
BIOGEOGRAPHY AND FLORISTIC AFFINITIES OF THE LIMESTONE FLORA IN SOUTHERN YUNNAN, CHINA¹

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ABSTRACT

The forests on limestone in southern Yunnan, in tropical southwest China, were inventoried, and their floristic composition and biogeographical affinities are discussed. These limestone forests were characterized by phanerophytes making up ca. 78% of the total species and those with mesophyllous leaves comprising 75%. Ecological species groups based on their habitat preferences were discerned from field observations: the species exclusive to the limestone habitats make up 10% and the preferents make up ca. 12% of the total limestone flora. From these limestone forests, 1394 vascular plant species belonging to 640 genera and 153 families were recorded. Based on their distributions, 12 biogeographic elements at the generic level and nine at the specific level were recognized. About 90% of the seed plant genera (over 90% of the species) were tropical; furthermore, 35% of the seed plant genera (65% of the species) have tropical Asian affinities. In a comparison with other regional floras from southern China and tropical Asia, the limestone flora of southern Yunnan revealed closer affinity to tropical floras than to temperate elements of eastern Asian floras. This limestone flora is thus tropical and part of the tropical Asian flora at its northern margin.

Key words: biogeography, China, limestone forest, southern Yunnan.

Limestone in tropical China occurs mainly in Yunnan and Guangxi Provinces of southern and central China. Because of the great diversity of edaphic conditions and topography, vegetation types on limestone are extremely diverse and rich in endemic taxa. Limestone vegetation in southern China has been destroyed as much as other vegetation types even though these limestone areas are more difficult to access and to farm. Limestone vegetation is also more vulnerable because it recovers much more slowly on usually thin soils. Our research was conducted mainly in the area of Xishuangbanna, in the southern part of Yunnan, where about 19% (3600 km²) of the total area is limestone (Liu et al., 1990). Most of this limestone area is still forested and is receiving increasing attention for its biodiversity and its urgent need of conservation. Primary floristic works in southern Yunnan have been written (Zhu et al., 1996, 1997, 1998a, 1998b; Wang et al., 1997). This paper represents a synthesis of its floristics, physiognomy, and biogeographical affinities.

GENERAL GEOGRAPHY

Xishuangbanna, the southern part of Yunnan, which borders Burma and Laos, is a mountainous area at the northern margin of tropical Southeast Asia (Fig. 1). Basically, the study area has a mountainous topography with the mountains running north-south and decreasing in elevation southward. Altitude varies from 480 m in the lowest valley in the south to 2400 m at the top of the highest mountain in the north. The limestone strata occur mainly in southeastern Xishuangbanna and range in altitude from 600 to 1600 m.

The region of Xishuangbanna has a typical tropical monsoon climate with an annual mean temperature of 22°C, annual temperature accumulation (the sum of daily temperature means where they are > 10°C) of 8000°C, and annual precipitation varying from 1200 to 1556 mm, of which more than 80% falls during the rainy season between May and the end of October (Xu et al., 1987).

The rock substrate is hard limestone of Permian origin with a rugged topography. The soil is mainly

¹ This project was funded by The National Natural Science Foundation of China (40271048), the Chinese Academy of Sciences (The Fund for Top One Hundred Young Scientists and KSCX2-1-06B), and the Yunnan Natural Science Foundation. The senior author thanks Xu Zaifu for his great help with his research and Wu Zheng-yi and Zhang Hongda, his academic advisors. He particularly thanks E. Tanner and P. Grubb for their help in analyzing data and preparing this paper during his visiting scholar's year at the University of Cambridge. Finally, he thanks T. C. Whitmore, who has greatly supported and helped him in his research, and two anonymous reviewers for their constructive comments on this article.

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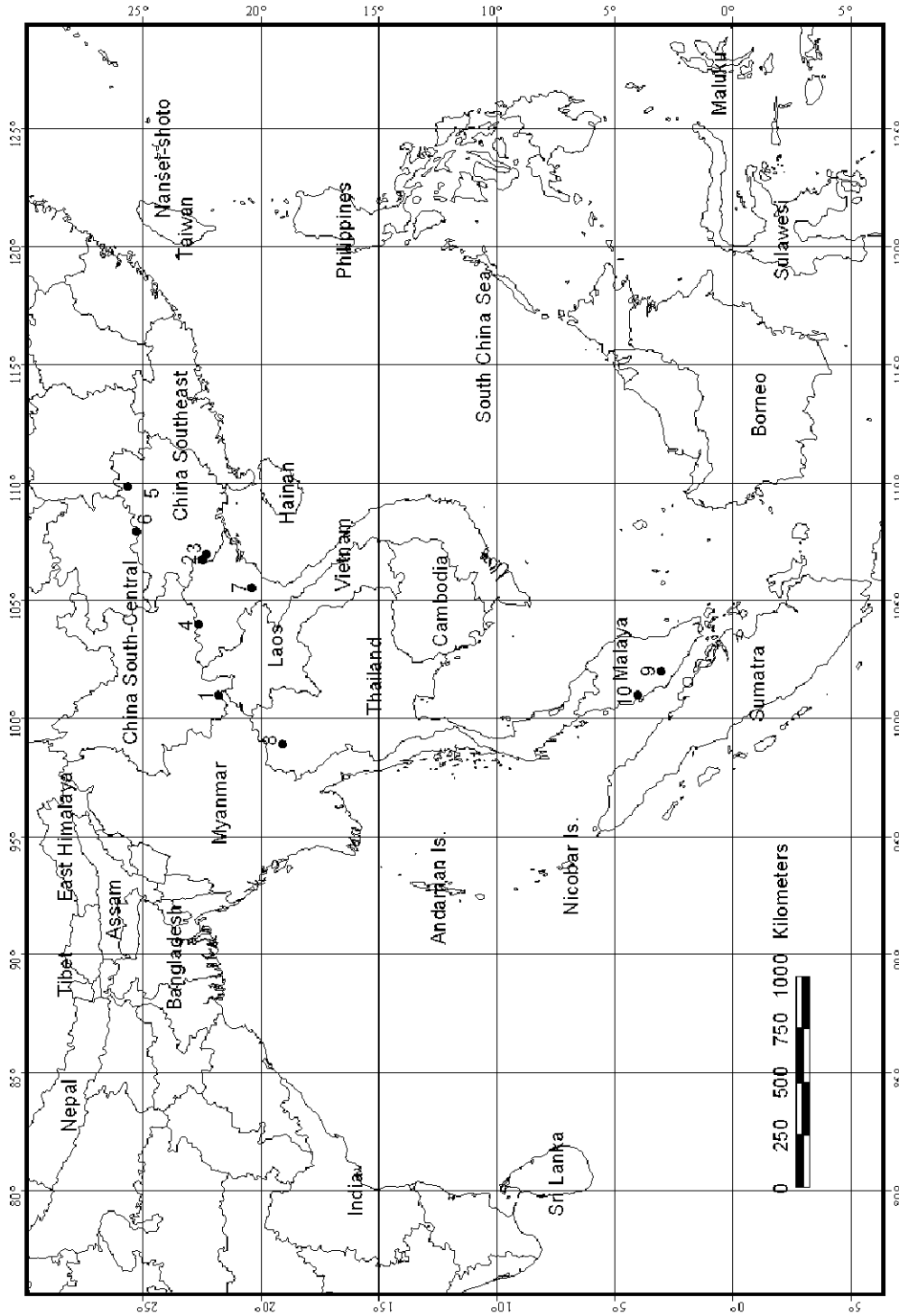


Figure 1. Locations of the research area in Xishuangbanna, southern Yunnan, China, and compared regional floras (see Table 6). —1. Our research area. —2. Longgan, SW China. —3. Daqing Mountains, SW China. —4. Gulingqing, SW China. —5. Huapin, China. —6. Dongyang Mountains, China. —7. Cuephuoung, N Vietnam. —8. Chiengdao, N Thailand. —9. The Malay Peninsula limestone. —10. Taping, Malay Peninsula.

brown, coarse in texture, and composed of loamy limestone with a pH of ca. 6.75 and ca. 3.56% organic matter (Liu et al., 1990).

METHODS

A complete floristic inventory was made based on the identification of more than 5000 plant specimens collected from the limestone habitat in southern Yunnan during 1985–1995 and deposited mainly at HITBC and SYS. The flora of the vegetation on the limestone consisted of 153 families of vascular plants, including 640 genera and 1394 species. An initial floristic analysis was made based on the inventory (Zhu et al., 1996). Three main vegetation types occur on the limestone—tropical seasonal rain forest, tropical seasonal moist forest, and tropical montane dwarf forest—which were selected for establishing plots. For the tropical seasonal rain forest, seven separate plots ranging in size from 2000 to 2500 m² were established. For the tropical seasonal moist forest seven separate plots ranging in size from 500 to 2000 m² were laid out. For the tropical montane dwarf forest, only two plots of 10 by 10 m were made due to its restriction to limestone summits. These different plot sizes were used because of the differential coverage of forest type and site restrictions. The structure and species composition of the vegetation on the limestone were analyzed based on plot data already published (Zhu et al., 1998a). In the present paper, plant inventory lists of the two main forest types (excluding montane dwarf forest) were compiled from sample plots separately for the physiognomic (life form and leaf size) analysis. The criteria for life form and leaf size classes suggested by Raunkiaer (1934) and the importance value index (IVI) suggested by Curtis and McIntosh (1951) were used in the physiognomic or ecological analysis. Ecological species groups were discriminated from field observation and correspond to groups used in Shimizu (1964) and Chin (1977). Species-level biogeographical affinities were assessed for the total flora of the limestone vegetation. The floristic similarities between the limestone flora of southern Yunnan and the floras on limestone and non-limestone habitats from southwest China, northern Vietnam, northern Thailand, and the Malay Peninsula were also discussed.

CLASSIFICATION OF LIMESTONE VEGETATION

Based on plant physiognomy, forest profile, floristic composition, and habitat, the primary limestone vegetation can be classified into three vegetation types, i.e., tropical seasonal rain forest,

tropical seasonal moist forest, and tropical montane dwarf forest (Zhu et al., 1998a). Within these, six formations, including nine communities, were recognized:

- (1) Ravine seasonal rain forest (including the *Pometia tomentosa*–*Alphonsea monogyna* community and *Pometia tomentosa*–*Celtis philippensis* var. *wightii* community);
- (2) Lower hill seasonal rain forest (including only the *Celtis philippensis* var. *wightii*–*Lasiococca comberi* var. *pseudoverticillata* community);
- (3) Evergreen moist forest (including the *Osmanthus polyneurus*–*Dracaena cochinchinensis* community and *Lasiococca comberi* var. *pseudoverticillata*–*Cleistanthus sumatranus* community);
- (4) Semi-evergreen moist forest (including the *Bombax insignis*–*Colona floribunda* community and *Bombax insignis*–*Garcinia bracteata* community);
- (5) Evergreen dwarf forest (including only the *Photinia angusta*–*Pistacia weinmannifolia* community);
- (6) Semi-evergreen dwarf forest (including only the *Ficus neriifolia*–*Dracaena cochinchinensis* community).

Detailed descriptions and ecological analyses of the communities have been reported earlier (Zhu et al., 1998a). Here the classification of the limestone vegetation is concisely enumerated so that the biogeographical components of the limestone vegetation can be better understood.

TROPICAL SEASONAL RAIN FOREST

Tropical seasonal rain forest on limestone, just as the regional tropical seasonal rain forest off limestone, shares characteristics with the equatorial lowland rain forest. These forests are mainly evergreen, but there are some deciduous trees in the emergent layer. This is equivalent to the tropical semi-evergreen rain forest of Southeast Asia (Whitmore, 1984), or the tropical semi-evergreen forest of India–Burma (Champion, 1936), as well as the evergreen seasonal forest of tropical America (Beard, 1944, 1955). In southern Yunnan, these limestone forests occur in wet valleys and on lower slopes of hills or mountains below 1000 m altitude. This same forest type also occurs in northern Thailand (Smitinand, 1966) and North Vietnam (Thin, 1997), although different names were used. The tropical seasonal rain forest represents Southeast Asian tropical rain forest at its latitudinal and altitudinal limits. The ecological structure of the tropical seasonal rain forest on limestone is almost exactly the same as the seasonal rain forest off limestone in the Xishuangbanna region (Zhu, 1992,

Table 1. Life forms of the limestone forest in southern Yunnan.

Life form*	Liana										Thero- geophytes	
	Para	Epiph	Woody	Herb	Megaph	Mesoph	Microph	Nanoph	Hph	All		Cham
Limestone seasonal rain forest (14800 m ² of 7 plots, total 249 species)	1	7	48	3	9	84	34	17	12	156	31	—
	0.4%	2.8%	19.3%	1.2%	3.6%	33.7%	13.7%	6.8%	4.8%	62.7%	12.4%	—
Limestone seasonal moist forest (9650 m ² of 7 plots, total 211 species)	—	18	27	5	2	62	36	21	3	124	28	2
	—	8.5%	12.8%	2.3%	0.9%	29%	17%	9.9%	1.4%	58.8%	13%	0.9%

* Life form (Raunkiaer, 1934); Megaph = Megaphanerophyte (perennials over 30 m high); Mesoph = Mesophanerophyte (perennials 8 to 30 m high); Microph = Microphanerophyte (perennials 2 to 8 m high); Nanoph = Nanophanerophyte (perennials 0.25 to 2 m high); Hph = Herbaceous phanerophyte (herbaceous perennials over 0.25 m high); Cham = Chamaephytes (perennials less than 0.25 m high above ground); Geoph = Geophyte (perennials, dying back above ground); Para = Parasitic; Epiph = Epiphytes; Therophytes (annuals).

1997). Most species in the seasonal rain forest on limestone are also found in the adjacent non-limestone seasonal rain forest, but the latter is more diverse with additional species, which are not found on the limestone.

TROPICAL SEASONAL MOIST FOREST

Tropical seasonal moist forest occurs on the middle and upper limestone slopes ranging from 650 to 1300 m altitude. This vegetation type abuts the seasonal rain forest and was called monsoon forest by some Chinese authors (Liu, 1987; Wu, 1980). The term seasonal moist forest is preferred here because the forest is not equivalent to Schimper's monsoon forest (Schimper, 1903), in spite of the fact that it is affected by seasonal dryness and contains a variable percentage of deciduous trees. The seasonal dryness in the region is compensated to some extent by dense fog accompanied by low temperatures in the same months (November to April) (Whitmore, 1984). Some deciduous trees, such as *Gmelina arborea* Roxb., *Anthocephalus chinensis* (Lam.) Rich. ex Walp., and *Homalium laoticum* Gagn. var. *glabretum* C. Y. Wu, shed leaves toward the end of the dry season, while others, such as *Cratoxylon cochinchinensis* (Lour.) Bl., *Ficus religiosa* L., and *Elaeocarpus varunua* Buch.-Ham. ex Mast., shed their old leaves as new ones develop. This suggests that deciduousness in the region is more frequently associated with locally dry habitats than the seasonal dryness of climate. Therefore, using the term monsoon forest for the evergreen or semi-evergreen forest on limestone is confusing because Schimper's monsoon forest is more or less completely leafless during the dry season.

MONTANE DWARF FOREST

Montane dwarf forest occurs only on the tops of hills and summits of mountains at altitudes above 900 m. There is only one dwarf tree layer with a canopy height of 7–15 m. Epiphytic orchids, such as *Eria hainanensis* Rolfe and *Bulbophyllum nigrescens* Rolfe, and non-vascular epiphytes (bryophytes and lichens) are abundant. In some sites small woody climbers, such as *Derris caudatilimba* How (Papilionaceae) and *Pristimera arborea* (Roxb.) A. C. Smith (Hippocrateaceae), are also frequent.

PLANT PHYSIOGNOMY OR ATTRIBUTES

From plot data, life form spectra (Raunkiaer, 1934) of the two main forest types (seasonal rain forest and seasonal moist forest) are compiled in

Table 2. Physiognomic characteristics of the limestone forest in southern Yunnan.

Forest type		Leaf form		Leaf texture		Leaf size			
		S	C	P	L	Na	Mi	Me	Ma
Limestone seasonal rain forest ¹	Percentage of species	72.3	27.7	47.9	52.1	0	13.8	76.6	9.6
	Percentage of Importance Value Index (IVI) ³	76.3	23.7	52.8	47.2	0	3.8	91	5.3
Limestone seasonal moist forest ²	Percentage of species	68	32	51.5	48.5	1	21.5	74.2	3.1
	Percentage of Importance Value Index (IVI)	74.8	25.2	41.7	58.3	0.4	23.3	66.5	9.7

¹ From 14800 m² of 7 plots, total of 94 tree species > 5 cm DBH.

² From 9650 m² of 7 plots, total of 97 tree species > 5 cm DBH.

³ IVI = Relative dominant density + Relative frequency + Relative dominant breast area (Curtis & McIntosh, 1951). S: Simple leaves; C: Compound leaves; P: Papery leaves; L: Leathery leaves; Ma: Macrophyll (large to 164,025 mm²); Me: Mesophyll (to 18,222 mm²); Mi: Microphyll (to 2025 mm²); Na: Nanophyll (to 225 mm²) (Raunkiaer, 1934).

Table 1. Leaf size spectra, leaf form, and leaf texture are shown in Table 2. Both forest types were dominated by phanerophytes. Including lianas, these perennial phanerophytes make up 73.9–83.2% of the total species, while annual chamaephytes account for only 12.4–13%. However, the seasonal moist forest shows lower percentages of woody lianas as well as megaphanerophytes and mesophanerophytes, but higher percentages of epiphytes as well as microphanerophytes and nanophanerophytes than the seasonal rain forest.

Both forest types have species with mesophyllous leaves making up ca. 75% of the total tree species, but the forests show clear differences if the species are weighted by importance value index (IVI). This increases the percentage of mesophyllous perennials and decreases the percentage of micro- and macrophyllous trees in seasonal rain forest, while the opposite trend is seen in seasonal moist forest. Seasonal moist forest occupies much more rugged habitats with thinner and drier soils, and has more microphyllous species. In weighting by IVI, the increase in percentage of macrophyllous trees in seasonal moist forest is mainly due to the dominant evergreen species *Dracaena cochinchinensis* (Lour.) S. C. Chen (Agavaceae), with its long leathery lanceolate leaves, and the dominant deciduous tree species *Colona floribunda* (Wall. ex Voigt) Craib (Tiliaceae) also with large leaves to 30 cm long. In

weighting the species by IVI, the percentage of leathery leaves decreases in seasonal rain forest but increases in seasonal moist forest due to the presence of some species with these leathery leaves such as *Cleistanthus sumatranus* (Miq.) Muell.-Arg. (Euphorbiaceae) and *Dracaena cochinchinensis*.

ECOLOGICAL SPECIES GROUP

Based on the study of the limestone floras of Japan and Taiwan, Shimizu (1964) divided limestone plants into five ecological groups:

- (1) plants exclusive to limestone habitat;
- (2) plants selective for and found mainly in limestone;
- (3) plants preferring and dominant on limestone;
- (4) taxa indifferent, with no special association with limestone;
- (5) plants found only occasionally on limestone or strangers to limestone.

To Shimizu, these first three groups were characteristic species for the limestone habitats and in particular his exclusive and selective taxa were calcicoles. Chin (1977) accepted this classification and similarly categorized plants on limestone in the Malay Peninsula into four groups, combining selective and preferent plants. Similar ecological species groups have been later recognized by Chinese botanists (Liang et al., 1985; Liu et al., 1994).

Table 3. The ecological species groups of the limestone flora of southern Yunnan.

Ecological species groups (see Shimizu, 1964; Chin, 1977)	Number of species	%
Plants found only on limestone: endemic to southern Yunnan	24	1.7
not endemic to southern Yunnan	117	8.4
Plants dominant on limestone	170	12.2
Plants no restriction on limestone	858	61.6
Plants found occasionally on limestone	225	16.1
Total	1394	100

Table 4. Predominant families found in limestone forests of southern Yunnan.

	No. of genera	No. of species	%*		No. of genera	No. of species	%
Orchidaceae	35	86	26.9	Verbenaceae	6	20	43.5
Rubiaceae	34	58	64.1	Labiatae	13	20	30.1
Euphorbiaceae	27	58	60.4	Gesneriaceae	13	19	63.3
Papilionaceae	22	55	43.4	Sterculiaceae	7	18	46.8
Moraceae	7	48	73.8	Dioscoriaceae	1	18	64.3
Vitaceae	7	38	79.5	Menispermaceae	10	17	60.7
Acanthaceae	26	36	65.4	Liliaceae	10	16	64.0
Rutaceae	11	35	71.4	Araceae	10	15	44.1
Asclepiadaceae	16	35	53.0	Compositae	8	15	14.6
Urticaceae	12	35	53.0	Myrsinaceae	4	14	38.2
Lauraceae	10	35	45.0	Commelinaceae	7	14	60.9
Apocynaceae	19	33	58.9	Zingiberaceae	6	14	42.4
Meliaceae	12	30	83.0	Myrtaceae	1	13	45.8
Annonaceae	12	30	50.9	Tiliaceae	3	12	57.1
Cucurbitaceae	9	24	52.3	Mimosaceae	6	12	66.6
Rhamnaceae	19	21	70.4	Anacardiaceae	7	11	64.7
Piperaceae	3	20	54.8	Convolvulaceae	4	11	37.4
				Ulmaceae	5	11	100

$$* \% = \frac{\text{the no. of species on limestone}}{\text{the total no. of species in southern Yunnan}} \times 100$$

Following Shimizu and Chin's classifications, we divided the limestone flora of southern Yunnan into these four ecological species groups (Table 3). In our study, 141 vascular plant species are restricted to limestone habitats and thus are exclusively found here. These include the following common species *Celtis philippensis* var. *wightii*, *Amoora calcicola*, *Murraya tetramera*, *Pistacia weinmannifolia*, as well as species in *Agapetes*, *Sageretia*, *Tupistra*, and *Pristimera*. Of these, 24 species are endemic to southern Yunnan. Taxa exclusive to limestone make up about 10% of the total limestone flora, which agrees with the results from Longgan limestone (exclusive taxa, 13%) (Liang et al., 1985) and Longhua limestone (exclusive taxa, 10%) (Liu et al., 1994) from Guangxi Province in China. Both the exclusive and preferent taxa make up 22.3% of the total sum. They could be termed as characteristic species for limestone habitats (see Appendix 1). This is similar to the results from Longgan in Guangxi (with these characteristic species making up 20% of the total sum) (Liang et al., 1985) and from the Malay Peninsula (27.5%) (Chin, 1977).

THE FLORA AND ITS BIOGEOGRAPHY

In the limestone forests of southern Yunnan, China, 153 families of vascular plants including 640 genera and 1394 species and varieties, were recorded, of which seed plants compose 129 families, 558 genera, and 1269 species (see Appendix 1).

More than 80% of the species also occur in the non-limestone habitats of the Xishuangbanna region.

The limestone flora makes up about one quarter of the total species of the regional flora. (The flora of the Xishuangbanna region was primarily documented with 3336 native species of 1218 genera and 207 families of seed plants; see Li, 1996.) Some families show relative preference for limestone habitats (with more than 60% of the total number of species in the region on limestone), for example, Acanthaceae, Euphorbiaceae, Gesneriaceae, Meliaceae, Menispermaceae, Moraceae, Rhamnaceae, Rubiaceae, Rutaceae, Vitaceae, and Ulmaceae (Table 4). Other families, such as Hippocrateaceae, Icacinaceae, and Vacciniaceae, show an even stronger preference for limestone (found almost exclusively in limestone habitats in southern Yunnan), although they are not among the predominant families in species richness.

The distribution types of Chinese seed plants at the generic level were documented by Wu (1991). Based on Wu's document, 544 of the 558 genera of seed plants from the limestone forest of southern Yunnan can be divided into 12 distribution types or geographic elements (14 genera, which are cosmopolitan in distribution, are not included in the geographic statistics). One thousand two hundred forty-four of the 1269 species of seed plants from the limestone forest can be recognized in nine dis-

Table 5. Geographic affinities of the limestone forests of southern Yunnan.

Geographic element at the generic level (see Wu, 1991)	Percentage of genera	Geographic elements at the specific level	Percentage of species
1. Pantropic	21.1%	1. Pantropic	0.6%
2. Tropical Asia–Tropical America disjunct	2.9%	2. Tropical Asia–Tropical America disjunct	0.2%
3. Old World Tropics	13.8%	3. Old World Tropics	0.4%
4. Tropical Asia to Tropical Australia	9.0%	4. Tropical Asia to Tropical Australia	3.2%
5. Tropical Asia to Tropical Africa	7.9%	5. Tropical Asia to Tropical Africa	1.3%
6. Tropical Asia	35.3%	6. Tropical Asia	(64.5%)
7. Northern Temperate	2.8%	6a. India–Malaysia	17.0%
8. Temperate Eastern Asia and Northern America disjunct	2.8%	6b. Mainland Southeastern Asia to Malaysia	7.3%
9. Old World Temperate	0.9%	6c. Southern Asia to Mainland Southeastern Asia	19.9%
10. Temperate Mediterranean, Western Asia to Central Asia	0.2%	6d. Mainland Southeastern Asia to Southern China	20.3%
11. Eastern Asia	2.9%	7. Eastern Asia	0.5%
12. Endemic to China	0.4%	8. Southern China	10.6%
		9. Endemic to Yunnan	18.6%
Total of 544 genera	100%	Total of 1244 species	100%

tribution types based on their geographic distribution (25 species of seed plants are not included due to insufficient distribution references) (Table 5). At the generic level, the geographic elements of tropical distribution (1–6, Table 5) compose 90% of the total genera; the geographic elements of temperate distribution (7–10, Table 5) make up only 6.7%. At the specific level, the species that are of typical tropical distribution (1–6, Table 5) account for 70.2% of the total species. Among these, the geographic types that are considered to be from tropical Asia make up 64.5% of the total species from limestone forests in Xishuangbanna. If the species from the tropical areas adjacent to Xishuangbanna from southern China and Yunnan are included, these tropical species compose more than 90%. This indicates that the limestone flora at Xishuangbanna is principally tropical in nature and represents the tropical Asian flora at its northern tropical margin.

In a floristic comparison with nine similar floras, both limestone and non-limestone, from southwest China, northern Vietnam (Thin, 1997), northern Thailand (Smitinand, 1966), and the Malay Peninsula (Chin, 1977, 1979; Burkill & Henderson, 1925) (Table 6), the limestone flora of southern Yunnan displays explicit taxonomic affinities to the tropical floras and shows a closer affinity to the floras from the Malay Peninsula than to other floras from subtropical China (the floras of Huapin and Dongyang, see Li et al., 1986; Xu, 1984), even though these Malaysian floras lie farther away geographically from southern Yunnan. Our limestone flora in southern Yunnan shares the most genera with the limestone flora of northern Vietnam (Cuc-phuong, see Thin, 1997) among those floras compared in this study. The similarity at the generic level between our limestone flora and the limestone flora of northern Thailand (Doi Chiengdao) (Smitinand, 1966) is less than would be expected from its geographic proximity. This lack of correspondence could be because the plant list for Doi Chiengdao used here for comparison is an incomplete one consisting of only 512 species, less than half reported for most other sites in Table 6. The limestone flora of Xishuangbanna did not show a higher floristic similarity to other regional limestone floras than to non-limestone floras in our comparison. It appears that limestone floras develop from local or regional floras, supported also by the fact that only about 10% of the total species of limestone floras (the exclusive group) are restricted to limestone habitats in our study.

The floristic relationships between our limestone flora in southern Yunnan and neighboring floras of

Table 6. Comparison of floristic similarities between the limestone habitats of Xishuangbanna, southern Yunnan, and the limestone and non-limestone habitats from southwestern China and southeastern Asia.

Location	Habitat	Size of flora (Seed plants)	Shared taxa by both floras	Similarity coefficients
2. Longgan, SW China 22°14–33'N, 106°46'E	limestone	149 families	118	91.2
		669 genera	371	66.5
3. Daqinshan Mountains, SW China 22°14'N, 107°E	non-limestone	1363 species		
		182 fam.	126	97.4
		871 gen.	389	69.8
4. Gulinqing, SW China 22°36'N, 104°E	limestone	1813 spp.		
		143 fam.	116	89.9
5. Huapin, SW China 25°31–39'N, 109°50'E	non-limestone	496 gen.	261	52.6
		1095 spp.		
		151 fam.	83	72.8
6. Dongyang Mountains, SW China 25°14'N, 107°56'E	limestone	475 gen.	150	33.2
		1051 spp.		
		116 fam.	86	73.7
7. Cucphuong, N Vietnam 20°14–24'N, 105°24–44'E	limestone	367 gen.	153	41.6
		736 spp.		
		167 fam.	120	93
8. Chiendae, N Thailand 19°2'N, 98°54'E	limestone	860 gen.	428	76.7
		1661 spp.		
		101 fam.	93	92.1
9. Malay peninsula limestone 1–6°N, 100–104°E	limestone	342 gen.	181	52.9
		512 spp.		
		117 fam.	93	81.6
10. Taiping, Malay peninsula 4°N, 101°E	non-limestone	535 gen.	244	51.6
		1112 spp.		
		115 fam.	94	82.5
		682 gen.	243	51.6
		1939 spp.		

Notes: The direct comparison of species composition between the different floras is not very significant before the local floras are updated and the taxa revised; therefore, the comparison of floristic similarities between the different floras at the specific level is not made.

References: location 2 (Chen, 1985); 3 (Daqinshan Forest station of Guanxi Forestry Bureau, 1980); 4 (Li, 1987); 5 (Li et al., 1986); 6 (Xu, 1984); 7 (Thin, 1997); 8 (Smitinand, 1966); 9 (Chin, 1977, 1979); 10 (Burkill & Henderson, 1925).

tropical Asia and southern China were discussed by Zhu (1997). This limestone flora shares all families and 88% of its genera with the flora of Indochina (Lecomte, 1907–1951; Aubréville et al., 1960–1996), 96% of its families and 68% of its genera with the flora of the Malay Peninsula (Ridley, 1967; Keng, 1978), 73% of its woody plant genera with Burma (Kurz, 1877), and more than 97% of its families and more than 80% of its genera with other tropical floras of south China (including Hainan Island; see Wu, 1994). The limestone flora of Xishuangbanna demonstrates strong affinity to other tropical Asian floras.

Literature Cited

Aubréville, A., N. L. Tardieu-Blot & J. E. Vidal (editors). 1960–1996. Flora du Cambodge, du Laos et du Vietnam. No. 1–28. Museum National d'Histoire Naturelle, Paris.

Beard, J. S. 1944. Climax vegetation in tropical America. *Ecology* 25: 127–158.
 ———. 1955. The classification of tropical American vegetation types. *Ecology* 36: 359–412.
 Burkill, I. H. & M. R. Henderson. 1925. The flowering plants of Taiping, in the Malay Peninsula. *Gard. Bull. Straits Settlem.* 3: 300–459.
 Champion, H. G. 1936. A preliminary survey of the forest types of India and Burma. *Indian Forest Rec.*, n.s. 1: 1–286.
 Chen, F. P. 1985. Limestone Flora in Longgan, Guangxi, China. Unpublished M.S. Thesis, Zhongshan University. [In Chinese.]
 Chin, S. C. 1977, 1979. The limestone hill flora of Malaya, I, II. *Gard. Bull. Singapore* 30: 165–219; 32: 64–203.
 Curtis, J. T. & R. P. McIntosh. 1951. An upland forest continuum in the prairie-forest border region of Wisconsin. *Ecology* 32: 467–496.
 Daqinshan Forest station of Guangxi Forestry Bureau. 1980. Plant list of Daqinshan, Guangxi. [Unpublished manuscript, in Chinese.]
 Keng, H. 1978. Orders and Families of Malayan Seed Plants. Singapore Univ. Press, Singapore.

- Kurz, W. S. 1877. Forest Flora of British Burma 1 & 2. Office of the Superintendent of Government Printing, Calcutta. [Reprint 1974, International Book Distributors.]
- Lecomte, H. (editor). 1907–1951. Flora generale de L'Indochine. Tome 1–7. Masson et Cie Editeurs, Paris.
- Li, B. 1987. Flora of Gulinqing Nature Reserve in south-eastern Yunnan. Unpublished M.S. Thesis, Zhongshan University. [In Chinese.]
- Li, S. K., S. F. Yuan, L. F. Liu & Z. Z. Chen. 1986. The flora of Huapin. *In*: Reports on the Huapin Forest Area in Guangxi. Shandong Science Press, Jinan. [In Chinese.]
- Li, Y. H. (editor). 1996. List of Plants in Xishuangbanna. Yunnan National Press, Kunming. [In Chinese.]
- Liang, C. F., J. Y. Liang & L. F. Liu. 1985. A report on the exploration of the flora of Longgang. *Guihaia* 5(3): 191–209. [In Chinese with English abstract.]
- Liu, L. H. 1987. Rain forest. *In*: C. Y. Wu (editor), Vegetation of Yunnan. Science Press, Beijing. [In Chinese.]
- Liu, L., Y. T. Hu, Y. C. Yang, W. W. Liu & R. X. Guo (editors). 1990. Reports on Land and Economy of Xishuangbanna. Yunnan People's Press, Kunming. [In Chinese.]
- , H. Ye, G. Zhang & H. Chen. 1994. Floristic analysis of the Longhua natural reserve. *Acta Bot. Austrosinica* 9: 1–16. [In Chinese with English abstract.]
- Raunkiaer, C. 1934. The Life Forms of Plants and Statistical Plant Geography. Oxford Univ. Press, Oxford.
- Ridley, H. N. 1967. The Flora of Malay Peninsula, I–V. L. Reeve, London. [Reprint.]
- Schimper, A. F. W. 1903. Plant-Geography upon a Physiological Basis. Oxford Univ. Press, Oxford.
- Shimizu, T. 1964. Studies on the limestone flora of Japan and Taiwan. Part II. *J. Fac. Textile Sci. Technol. Shinsu Univ.*, A 12: 1–38.
- Smitinand, T. 1966. The vegetation of Dao Chiengdao, a limestone massive in Chiengmai, north Thailand. *Nat. Hist. Bull. Siam Soc.* 21(1–2): 93–128.
- Thin, N. N. 1997. The vegetation of Cucphuong national park, Vietnam. *Sida* 17: 719–759.
- Wang, H., H. Zhu & B. G. Li. 1997. Vegetation on limestone in Xishuangbanna, southwest China. *Guihaia* 17: 101–117. [In Chinese with English abstract.]
- Whitmore, T. C. 1984. Tropical Rain Forests of the Far East, 2nd ed. Clarendon Press, Oxford.
- Wu, C. Y. (editor). 1980. Vegetation of China, pp. 363–397. Science Press, Beijing. [In Chinese.]
- . 1991. The areal-types of Chinese genera of seed plants. *Acta Bot. Yunnan Suppl.* IV: 1–139.
- Wu, T. L. (editor). 1994. A Checklist of Flowering Plants of Islands and Reefs of Hainan and Guangdong Province. Science Press, Beijing. [In Chinese.]
- Xu, Y. C., H. Q. Jiang & F. Quan (editors). 1987. Reports on the Nature Reserve of Xishuangbanna. Yunnan Sci. & Techn. Press, Kunming. [In Chinese.]
- Xu, Z. R. 1984. Limestone Flora of Dongyang Mountain in Libo, Guizhou, China. Unpublished M.S. Thesis, Zhongshan University. [In Chinese.]
- Zhu, H. 1992. Tropical rain forest vegetation in Xishuangbanna. *Chin. Geogr. Sci.* 2: 64–73.
- . 1997. Ecological and biogeographical studies on the tropical rain forest of south Yunnan, SW China with a special reference to its relationship with rain forests of tropical Asia. *J. Biogeogr.* 24: 647–662.
- , H. Wang, B. G. Li & Z. F. Xu. 1996. A phyto-geographical research on forest flora of limestone hills in Xishuangbanna. *Guihaia* 16: 317–330. [In Chinese with English abstract.]
- , ———, ——— & ———. 1997. Floristic relationships between the limestone flora of Xishuangbanna and neighboring floras of tropical Asia and south China. *Acta Bot. Yunn.* 19: 357–365. [In Chinese with English abstract.]
- , H. Wang & B. G. Li. 1998a. The Structure, Species Composition and Diversity of the Limestone Vegetation in Xishuangbanna, SW China. *Gard. Bull. Singapore* 50: 5–33.
- , H. Wang, B. G. Li & Z. F. Xu. 1998b. Research on the tropical seasonal rainforest of Xishuangbanna, south Yunnan. *Guihaia* 18: 371–384. [In Chinese with English abstract.]

Appendix 1. Ecological species groups of the limestone vegetation in southern Yunnan. *Flora Reipublicae Popularis Sinicae* is the authoritative source for specific and infraspecific names except for ones recently revised and in IPNI (www.ipni.org) and TROPICOS (<http://mobot.mobot.org/W3T/Search/vast.html>). The family names of angiosperms are according to the Angiosperm Phylogeny Website (<http://www.mobot.org/MOBOT/research/APweb/>).

Seed Plant Taxa exclusive to limestone habitats and endemic to southern Yunnan

ACANTHACEAE			
<i>Baphicacanthus multibracteolata</i>	H. T. Chang & H. Chu	<i>Chu Hua 1192</i>	(holotype, SYS)
AGAVACEAE			
<i>Dracaena menglaensis</i>	G. Z. Ye	<i>Ye Guang-zheng 9035</i>	(holotype, YCE; isotype, KUN)
ALANGIACEAE			
<i>Alangium kurzii</i> var. <i>pachyphyllum</i>	W. P. Fang & H. Y. Su	<i>Zhang Shun-cheng 24027</i>	(HITBC); <i>Li Yan-hui 1255</i> (holotype, KUN)
DIOSCOREACEAE			
<i>Dioscorea menglaensis</i>	H. Li	<i>Pei Sheng-ji 10347</i>	(holotype, KUN)
EBENACEAE			
<i>Diospyros atrotricha</i>	H. W. Li	<i>Li Yan-hui 4215</i>	(holotype, KUN; isotype, HITBC)
EUPHORBIACEAE			
<i>Croton yanhuii</i>	Y. T. Chang	<i>Ch1050</i> (SYS); <i>Li Yan-hui 03587</i>	(holotype, KUN; isotype, HITBC)
<i>Trigonostemon lii</i>	Y. T. Chang	<i>Li Yan-hui 4576</i>	(holotype, KUN)
FAGACEAE			
<i>Quercus yiwuensis</i>	Huang	<i>Pei Sheng-ji 59-10040</i>	(holotype, KUN)
GESNERIACEAE			
<i>Ornithoboea calcicola</i>	C. Y. Wu ex H. W. Li	<i>Pei Sheng-ji 59-10072</i>	(isotype, HITBC)
LAURACEAE			
<i>Lindera nactusua</i> var. <i>monglunensis</i>	H. P. Tsui	<i>Li Yan-hui 4231</i>	(HITBC), 386 (holotype, KUN)
<i>Neolitsea menglaensis</i>	Y. C. Yang & P. H. Huang	<i>Li Yan-hui 20078</i>	(holotype, KUN; isotype, HITBC)
MAIYACEAE			
<i>Pterospermum menglunensis</i>	H. H. Hsue	<i>Ch378</i> (SYS); <i>Li Yan-hui 4634</i>	(holotype, KUN; isotype, HITBC)
<i>Pterospermum yunnanensis</i>	H. H. Hsue	<i>Li Yan-hui 33830</i>	(HITBC), 3717 (holotype, KUN); <i>Tao Guo-da 13655</i> (HITBC)
MELIACEAE			
<i>Amoora calcicola</i>	C. Y. Wu & H. Li	<i>Li Yan-hui 3712</i>	(HITBC), 3814 (HITBC), 2804 (HITBC); <i>Pei Sheng-ji 59-10292</i> (holotype, KUN)
PIPERACEAE			
<i>Piper mischocarpum</i>	Y. C. Tseng	<i>Cai C.T. 59-10784</i>	(holotype, KUN); <i>Li Yan-hui 3771</i> (HITBC); <i>Tao Guo-da 4177</i> (HITBC), 7152 (HITBC)
<i>Sageretia thea</i> var. <i>cordiformis</i>	Y. L. Chen & P. K. Chou	<i>W. T. Wang 10496</i>	(holotype, KUN)

Appendix 1. Continued.

THEACEAE*Pyrenaria menglaensis* G. D. Tao

Tao Guo-da 15933 (holotype, KUN; isotype, HITBC)

Seed Plant Taxa exclusive to limestone habitats but not endemic to southern Yunnan

ACANTHACEAE*Andrographis laxiflora* var. *glomeruliflora* (Bremek.) H. Chu

Ch1193 (SYS), Ch1219 (SYS)

Daedalacanthus tetragonus T. Anders.

Ch255 (SYS), Ch1175 (SYS), Ch1217 (SYS); Tao-Guo-da 3797 (HITBC)

Pieracanthus alatus (Wall. ex Nees) Bremek.

Li Yan-hui 20047 (HITBC)

Strobilanthes psitachys C. B. Clarke ex W. W. Smith

Li Yan-hui 4605 (HITBC)

Thunbergia coccinea Wall.

Ch454 (SYS), Ch1186 (SYS); Li Yan-hui 5190 (HITBC), 2911 (HITBC)

AGAVACEAE*Dracaena cambodiana* Pierre ex Gagnep.

Wang Hong 3159 (HITBC), 3160 (HITBC)

Dracaena ternstrofia Roxb.

Yang Zheng-hong 12178 (HITBC); Expedition 32120 (HITBC), 34923 (HITBC)

ANACARDIACEAE*Pistacia weinmannifolia* Poiss. ex Franch.

Expedition 32613 (HITBC); Pei Sheng-ji 10045 (HITBC); Tao Guo-da 1212 (HITBC)

Spondias lakonensis var. *hirsutus* C. Y. Wu & T. L. Ming

Wang Hong 1792 (HITBC)

Toxicodendron fulvum (Craib) C. Y. Wu & T. L. Ming

Pei Sheng-ji 10034 (HITBC); Tao Guo-da 13650 (HITBC)

ANNONACEAE*Alphonsea boniana* Finet & Gagnep.

Ch56 (SYS)

Alphonsea mollis Dunn

Li Yan-hui 1043 (HITBC), 4610 (HITBC)

Alphonsea squamosa Finet & Gagnep.

Ch815 (SYS)

Milusa velutina Hook. f. & Thoms.

Ch386 (SYS), Ch814 (SYS), Ch985 (SYS); Zhu Hua & Wang Hong 2416 (HITBC)

Mitrephora calcarea Diels ex Ast

Ch545 (SYS)

Polyalthia petelotii Merr.

Ch909 (SYS)

APOCYNACEAE*Aganosma acuminata* (Roxb.) G. Don

Ch584 (SYS)

Anodendron affine var. *pingpienense* Tsiang & P. T. Li

Ch802 (SYS), Ch715 (SYS)

Cosmostigma hainanense Tsiang

Ch870 (SYS)

ARACEAE*Amorphophallus yunnanensis* Engl.

Li Yan-hui 4225 (HITBC)

Goniatanthus pumilus Engl. & K. Krause

Tao Guo-da et al. 16166 (HITBC)

Remusatia vivipara Schott

Expedition 10201 (HITBC)

BOMBACACEAE*Bombax insignie* Wall.

Tao Guo-da 9007 (HITBC), 9008 (HITBC)

BORAGINACEAE*Ehretia dunniana* Lévl.

Ch29 (SYS), Ch373 (SYS); Li Yan-hui 3300 (HITBC), 3726 (HITBC)

Appendix 1. Continued.

BUXACEAE	
<i>Sarcococca vagans</i> Stapf	Tao Guo-da 15739 (HITBC), 13691 (HITBC)
CAPPARIDACEAE	
<i>Capparis bodinieri</i> Lévl.	Ch321 (SYS)
CELASTRACEAE	
<i>Loeseneriella merrilliana</i> A. C. Smith	Li Yan-hui 455 (HITBC); Tao Guo-da 13672 (HITBC)
<i>Loeseneriella yunnanensis</i> (Hu) A. C. Smith	Ch1015 (SYS), Ch1063 (SYS); Li Yan-hui 2736 (HITBC); Wang Hong 1573 (HITBC)
<i>Pristimera cambodiana</i> (Pierre) A. C. Smith	Ch24 (SYS); Wang Hong 1575 (HITBC)
<i>Pristimera setulosa</i> A. C. Smith	Li Yan-hui 3141 (HITBC)
COMBRETACEAE	
<i>Anogeissus acuminata</i> Wall.	Tong Shao-quan 24960 (HITBC)
COMPOSITAE	
<i>Pterocypela indica</i> (L.) C. Shih	YB004125 (HITBC)
<i>Vernonia curtisii</i> Craib & Hutchison	Li Yan-hui 3780 (HITBC); Tao Guo-da 13664 (HITBC)
CONVOLVULACEAE	
<i>Porana paniculata</i> Roxb.	Ch1170 (SYS); Wang Hong 2655 (HITBC)
<i>Porana racemosa</i> Roxb.	Ch469 (SYS); Zhu Pei-zhi 10527 (HITBC)
<i>Tridynamia sinensis</i> (Hemsl.) G. W. Staples	Ch1232 (SYS)
<i>Tridynamia sinensis</i> var. <i>delavayi</i> (Gagnep. & Courchet) G. W. Staples	Ch513 (SYS)
CRUCIFERAE	
<i>Cardamine calcicola</i> W. W. Smith	Li Yan-hui 4217 (HITBC)
DIOSCOREACEAE	
<i>Dioscorea arachidna</i> Prain & Burkill	Ch845 (SYS)
<i>Dioscorea aspersa</i> Prain & Burkill	Ch921 (SYS)
<i>Dioscorea chingii</i> Prain & Burkill	Ch473 (SYS); Li Yan-hui 2036 (HITBC)
<i>Dioscorea pulverea</i> Prain & Burkill	Ch791 (SYS); Wang Hong 3147 (HITBC)
<i>Dioscorea tentaculigera</i> Prain & Burkill	Pei Sheng-ji 9985 (HITBC)
ERICACEAE	
<i>Agapetes burmanica</i> W. E. Evans	Li Yan-hui 3718 (HITBC), 2739 (HITBC)
<i>Agapetes lobbii</i> C. B. Clarke	Li Yan-hui 3719 (HITBC)
<i>Agapetes manni</i> Hemsl.	Li Yan-hui 3629 (HITBC)
EUPHORBIACEAE	
<i>Cleistanthus sumatranus</i> (Miq.) Muell.-Arg.	Li Yan-hui 3095 (HITBC), 2529 (HITBC)
<i>Croton argyrateus</i> Blume	Ch179 (SYS)
<i>Phyllanthus clarkei</i> Hook. f.	Ch563 (SYS), Ch812 (SYS)
<i>Trigonostemon bonianus</i> Gagnep.	Ch367 (SYS), Ch39 (SYS), Ch353 (SYS)

Appendix 1. Continued.

FABACEAE

- Albizia odoratissima* (L.) Benth.
Bauhinia carcinophylla Merr.
Caesalpinia isoongii Merr.
Callerya eurybotrya (Drake) A. M. Schot
Derris caudatilimba How
Milletia tetrapera Kurz
Sophora prazeri Prain
Sophora tonkinensis Gagnep.

Li Yan-hui 1411 (HITBC)
Ch1097 (SYS)
Ch118 (SYS)
Li Yan-hui 4200 (HITBC)
Ch398 (SYS), *Ch504* (SYS)
Li Yan-hui 4100 (HITBC)
Ch394 (SYS), *Ch559* (SYS); *Li Yan-hui 2802* (HITBC), *4277* (HITBC)
Ch619 (SYS)

FUMARIACEAE

- Corydalis taliensis* var. *siamensis* (Craib) X. Zhang

Li Yan-hui 20062 (HITBC), *3727* (HITBC)

GESNERIACEAE

- Raphiocarpus begoniifolius* (H. Lévl.) B. L. Burt
Didymocarpus margaritae W. W. Sm.
Lysionotus serratus D. Don
Ornithoboea henryi Craib

Ch947 (SYS); *Pei Sheng-ji 9892* (HITBC); *Tao Guo-da 15902* (HITBC)
Pei Sheng-ji 1054 (HITBC)
Ch624 (SYS), *Ch806* (SYS); *Pei Sheng-ji 59-9937* (HITBC); *Tao Guo-da 15750* (HITBC)
Expedition 32625 (HITBC); *Pei Sheng-ji 59-10069* (HITBC)

GUTTIFERAE

- Garcinia bracteata* C. Y. Wu ex Y. H. Li

Li Yan-hui 4103 (HITBC), *3813* (HITBC)

ICACINACEAE

- Gomphandra tetrandra* (Wall.) Sleum.

Tao Guo-da 11182 (HITBC)

LABIATAE

- Coleus xanithanthus* C. Y. Wu & Y. C. Huang
Gomphostemma parviflorum Wall.
Rabdosia ertocalyx var. *laxiflora* C. Y. Wu & H. W. Li

Pei Sheng-ji 10138 (HITBC)
Cui Jing-yun 14659 (HITBC); *Tao Guo-da 15798* (HITBC)
Li Bao-gui 9911209 (HITBC); *Li Yan-hui 3759* (HITBC); *Wang Zhong-yu s.n.* (HITBC)

LAMIACEAE

- Symphorema involucreatum* Roxb.

Li Yan-hui 2988 (HITBC), *4852* (HITBC)

LAURACEAE

- Cryptocarya acutifolia* H. W. Li

Li Yan-hui 1029 (HITBC), *3052* (HITBC)

LINACEAE

- Reinwardtia indica* Dum.

Expedition 34310 (HITBC)

MAIYACEAE

- Pterospermum chingtungense* C. Y. Wu & Hsue
Pterospermum proteus Burkill

Expedition 34533 (HITBC)
Li Yan-hui 3586 (HITBC); *Wang Hong 831* (HITBC), *842* (HITBC)

Appendix 1. Continued.

MELIACEAE			
<i>Aglaia testicularis</i> C. Y. Wu	Ch339 (SYS)		
<i>Amoora tetrapetala</i> (Pierre) C. Y. Wu	Ch529 (SYS); Wang Hong 1710 (HITBC), 1715 (HITBC)		
<i>Munronia henryi</i> Harms	Ch351 (SYS), Ch192 (SYS); Li Yan-hui 3327 (HITBC)		
MENISPERMACEAE			
<i>Cyclea sutchuenensis</i> Gagnep.	Ch901 (SYS)		
<i>Stephania chingtungensis</i> H. S. Lo	Tao Guo-da 43898 (HITBC)		
<i>Stephania epigaea</i> H. S. Lo	Tao Guo-da 15672 (HITBC)		
MYRSINACEAE			
<i>Myrsine semiserrata</i> Wall.	Li Yan-hui 20032 (HITBC); Tao-Guo-da 15729 (HITBC); Wang Hong 1960 (HITBC)		
OLACACEAE			
<i>Natsiatopsis thunbergiaefolia</i> Kurz	Tao Guo-da 42370 (HITBC)		
OLEACEAE			
<i>Ligustrum sinense</i> var. <i>coryanum</i> (W. W. Smith) Hand.-Mazz.	Li Yan-hui 429 (HITBC); Tao Guo-da 16440 (HITBC); Wang Hong 2101 (HITBC), 2091 (HITBC)		
ORCHIDACEAE			
<i>Bulbophyllum ambrosia</i> (Hance) Schltr.	Ch679 (SYS)		
<i>Bulbophyllum kwangtungense</i> Schltr.	Ch22 (SYS)		
<i>Bulbophyllum nigrescens</i> Rolfe	Zhu Pei-zhi 8683 (HITBC)		
<i>Dendrobium salaccense</i> Lindl.	Ch158 (SYS)		
<i>Eulophia bracteosa</i> Lindl.	Li Yan-hui 4150 (HITBC)		
<i>Pholidota chinensis</i> Lindl.	Tao Guo-da 44107 (HITBC)		
PALMAE			
<i>Caryota urens</i> L.	Chen San-yang 18959 (HITBC)		
PIPERACEAE			
<i>Peperomia leptostachya</i> var. <i>cambodiana</i> (C. DC.) Merr.	Ch950 (SYS)		
PRIMULACEAE			
<i>Lysimachia garrettii</i> Fletcher	Li Yan-hui 3302 (HITBC)		
RHAMNACEAE			
<i>Gouania javanica</i> Miq.	Ch798 (SYS), Ch850 (SYS); Li Yan-hui 3714 (HITBC)		
<i>Hovenia acerda</i> var. <i>kiukiangensis</i> (Hu & Cheng) C. Y. Wu ex Y. L. Chen	Tao Guo-da 39915 (HITBC)		
<i>Sageretia laxiflora</i> Hand.-Mazz.	Ch399 (SYS); Zhu Pei-zhi 10478 (HITBC), 10479 (HITBC)		
<i>Ventilago calyculata</i> var. <i>trichoclada</i> Y. L. Chen & P. K. Chou	Ch550 (SYS); Li Yan-hui 5230 (HITBC)		

Appendix 1. Continued.

RUBIACEAE			<i>Ch361</i> (SYS), <i>Ch816</i> (SYS) <i>Tao Guo-da 13651</i> (HITBC) <i>Ch368</i> (SYS), <i>Ch270</i> (SYS); <i>Li Yan-hui 1773</i> (HITBC), <i>4111</i> (HITBC) <i>Li Yan-hui 4240</i> (HITBC), <i>3871</i> (HITBC)
RUTACEAE			<i>Li Yan-hui 3716</i> (HITBC), <i>3309</i> (HITBC); <i>Tao Guo-da 15722</i> (HITBC); <i>Expedition 32673</i> (HITBC) <i>Li Yan-hui 3815</i> (HITBC), <i>4269</i> (HITBC)
SCROPHULARIACEAE			<i>Ch96</i> (SYS); <i>Li Yan-hui 363</i> (HITBC), <i>3952</i> (HITBC)
SIMARUBACEAE			<i>Li Yan-hui 4203</i> (HITBC)
STAPHYLEACEAE			<i>Li Yan-hui 393</i> (HITBC); <i>Zhang Jian-hou 13707</i> (HITBC)
ULMACEAE			<i>Ch32</i> (SYS), <i>Ch371</i> (SYS), <i>Ch1089</i> (SYS); <i>Li Yan-hui 391</i> (HITBC), <i>4211</i> (HITBC)
URTICACEAE			<i>Ch877</i> (SYS) <i>Ch879</i> (SYS); <i>Li Yan-hui 4105</i> (HITBC); <i>Zhu Pei-zhi 8649</i> (HITBC) <i>Li Yan-hui 396</i> (HITBC) <i>Ch917</i> (SYS) <i>Ch572</i> (SYS), <i>Ch719</i> (SYS) <i>Ch514</i> (SYS), <i>Ch632</i> (SYS); <i>Li Yan-hui 3751</i> (HITBC)
VERBENACEAE			<i>Ch358</i> (SYS), <i>Ch710</i> (SYS), <i>Ch941</i> (SYS)
VITACEAE			<i>Ch91</i> (SYS), <i>Ch925</i> (SYS); <i>Zhang Jian-hou 13602</i> (HITBC) <i>Li Yan-hui 3700</i> (HITBC), <i>2737</i> (HITBC) <i>Ch139</i> (SYS)
ZINGIBERACEAE			<i>Pei Sheng-ji 10073</i> (HITBC); <i>Tao Guo-da 44091</i> (HITBC)
		Seed Plant Taxa preferent to limestone habitats	

Appendix 1. Continued.

ACANTHACEAE

- Andrographis laxiflora* (Blume) Lindau
Eranthemum pulchellum Andr.
Goldfussia glomerata Nees
Pseuderanthemum palatiferum Radlk.
Pseuderanthemum polyanthum (C. B. Clarke) Merr.
Rhapidospora vagabunda (R. Ben) C. Y. Wu
Semnostachya longispicata (Hayata) C. F. Hsieh & T. C. Huang
- Ch376 (SYS), Ch808 (SYS), Ch974 (SYS); *Li Yan-hui 3721* (HITBC)
Li Yan-hui 2898 (HITBC)
Ch1191 (SYS); *Tao Guo-da 3775* (HITBC)
Ch137 (SYS); Ch172 (SYS), Ch180 (SYS), Ch310 (SYS)
Ch91 (SYS); *Li Yan-hui 1011* (HITBC)
Ch36 (SYS), Ch247 (SYS); *Li Yan-hui 2829* (HITBC)
Ch1182 (SYS)

ANNONACEAE

- Mitusa chinii* W. T. Wang
Mitrophora maingayi Hook. f. & Thoms.
Mitrophora thorelii Pierre
- Ch499 (SYS), Ch1211 (SYS); *Unknown coll. 74317* (HITBC), 74318 (HITBC)
Li Yan-hui 3139 (HITBC)
Ch673 (SYS), Ch420 (SYS); *Li Yan-hui 67493* (HITBC)

APOCYNACEAE

- Antiostelma lantsangensis* (Tsiang & P. T. Li) P. T. Li
Bidaria yunnanense (Tsiang) P. T. Li
Dischidia esquirolii (Lév.) Tsiang
Dischidia minor (Vahl) Merr.
Gynemema sylvestre (Retz.) Schult.
Gynemema latifolium Wall. ex Wight
Hoya carmosa (L. f.) R. Br.
Hoya lyi Lévl.
Hoya nervosa Tsiang & P. T. Li
Hoya villosa Costantin.
Jasminanthes saxatilis (Tsiang & P. T. Li) W. D. Stevens & P. T. Li
Marsdenia tenacissima (Roxb.) Moon
Toxicarpus villosus (Blume) Decne.
- Ch658 (SYS)
Ch242 (SYS), Ch764 (SYS)
Ch23 (SYS)
Ch729 (SYS)
Expedition 34523 (HITBC)
Ch586 (SYS), Ch633 (SYS), Ch716 (SYS); *Yang Zheng-hong 10976* (HITBC)
Ch651 (SYS)
Tao Guo-da 35474 (HITBC)
Zhang Jian-hou 18562 (HITBC)
Ch960 (SYS); *Li Yan-hui 2574* (HITBC)
Tao Guo-da 44195 (HITBC)
Ch438 (SYS); *Expedition 32621* (HITBC)
Ch544 (SYS), Ch587 (SYS), Ch646 (SYS)

ARACEAE

- Aglaonema pierreanum* Engl.
Colocasia gigantea Hook. f.
Rhaphidophora decursiva (Roxb.) Schott
Rhaphidophora hongkongensis Schott
- Ch233 (SYS); Ch240 (SYS); *Pei Sheng-ji 10274* (HITBC)
Ch1169 (SYS); *Tao Guo-da 9123* (HITBC)
Ch1160 (SYS); *Li Jie 722* (HITBC)
Ch706 (SYS), Ch1179 (SYS)

BEGONIACEAE

- Begonia augustinei* Hemsf.
Begonia dryadis Immsch.
Begonia prostrata Immsch.
- Ch265 (SYS); *Tao Guo-da 15926* (HITBC)
Zhu Pei-zhi 10364 (HITBC)
Ch976 (SYS)

BOMBACACEAE

- Bombax ceiba* L.
- Li Yan-hui 2946* (HITBC)

Appendix 1. Continued.

BORAGINACEAE		
<i>Ehretia tsangii</i> I. M. Johnston.		<i>Li Yan-hui</i> 3360 (HITBC), 3726 (HITBC)
CAPPARIDACEAE		
<i>Capparis membranifolia</i> Kurz		<i>Ch</i> 612 (SYS); <i>Zhao Shi-wang</i> 22582 (HITBC)
<i>Capparis urophylla</i> F. Chun		<i>Ch</i> 853 (SYS), <i>Ch</i> 136 (SYS), <i>Ch</i> 153 (SYS), <i>Ch</i> 195 (SYS); <i>Li Yan-hui</i> 2112 (HITBC)
CAPRIFOLIACEAE		
<i>Viburnum tsangii</i> Rehder		<i>Li Yan-hui</i> 4235 (HITBC); <i>Zhu Pei-zhi</i> 10470 (HITBC)
CARDIOPTERIDACEAE		
<i>Periperygium quinquelobum</i> Hassk.		<i>Expedition</i> 34761 (HITBC)
COMMELINACEAE		
<i>Porandra scandens</i> D. Y. Hong		<i>Ch</i> 902 (SYS); <i>Pei Sheng-ji</i> 9947 (HITBC); <i>Unknown coll.</i> 262 (HITBC)
COMPOSITAE		
<i>Youngia japonica</i> (L.) DC.		<i>Ch</i> 1201 (SYS), <i>Ch</i> 326 (SYS); <i>Tao Guo-da</i> 1742 (HITBC)
EBENACEAE		
<i>Diospyros yunnanensis</i> Rehder & Wils.		<i>Ch</i> 516 (SYS), <i>Ch</i> 1214 (SYS); <i>Cui Jing-yun</i> 14656 (HITBC); <i>Pei Sheng-ji</i> 10300 (HITBC)
EUPHORBIACEAE		
<i>Adenochlaena silhetensis</i> Benth.		<i>Ch</i> 807 (SYS); <i>Zou Shuang-yun</i> 356 (HITBC)
<i>Antidesma montanum</i> var. <i>microphyllum</i> (Hemsl.) P. Hoffmann		<i>Li Yan-hui</i> 3575 (HITBC)
<i>Cleidion bracteosum</i> Gagnep.		<i>Li Yan-hui</i> 4250 (HITBC)
<i>Cleidion brevipetiolatum</i> Pax & K. Hoffm.		<i>Ch</i> 922 (SYS); <i>Li Yan-hui</i> 399 (HITBC)
<i>Lasiococca comberi</i> var. <i>pseudoverticillata</i> (Merr.) H. S. Ku		<i>Ch</i> 309 (SYS), <i>Ch</i> 226 (SYS), <i>Ch</i> 38 (SYS); <i>Li Yan-hui</i> 1694 (HITBC)
<i>Sumbatiopsis albicans</i> (Blume) J. J. Smith		<i>Ch</i> 131 (SYS); <i>Li Yan-hui</i> 2423 (HITBC)
FABACEAE		
<i>Bauhinia genyflexa</i> Craib		<i>Ch</i> 25 (SYS), <i>Ch</i> 97 (SYS); <i>Li Yan-hui</i> 1500 (HITBC)
<i>Milletia yunnanensis</i> Pampan.		<i>Tao Guo-da</i> 13668 (HITBC)
<i>Whitfordiodendron filipes</i> (Dunn) Dunn		<i>Zhao Shi-wang</i> 22492 (HITBC)
FLACOURTIACEAE		
<i>Flacourtia rukam</i> Zoll. & Mor.		<i>Ch</i> 784 (SYS)
GESNERIACEAE		
<i>Chirita dimidiata</i> R. Br.		<i>Ch</i> 948 (SYS)
<i>Paraboea rufescens</i> (Franch.) B. L. Burt		<i>Ch</i> 379 (SYS); <i>Wang Hong</i> 2724 (HITBC)
<i>Paraboea dictyonera</i> (Hance) B. L. Burt		<i>Ch</i> 842 (SYS); <i>Wang Hong</i> 2707 (HITBC)
<i>Paraboea sinensis</i> f. <i>macrophylla</i> (Stapf) C. Y. Wu		<i>Ch</i> 272 (SYS); <i>Expedition</i> 34359 (HITBC); <i>Tao Guo-da</i> 16748 (HITBC), 3792 (HITBC)

Appendix 1. Continued.

GRAMINEAE		
<i>Dendrocalamus strictus</i> (Roxb.) Nees		Ch1058 (SYS); Sun Ji-liang 18151 (HITBC)
ICACINACEAE		
<i>Apodytes dimidiata</i> E. Meyer ex Arn.		Tao Guo-da 16690 (HITBC)
LABIATAE		
<i>Colebrookea oppositifolia</i> Sm.		Ch51 (SYS); Li Yan-hui 252 (HITBC), Sun Ji-liang 18005 (HITBC)
<i>Eisholtzia stachyodes</i> (Link) C. Y. Wu		Tao Guo-da 3798 (HITBC)
LAMIACEAE		
<i>Clerodendron henryi</i> Pei		Wang Hong 2921 (HITBC), 2922 (HITBC), 2940 (HITBC)
<i>Garrettia stamensis</i> Fletcher		Expedition 32276 (HITBC); Unknown coll. 2434 (HITBC), 456 (HITBC); Wang Hong 2727 (HITBC)
<i>Premna hamiltonii</i> J. L. Ellis		Ch177 (SYS), Ch278 (SYS); Expedition 32617 (HITBC)
<i>Sphenodesme mollis</i> Craib		Ch864 (SYS)
LAURACEAE		
<i>Litsea dillenifolia</i> P. Y. Bai & P. H. Huang		Li Yan-hui 3053 (HITBC)
<i>Litsea elongata</i> (Wall. ex Nees) Benth. & Hook. f.		Ch269 (SYS), Ch119 (SYS)
<i>Phoebe lanceolata</i> (Wall. ex Nees) Nees		Ch161 (SYS), Ch61 (SYS), Ch324 (SYS); Li Yan-hui 754 (HITBC)
LILIACEAE		
<i>Polygonatum punctatum</i> Royle ex Kunth		Ch711 (SYS)
<i>Tipstria waltii</i> Hook. f.		Expedition 34321 (HITBC); Yang Zhen-hong 6971 (HITBC); Wang Hong 3102 (HITBC)
MALPIGHIACEAE		
<i>Hiptage benghalensis</i> var. <i>tonkinensis</i> (Dop) S. K. Chen		Ch45 (SYS); Li Yan-hui 1051 (HITBC)
MALVACEAE		
<i>Sterculia villosa</i> Roxb.		Zou Shuang-yun 324 (HITBC)
MELIACEAE		
<i>Chukrasia tabularia</i> var. <i>velutina</i> King		L. Yan-hui 385 (HITBC)
<i>Dysoxylum lenticellatum</i> C. Y. Wu & H. Li		Ch508 (SYS); Cui Jing-yun 22658 (HITBC)
<i>Dysoxylum spicatum</i> H. L. Li		Unknown coll. 250 (SYS)
<i>Toona ciliata</i> var. <i>pubescens</i> (Franch.) Hand.-Mazz.		Ch680 (SYS), Ch566 (SYS), Ch581 (SYS)
MORACEAE		
<i>Cudrania jinghongensis</i> S. S. Chang		Li Yan-hui 3135 (KUN)
<i>Ficus orthoneura</i> Lévl. & Vaniot		Ch41 (SYS); Li Yan-hui 3802 (HITBC)
<i>Ficus prostata</i> Wall. ex Miq.		Zhu Hua & Wang Hong 88-11 (HITBC)
<i>Ficus pubigera</i> var. <i>maliformis</i> (King) Corner		Li Yan-hui 3223 (HITBC)
MYRSINACEAE		
<i>Ardisia garrettii</i> Fletcher		Ch130 (SYS), Ch170 (SYS), Ch47 (SYS); Li Yan-hui 3867 (HITBC)

Appendix 1. Continued.

MYRTACEAE			
<i>Syzygium claviflorum</i> (Roxb.) Wall ex A. M. & J. M. Cowan			Ch501 (SYS), Ch492 (SYS)
ORCHIDACEAE			
<i>Gastrochilus obliquus</i> (Lindl.) Kuntze			Li Yan-hui 2734 (HITBC)
<i>Nemilia plicata</i> (Andr.) Sehlr.			Ch713 (SYS); Li Yan-hui 3138 (HITBC)
<i>Tropidia angulosa</i> (Lindl.) Blume			Li Yan-hui 392 (HITBC); Wang Pei-qun 11115 (HITBC)
OROBANCHACEAE			
<i>Aeginetia indica</i> L.			Zhao Shi-xiang 165 (HITBC)
OXALIDACEAE			
<i>Averrhoa carambola</i> L.			Li Yan-hui 3129 (HITBC)
<i>Biophytum esquirolii</i> Lévl.			Li Yan-hui 4004 (HITBC)
PALMAE			
<i>Caryota ochlandra</i> Hance			Chen Yu 62079 (HITBC)
PIPERACEAE			
<i>Peperomia heyneana</i> Miq.			Ch804 (SYS); Li Yan-hui 2738 (HITBC)
<i>Piper arboricola</i> C. DC.			Ch585 (SYS), Ch924 (SYS), Ch1216 (SYS); Unknown coll. 865 (HITBC)
<i>Piper curtipendunculatum</i> C. DC.			Cui jing-yun 22811 (HITBC)
RHAMNACEAE			
<i>Venilago leiocarpa</i> var. <i>pubescens</i> Y. L. Chen & P. K. Chou			Ch1088 (SYS), Ch645 (SYS)
<i>Zizyphus atropensis</i> Pierre			Li Yan-hui 1289 (HITBC), Ch251 (SYS)
RUBIACEAE			
<i>Ixora cephalophora</i> Merr.			Ch1218 (SYS), Ch1229 (SYS)
<i>Pavetta arenosa</i> Lour.			Li Yan-hui 246 (HITBC), 2814 (HITBC)
<i>Pavetta hongkongensis</i> Bremek.			Ch355 (SYS); Zhu Hua & Wang Hong 3004 (HITBC)
<i>Psychotria pilijera</i> Hutch.			Ch712 (SYS), Ch165 (SYS); Li Yan-hui 1498 (HITBC)
<i>Psychotria siamica</i> (Craib) Hutch.			Ch836 (SYS); Li Yan-hui 2473 (HITBC), 258 (HITBC)
<i>Spiradiclis caespitosa</i> f. <i>subimmersa</i> Lo			Li Yan-hui 12675 (HITBC)
RUTACEAE			
<i>Glycosmis citrifolia</i> (Willd.) Lindl.			Ch222 (SYS), Ch146 (SYS); Zou Shuang-yun 333 (HITBC)
<i>Murraya koenigii</i> (L.) Spreng.			Ch176 (SYS), Ch330 (SYS), Ch352 (SYS), Ch313 (SYS); Li Yan-hui 1859 (HITBC)
<i>Murraya microphylla</i> (Merr. & Chun) Swingle			Expedition 34267 (HITBC); Tao Guo-da 44056 (HITBC)
<i>Murraya paniculata</i> (L.) Jack.			Li Yan-hui 3315 (HITBC)
<i>Zanthoxylum armatum</i> var. <i>ferrugineum</i> (Rehder & E. H. Wilson) C. C. Huang			Ch887 (SYS); Unknown coll. 1010 (HITBC)
<i>Zanthoxylum laetum</i> Drake			Ch475 (SYS), Ch578 (SYS)
<i>Zanthoxylum utile</i> C. C. Huang			Ch636 (SYS), Ch777 (SYS)

Appendix 1. Continued.

STAPHYLEACEAE		
<i>Tapiscia yunnanensis</i> W. C. Cheng & S. D. Chu		Zhu Hua 93011 (HITBC)
TETRAMELACEAE		
<i>Tetrameles nudiflora</i> R. Br.		Li Yan-hui 8541 (HITBC)
TILIACEAE		
<i>Colona floribunda</i> (Wall.) Craib		Ch700 (SYS), Ch932 (SYS); Pei Sheng-ji 10084 (HITBC)
<i>Colona thorelii</i> (Gagnep.) Burret		Li Yan-hui 1696 (HITBC)
URTICACEAE		
<i>Boehmeria zollingeriana</i> Wedd.		Ch1064 (SYS); Cui Jing-yun 19416 (HITBC)
<i>Debregeasia edulis</i> (Stebold & Zucc.) Wedd.		Ch311 (SYS); Tao Guo-da 41641 (HITBC)
<i>Elatostema rupestre</i> (Buch.-Ham.) Wedd.		Ch168 (SYS), Ch388 (SYS), Ch359 (SYS); Wang Hong 1494 (HITBC)
<i>Pilea monilifera</i> Hand.-Mazz.		Ch984 (SYS); Wang Hong 1484 (HITBC)
<i>Pilea plataniflora</i> C. H. Wright		Ch381 (SYS); Ch657 (SYS); Li Yan-hui 4210 (HITBC); Tao Guo-da 16090 (HITBC)
<i>Pouzolzia sanguinea</i> (Blume) Merr.		Cui Jing-yun 22793 (HITBC)
VITACEAE		
<i>Leea aequata</i> L.		Ch468 (SYS), Ch714 (SYS); Pei Sheng-ji 9359 (HITBC)
<i>Yua austro-orientalis</i> (Metcalfe) C. L. Li		Ch844 (SYS)
<i>Tetrastigma cauliflorum</i> Merr.		Ch268 (SYS); Li Yan-hui 11915 (HITBC)
<i>Tetrastigma delavayi</i> Gagnep.		Ch507 (SYS); Ch811 (SYS)
<i>Tetrastigma erubescens</i> var. <i>monospermum</i> Gagnep.		Ch463 (SYS), Ch1054 (SYS); Tao Guo-da 9189 (HITBC)
<i>Tetrastigma pubinerve</i> Merr. & Chun		Ch653 (SYS), Ch616 (SYS)
<i>Vitis balansaeana</i> Planch.		Ch668 (SYS), Tao Guo-da 16447 (HITBC)
<i>Vitis betulifolia</i> Diels & Gilg		Ch654 (SYS), Ch408 (SYS)
ZINGIBERACEAE		
<i>Hedychium sino-aureum</i> Stapf		Ch1240 (SYS); Wang Hong 3066 (HITBC); Tao Guo-da 16049 (HITBC)
<i>Hedychium villosum</i> var. <i>teniflorum</i> Wall. ex Baker		Li Yan-hui 4866 (HITBC)
<i>Pommereschea spectabilis</i> (King & Prain) K. Schum.		Tao Guo-da 13661 (HITBC); Zhu Pei-zhi 8642 (HITBC)
Pteridophyta preferent to limestone habitats		
ADIANTACEAE		
<i>Adiantum capillus-veneris</i> L.		Expedition 34430 (HITBC)
<i>Adiantum caudatum</i> L.		Li Yan-hui 2554 (HITBC)
<i>Adiantum caudatum</i> var. <i>edgeworthii</i> (Hook.) Bedd.		Li Bao-gui 734 (HITBC)
<i>Adiantum malesianum</i> J. Ghatak		Zhu Pei-zhi 8668 (HITBC)
ANTROPHYACEAE		
<i>Antrophyum callifolium</i> Blume		Li Bao-gui 803 (HITBC)

Appendix 1. Continued.

ASPLENIACEAE

- Asplenium austrochinense* Ching
Asplenium excisum C. Presl
Asplenium interjectum H. Christ
Asplenium prolongatum Hook.
Asplenium saxicola Rosenst.
Asplenium varians Wall. ex Hook. & Grev.
Hymenasplenium chellosorum (Kunze ex Mett.) Tagawa
Neottopteris antrophyoides (H. Christ) Ching

ATHYRIACEAE

- Allantodia alata* (Christ) Ching
Allantodia pinnatifido-pinnata (Hook.) Ching
Kuniatzuchia cuspidata (Bedd.) Pic. Sem.

BOLBITIDACEAE

- Egenolfia tonkinensis* C. Chr. ex Ching

DRYNAIACEAE

- Drynaria bonii* H. Christ
Drynaria fortunei (Kunze ex Mett.) J. Sm.
Drynaria rigidula (Sw.) Bedd.

DRYOPTERIDACEAE

- Dryopteris cochlaeta* (D. Don) C. Chr.
Polystichum deltodon (Baker) Diels

HEMONITIDACEAE

- Pityrogramma calomelanos* (L.) Link

NEPHROLEPIDACEAE

- Nephrolepis auriculata* (L.) Trimen

POLYPODIACEAE

- Lepisorus bicolor* (Taketa) Ching
Lepidogrammitis rostrata (Bedd.) Ching
Lemmaphyllum microphyllum C. Presl
Lemmaphyllum carnosum (Wall.) C. Presl
Phymatodes cuspidata (D. Don) J. Sm.
Pyrosia assimilis (Baker) Ching
Pyrosia mollis (Kunze) Ching
Pyrosia nuda (Giesenh.) Ching
Pyrosia nummularifolia (Sw.) Ching
Pyrosia subfurfuracea (Hook.) Ching
Pyrosia tonkinensis (Giesenh.) Ching
- Li Yan-hui* 3810 (HITBC)
Li Bao-gui 737 (HITBC); *Unknown coll.* 9498 (HITBC)
Li Bao-gui 880 (HITBC)
Li Yan-hui 3739 (HITBC)
Li Yan-hui 2749 (HITBC)
Tao Guo-da 43453 (HITBC)
Li Qing-jun 42749 (HITBC)
Zhu Pei-zhi 10487 (HITBC)
- Li Bao-gui* 674 (HITBC)
Tao Guo-da 43571 (HITBC)
Tao Guo-da 17161 (HITBC)
- Li Bao-gui* 756 (HITBC)
- Li Yan-hui* 2735 (HITBC)
Tao Guo-da 38772 (HITBC)
Expedition 34292 (HITBC)
- Li Bao-gui* 98085 (HITBC)
Tao Guo-da 15730 (HITBC)
- Li Bao-gui* 45749 (HITBC)
- Tao Guo-da* 16010 (HITBC)
- Tao Guo-da* 39738 (HITBC)
Li Bao-gui 774 (HITBC)
Li Bao-gui 600 (HITBC)
Li Bao-gui 604 (HITBC)
Li Yan-hui 3808 (HITBC)
Expedition 34719 (HITBC)
Tao Guo-da 38843 (HITBC)
Tao Guo-da 38875 (HITBC)
Li Qing-jun 42624 (HITBC)
Li Bao-gui 9904152 (HITBC)
Pei Sheng-ji 9933 (HITBC)

Appendix 1. Continued.

PTERIDACEAE

Pteris actiniopteroides H. Christ

Li Bao-gui 921 (HITBC)

SELAGINELLACEAE

Selaginella involvens (Sw.) Spring

Li Bao-gui 960463 (HITBC)

Selaginella pubinata (Hook. & Grev.) Maxim.

Li Bao-gui 45178 (HITBC)

SINOPTERIDACEAE

Aleuritopteris pseudofarinosa Ching & S. K. Wu

Mengliandui 10242 (HITBC)

Cheilosoria tenuifolia (Burm. f.) Trev.

Mengliandui 10140 (HITBC)

TECTARIACEAE

Tectariopsis denvea (Kunze) Ching & C. H. Wang

Li Qing-jun 42687 (HITBC)

Tectaria decurrens (C. Presl) Copel.

Pei Sheng-ji 9277 (HITBC)

Tectaria simaoensis (Bedd.) Ching & C. H. Wang

Sun Ji-liang 18185 (HITBC)

THELYPTERIDACEAE

Cyclosorus papilio (Hope) Ching

Li Bao-gui 98086 (HITBC)

Cyclosorus parasitica (L.) Tardieu

Li Yan-hui 1326 (HITBC)