dr. Peter H. Raven, Director of the Missouri Botanical Garden, for his kind invita-

tion to St. Louis, and for making library and herbarium facilities available during the period of August 1987 to February 1988. The author gladly expresses his thanks to Drs. M.R. Crosby, R.E. Magill and B. Allen for their valuable help and discussions during his stay in St. Louis. This paper would not have been completed without Dr. Magill's important suggestions and linguistic help.

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#### Appendix

List of the mossflora of Xishuangbanna, southern Yunnan, China

Abbreviation of the collectors: Hsu: W. S. Hsu; Luo: J. X. Luo; Wang: M. Z. Wang; Wu: P. C. Wu.

#### FISSIDENTACEAE

- Fissidens gymnogynus* Besch. - Hsu 6309  
*Fissidens hollianus* Dozy et Molk. - Hsu 6226, 6331, 6872; Wu 21849, 21851, 21853, 21891  
*Fissidens javanicus* Dozy et Molk. - Hsu 6943, 11160, 11275  
*Fissidens microcladus* Thwait. et Mitt. - Wu 21900  
*Fissidens nobilis* Griff. - Hsu 6392, 6449, 6536,

- 6731, 6782, 6850; - Luo 86003; - Wang 4060, 4315 - Wu 21674, 21693  
*Fissidens plagiochiloides* Besch. - Hsu 11428; - Wang 4099; - Wu 21700, 21702, 21704  
*Fissidens taxifolius* Hedw. - Hsu 6534, 6998; - Luo 86293; - Wu 21897, 21898, 21917, 21951  
*Fissidens tosaensis* Broth. - Wang 4292; - Wu 21863, 21864  
*Fissidens zippelianus* Dozy et Molk. - Hsu 6213, 6214, 6668, 6907, 6976, 11112, 11155; - Wang 4153; - Wu 21750, 21895  
*Fissidens zollingeri* Mont. - Hsu 6663A

#### DITRICHACEAE

- Garckeia phascoides* (Hook.) C. Müll. - Hsu 6043, 6276, 6587, 6971; - Wu 21908A, 21945A

#### DICRANACEAE

- Brothera leana* (Sull.) C. Müll. - Hsu 6119, 6122, 6188, 11097  
*Campylopus japonicus* Broth. - Hsu 6179, 6271; - Wang 4141, 4306, 4412; - Wu 21736, 21938, 22013, 22016  
*Dicranella coarctata* (C. Müll.) Besch. et Lac. - Hsu 6004, 11195  
*Dicranella divaricata* (Mitt.) Jaeg. - Hsu 6103  
*Dicranella setifera* (Mitt.) Jaeg. - Hsu 6578, 11171  
*Dicranoloma fragile* Broth. - Hsu 6012, 6030, 6054; - Luo 86313; - Wu 21966  
*Holomitrium densifolium* (Wils.) Wijk et Marg. - Wu 21916  
*Microdus brasiliensis* (Dub.) Ther. - Hsu 6570, 6606, 6973; - Wu 21908B, 21910B, 21945B  
*Wilsoniella decipiens* (Mitt.) Alst. var. *acutifolia* (Dix.) Wijk et Marg. - Hsu 6330

#### LEUCOBRYACEAE

- Leucobryum bowringii* Mitt. - Hsu 11164  
*Leucobryum javense* (Brid.) Mitt. - Hsu 6403; - Wang 4447; - Wu 22058  
*Leucobryum neilgherrense* C. Müll. - Hsu 6022, 6120, 6291, 11069, 11293; - Luo 86407; - Wu 21931  
*Leucobryum scalare* C. Müll. ex Fleisch. - Hsu 6139, 6296, 6608, 6916, 11092, 11231, 11233; - Luo 86316, 86326; - Wang 4437  
*Octoblepharum albidum* Hedw. - Hsu 6108, 6121, 6846, 6900, 11042, 11298, 11375; - Wang 4186, 4338; - Wu 21734, 22047

## CALYMPERACEAE

- Calymperes afzelii* Sw. - Hsu 11129; - Luo 86269; - Wang 4323, 4226; - Wu 21874, 21879, 21890  
*Mitthyridium flavum* (C. Müll.) Robins. - Wu 21878  
*Syrrhopodon armatus* Mitt. - Hsu 6895  
*Syrrhopodon gardneri* (Hook.) Schwaegr. - Hsu 6181, 6699, 11024; - Wang 4067, 4434; - Wu 22025  
*Syrrhopodon parasiticus* (Brid.) Besch. - Hsu 6166; - Wu 21779A

## POTTIACEAE

- Barbula cf. convoluta* (Hedw.) P. Beauv. - Luo 86204; - Wu 21936  
*Barbula indica* (Hook.) Spreng - Luo 86395, 86432; - Wang 4164, 4173; - Wu 21812A  
*Barbula subcomosa* Broth. - Hsu 6854, 6972  
*Didymodon vinealis* (Brid.) Zander - Hsu 6576, 6577, 11058, 11175  
*Gymnostomum aurantiacum* (Mitt.) Par. - Hsu 11142, 11246, 11441  
*Hyophila involuta* (Hook.) Jaeg. - Hsu 6269, 6983, 11080, 11221, 11227, 11429; - Luo 86075, 86186, 86189; - Wang 4137; - Wu 21733, 21745, 21753, 21810, 21814, 21815, 22019  
*Oxystegus tenuirostris* (Hook. et Tayl.) A. J. Sm. - Hsu 6818, 11367, 11435; - Luo 86343; - Wu 21954  
*Pseudosymblypharis angustata* (Mitt.) Chen - Hsu 11166  
*Weissia crispa* (Hedw.) Mitt. - Wu 21812 B  
*Weissia longidens* Card. - Hsu 6588  
*Weissia cf. planifolia* Dix. - Hsu 11134

## FUNARIACEAE

- Funaria hygrometrica* Hedw. - Hsu 6100, 6335 B; - Wang 4118A  
*Physcomitrium coorgense* Broth. - Hsu 6098, 6595

## SPLACHNACEAE

- Tayloria indica* Mitt - Hsu 6183

## BRYACEAE

- Anomobryum filiforme* (Dicks.) Solms. ssp. *concinatum* (Spruce) Amann - Hsu 6584, 11193; - Wu 22010  
*Bryum argenteum* Hedw. var. *lanatum* (P. Beauv.) Hampe - Hsu 6569; - Luo 86398

- Bryum cellulare* Hook. - Hsu 11448, 11449  
*Bryum coronatum* Schwaegr. - Hsu 6590, 6886; - Luo 86370, 86404; - Wang 4383; - Wu 22015  
*Brachymenium nepalense* Hook. - Hsu 6007, 6153, 6218; - Luo 86372, 86378; - Wang 4359; - Wu 21982, 21998, 21999  
*Brachymenium sikkimense* Ren. et Card. - Hsu 11124A  
*Rhodobryum giganteum* (Schwaegr.) Par. - Hsu 6058, 11158  
*Rhodobryum ontariense* (Kindb.) Kindb. - Hsu 6215

## MNIACEAE

- Orthomnion dilatata* (Mitt.) Chen - Hsu 6192, 11139, 11376; - Wang 4198, 4205, 4355  
*Orthomnion yunnanense* T. Kop., Liet Zang - Hsu 6167, 6417, 6809; - Luo 86385; - Wu 21778, 21911A  
*Plagiomnium cuspidatum* (Hedw.) T. Kop. - Hsu 6268, 6319  
*Plagiomnium elimbatum* (Fleisch.) T. Kop. - Wang 4192, 4409; - Wu 21940, 21980, 21994  
*Plagiomnium maximoviczii* (Lindb.) T. Kop. - Hsu 11344; - Wang 4183, 4454  
*Plagiomnium rhynchophorum* (Hook.) T. Kop. - Hsu 6405; - Wu 21759  
*Plagiomnium rostratum* (Schrad.) T. Kop. - Hsu 11218, 11309; - Wang 4100; - Wu 21770  
*Plagiomnium succulentum* (Mitt.) T. Kop. - Hsu 6232, 6391, 6501, 6516, 6626, 6728, 6772, 6811, 6849, 11062, 11225A, 11331, 11361; - Luo 86006, 86042, 86049, 86139, 86234; - Wang 4262, 4264

## BARTRAMIACEAE

- Bartramidula bartramioides* (Griff.) Wijk et Marg. - Luo 86074, 86164  
*Philonotis falcata* (Hook.) Mitt. - Hsu 6478, 6647, 11436  
*Philonotis socia* Mitt. - Hsu 6863; - Wang 4374  
*Philonotis turneriana* (Schwaegr.) Mitt. - Hsu 6273, 6332, 6546, 6580, 6610, 6611, 6848, 6879, 6884, 11125, 11172; - Wu 21756, 21974

## ORTHOTRICHACEAE

- Groutiella tomentosa* (Hornsch.) Wijk et Marg. - Hsu 6959, 6960, 11337  
*Macromitrium nepalense* (Hook. et Grev.) Schwaegr. - Hsu 6574, 6597, 6841, 11032; - Luo

86415 A; - Wang 4346; - Wu 21694, 21775A  
*Schlotheimia cf. grevilleana* Mitt. - Luo 86417  
*Zygodon obtusifolius* Hook. - Hsu 6279

#### GLYPHOMITRIACEAE

*Glyphomitrium humillimum* (Mitt.) Card. - Hsu 11401

#### RACOPILACEAE

*Racopilum orthocarpum* Mitt. - Hsu 6051, 6180, 6203, 6220, 11001, 11238, 11295; - Luo 86131 B; - Wang 4390, 4406

#### CRYPHACEAE

*Schoenobryum concavifolium* (Griff.) Gangulee - Hsu 6692; - Wu 21959

#### TRACHYPODACEAE

*Duthiella flaccida* (Card.) Broth. - Hsu 6517, 6519, 6735, 6817; - Luo 86041; - Wang 4009, 4011, 4018, 4087, 4097, 4129; - Wu 21711, 21727, 21865

*Duthiella wallichii* (Mitt.) Broth. - Hsu 11261  
*Trachypus bicolor* Reinw. et Hornsch. var. *bicolor* - Hsu 6159, 11234; - Wang 4236

*Trachypus bicolor* Reinw. et Hornsch. var. *viridulus* (Mitt.) Zant. - Hsu 11243

*Trachypodopsis serrulata* (P. Beauv.) Fleisch. var. *crispatula* (Hook.) Zant. - Hsu 6341

*Trachypodopsis serrulata* (P. Beauv.) Fleisch. var. *serrulata* - Hsu 6310, 6311, 6736, 6814, 11012

#### PTEROBRYACEAE

*Garovaglia plicata* (Brid.) Bosch et Lac. - Hsu 6057

*Pterobryopsis auriculata* Dix. - Hsu 6016, 6169, 6172, 6235, 6377, 6828; - Luo 86205, 86365, 86413; - Wang 4013; - Wu 21744, 21828, 21996  
*Pterobryopsis yunnanensis* Broth. - Hsu 6217, 6875, 6879; - Luo 86475

*Pterobryopsis cf. frondosa* (Mitt.) Fleisch. - Wu 21976

#### NECKERACEAE

*Homaliadelphus targionianus* (Mitt.) Dix. et P. de la Varde - Hsu 6821, 11145B, 11150, 11434  
*Homaliodendron exiguum* (Boschet Lac.) Fleisch. - Hsu 6190, 6422, 6499, 6502, 6507, 11133, 11292, 11306, 11330, 11349, 11362; - Luo

86207; - Wang 4019 B; - Wu 21669, 21720, 21726

*Homaliodendron microdendron* (Mont.) Fleisch. - Hsu 6266, 6304, 6434, 6505, 6509, 6550, 6681, 6707, 6734, 6765, 6793, 6847, 6970, 11187; - Luo 86008, 86017, 86019; - Wang 4027, 4079, 4081, 4248, 4263; - Wu 21665, 21672, 21710, 21719, 21807, 21824, 21827

*Homaliodendron flabellatum* (Sm.) Fleisch. - Hsu 6053, 6193, 6299

*Neckeropsis calcicola* Nog. - Luo 86197; - Wang 4245, 4267; - Wu 21825, 21826

*Neckeropsis crinita* (Griff.) Fleisch. - Hsu 6064, 11094B, 11350, 11403

*Neckeropsis exserta* (Hook.) Broth. - Hsu 6756, 6813, 6952, 11397; - Wang 4281, 4320; - Wu 21839, 21850, 21854

*Pinnatella cf. alopecuroides* (Hook.) Fleisch. - Hsu 6371, 6762, 11245

*Pinnatella ambigua* (Bosch et Lac.) Fleisch. - Hsu 6440, 6760, 11260; - Luo 86024; - Wang 4025, 4266; - Wu 21666, 21676, 21684, 21723, 21729

*Pinnatella intralimbata* Fleisch. - Hsu 6013, 6083

*Pinnatella mariei* (Besch.) Broth. - Hsu 6795A

*Pinnatella makinoi* (Broth.) Broth. - Wang 4106

*Thamnobryum plicatulum* (Lac.) Iwats. - Hsu 6444A

*Thamnobryum sandei* (Besch.) Iwats. - Hsu 6460

#### HOOKERIAACEAE

*Callicostella papillatum* (Mont.) Sull. - Hsu 6767

*Distichophyllum maibarae* Besch. - Hsu 6733

*Chaetomitriopsis glaucocarpa* (Schwaegr.) Fleisch. - Hsu 6089, 6612, 6778, 6815; - Wang 4054, 4056A, 4364

#### HYPOPTERYGIACEAE

*Cyathophorella hookeriana* (Griff.) Fleisch. - Hsu 6297A, 6788

*Cyathophorella tonkinensis* (Broth. et Par.) Broth. - Hsu 11105, 11404; - Wu 22006A

*Hypopterygium fauriei* Besch. - Hsu 6331, 6615, 6625, 11103, 11202, 11346; - Wang 4019A

*Hypopterygium japonicum* Mitt. - Hsu 11109, 11358, 11424

#### THELIACEAE

*Myurella sibirica* (C. Mull.) Reim. - Luo 86120

#### FABRONIACEAE

*Anacamptodon cf. latidens* (Besch.) Broth. - Hsu

6573, 11046

*Schwetschkeopsis fabronia* (Schwaegr.) Broth. -  
Hsu 6305, 6312

#### LESKEACEAE

*Leskea polycarpa* Hedw. - Wu 21831, 21832

*Pseudoleskeopsis zippelii* (Doz. et Molk.) Broth.  
- Hsu 6339, 6359

*Regmatodon declinatus* (Hook.) Brid. - Wu 21877

*Regmatodon orthostegius* Mont. - Hsu 6262

#### THUIDIACEAE

*Anomodon thraustus* C. Müll. - Hsu 11374

*Anomodon viticulosus* (Hedw.) Hook. et Tayl. -  
Hsu 6267, 6336; - Luo 86179; - Wang 4241,  
4261; - Wu 21819, 21836

*Bryohaplocladium angustifolium* (Hampe et C.  
Müll.) - Watan. et Iwats.; - Hsu 6219; - Luo 86296,  
86342, 86495; - Wang 4280; - Wu 21947, 22035

*Bryohaplocladium microphyllum* (Hedw.) Wa-  
tan. et Iwats. - Hsu 6780, 11440; - Luo 86190; - Wu  
21820

*Claopodium assurgens* (Sull. et Lesq.) Card. - Hsu  
6263, 6397, 6533, 6542, 6705, 6946, 6948, 6979,  
11072, 11093, 11357; - Luo 86090, 86183; -  
Wang 4030, 4184, 4272; - Wu 21633, 21675,  
21679, 21685, 21718, 21871

*Claopodium prionophyllum* (C. Müll.) Broth. -  
Hsu 6263, 6533, 6705, 6948, 6979, 11054, 11057;  
- Luo 86090, 86183; - Wang 4030, 4080, 4184;  
- Wu 21663, 21675, 21718, 21722, 21904, 22001

*Herpetineuron tocoae* (Sull. et Lesq.) Card. -  
Hsu 6307, 6318, 6437; - Luo 86476; - Wang  
4253; - Wu 29106

*Pelekium bifarium* (Bosch et Lac.) Fleisch. - Hsu  
6540, 6556, 6873, 6906, 11101; - Luo 86064,  
86068, 86110, 86208; - Wang 4113; - Wu 21660,  
21668, 21717, 21856

*Thuidium cymbifolium* (Doz. et Molk.) Doz. et  
Molk. - Hsu 6010, 6104, 6144, 6229, 6766; - Luo  
86025, 86070, 86093; - Wang 4083, 4114; - Wu  
21757, 21922, 21804

*Thuidium delicatulum* (Hedw.) Mitt. var. *radi-  
cans* (Kindb.) Crum, Steere et Anderson - Luo  
86026 A; - Wang 4002

*Thuidium bipinnatulum* Mitt. - Luo 86432

*Thuidium glaucinoides* Broth. - Hsu 6015, 6094,  
6129, 6130, 6160, 11290; - Luo 86136; - Wang  
4419, 4444

*Thuidium glaucinum* (Mitt.) Bosch et Lac. - Hsu  
6002, 6107, 6158, 6233, 6252, 11111; - Luo  
86452, 86310, 86466; - Wang 4375; - Wu 21914,  
21794, 21983, 21990, 22023

*Thuidium lejeuneoides* Nog. - Hsu 6500, 6755,  
6855; - Luo 86051, 86084, 86229, 86359; - Wang  
4050, 4073, 4130; - Wu 21683

*Thuidium squarrosulum* Ren. et Card. - Luo  
86218A

*Thuidium talongense* Besch. - Wu 21901

#### BRACHYTHECIACEAE

*Brachythecium wichurae* (Broth.) Par. - Hsu  
11287; - Luo 86080

*Eurhynchium riparioides* (Hedw.) Richards. - Hsu  
11185

#### ENTODONTACEAE

*Campylodontium flavescens* (Hook.) Bosch et  
Lac. - Hsu 6880; - Luo 86170, 86217; - Wu 21858,  
21862 c, 21902, 21913, 21934

*Entodon macropodous* (Hedw.) C. Müll. - Luo  
86011, 86036, 86194, 86219 A; - Wu 21862A

*Entodon prorepens* (Mitt.) Jaeg. - Luo 86188; -  
Wang 4082; - Wu 21822

*Entodon flavescens* (Hook.) Jaeg. - Luo 86491  
*Erythrodontium julaceum* (Schwaegr.) Par. - Hsu  
6674, 6877, 11128; - Luo 86161, 86215, 86382;  
- Wang 4035, 2159; - Wu 21731, 21741, 21860,  
22018

#### PLAGIOTHECIACEAE

*Stereophyllum ligulatum* Jaeg. - Hsu 6833

*Stereophyllum tavoyense* (Hook.) Jaeg. - Wu  
21876, 21885

#### SEMATOPHYLLACEAE

*Foreauella orthothecia* (Schwaegr.) Dix. et P.  
Varde - Hsu 6358, 6653, 6693, 6860, 6868, 6876,  
6918, 11017, 11045, 11047, 11079, 11144,  
11213, 11289; - Luo 86363; - Wu 21755, 21771,  
22052

*Glossadelphus bilobatus* (Dix.) Broth. - Luo  
86007A

*Glossadelphus glossoides* (Boschet Lac.) Fleisch.  
- Hsu 6452

*Glossadelphus zollingeri* (C. Müll.) Fleisch. -  
Hsu 6292

*Sematophyllum robustulum* (Card.) Broth. - Hsu  
11156

*Sematophyllum subhumile* (C. Müll.) Fleisch. - Hsu 6428, 6696, 6839; - Luo 86121, 86332; - Wang 4065; - Wu 21857, 21859, 21969, 21921  
*Sematophyllum tristiculum* (Mitt.) Fleisch. - Hsu 11061

#### HYPNACEAE

*Gollania ruginosa* (Mitt.) Broth. - Hsu 11437  
*Gollania varianus* (Mitt.) Broth. - Wu 22048  
*Taxiphyllum taxirameum* (Mitt.) Fleisch. - Hsu 6008, 6049, 6077, 6230, 6591, 6652, 6660, 6667, 6669, 6719, 6753, 6754, 11003, 11009; - Luo 86054, 86057, 86059, 86067, 86086, 86111, 86118, 86119, 86126, 86167, 86181, 86357; - Wang 4088, 4133, 4134, 4316, 4343, 4450; - Wu 21673, 21738, 21809, 21844, 21896, 21953, 22169, 22176, 22178  
*Vesicularia montagnei* (Bel.) Broth. - Hsu 6638, 6718, 6721, 6722, 6723, 6770, 6787, 11192, 11286, 11315; - Luo 86157; - Wang 4048; - Wu 21662B, 21799, 21952

#### HYLOCOMIACEAE

*Macrothamnium macrocarpum* (Reinw. et Hornsch.) Fleisch. - Hsu 6031, 6257, 6342; - Wang 4421

#### DIPHYSICIACEAE

*Diphyscium involutum* Mitt. - Hsu 6940, 6941

#### POLYTRICHACEAE

*Atrichum cf. yakushimense* (Horik.) Miz. - Luo 86102, 86327; - Wang 4388, 4399, 4424; - Wu 21950, 22027, 22033  
*Pogonatum inflexum* (Lindb.) Lac - Hsu 6123; - Luo 86100, 86294, 86295; - Wang 4415, 4417; - Wu 21861, 21893, 21909, 22029