

A synopsis of Chinese epiphyllous liverworts

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Epiphyllous liverworts are characteristic of tropical and subtropical forests where the air is very moist. The distribution of epiphyllous liverworts is primarily in the tropical or subtropical regions of Indo-Malay, Central and South America, central Africa and the Asian-Pacific regions of South Korea and southern Japan south to Australia. Epiphyllous liverworts are also abundant in some evergreen forests of China (Cao & Be, 1988; Chen & Wu, 1964; Wu & Guo, 1986; Wu & Lou 1978; Wu et al., 1983). Little has been known about the liverworts in Sichuan Province of China. Only eight species and one variety, belonging to eight genera have been reported from Mt. Emei (Wu & Lou, 1978) and some scattered records from Mt Erlang, Mt Yaan and Mabin County.

Recently we found two species, *Leptocolea yunnanensis* Chen and *Lejeunea borneensis* Steph. growing on the leaves of *Mecodium* (Pteridophyta) in Guanxian County, Sichuan Province, at 31 degrees north latitude. This is the first record of epiphyllous liverworts occurring beyond 30 degrees north latitude in China.

Investigations on epiphyllous liverworts in other areas of China have been reported by several authors. Wu, Li and Cao (1983) reported 36 species in 21 genera of 7 families from Mt. Wuyi of Fujian Province and 3 species from Qimen County of

Anhui Province. 17 species, belong to 4 families and 10 genera of epiphyllous liverworts were recently reported to Qimen County, Anhui Province by Liu et al. (1988). Recently Cao and Be (1988) reported 12 species belonging to 10 genera in five families from Mt. Dawu, Jiulong, Hong Kong. In addition, epiphyllous liverworts have also been collected from Guangdong, Guangxi, Guizhou, Hainan, Jiangxi, Xizang, Yunnan and Zheijiang Provinces.

In this study, a survey of Chinese epiphyllous liverworts has been conducted to reveal the distribution patterns in China and to report a significant range extension of epiphyllous liverworts.

The list of Epiphyllous Liverworts in China

1. *Aphanolejeunea grossepapillosa* Horikawa
2. *A. truncatifolia* Horikawa
3. *Brachiolejeunea recurvidentata* Chen & Wu
4. *Calypogeia tosana* (Steph.) Steph.
5. *Caudalejeunea circinata* Steph.
6. *C. reniloba* (Gottsche) Steph.
7. *Ceratolejeunea sinensis* Chen & Wu
8. *Cephaloziella microphylla* (Steph.) Douin
9. *C. ceylanica* (Gottsche) Schuster & Kachroo
10. *C. imbricata* (Nees) Hatt.

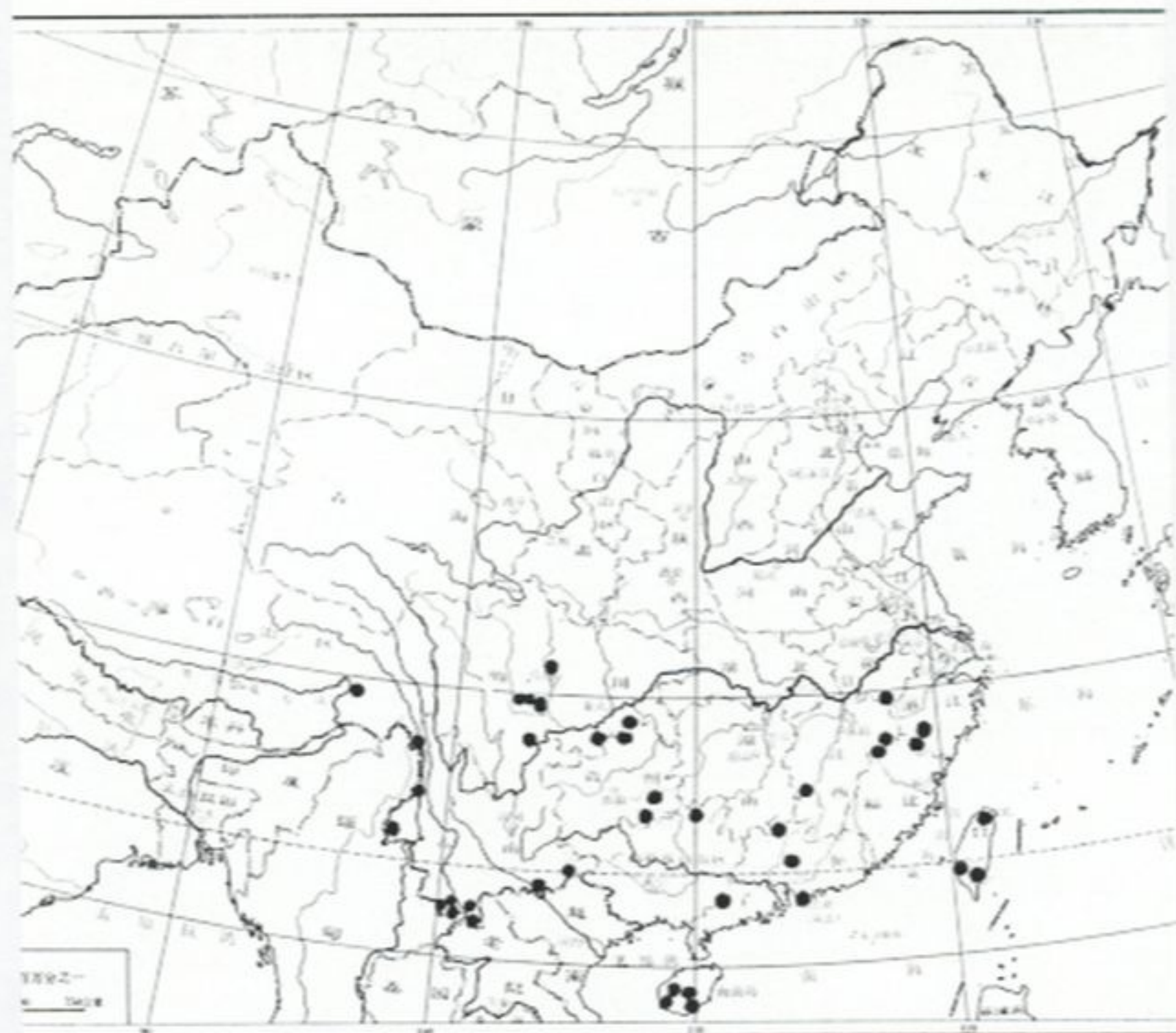


Fig.1 The distribution of Epiphyllous Liverworts in China

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|---|--|
| 20. <i>C. magnipapillosa</i> (Kamimura) Chen & Wu | 34. <i>Colura ari</i> Steph. |
| 21. <i>C. ocellata</i> (Horikawa) Benedix | 35. <i>C. inuii</i> Horikawa |
| 22. <i>C. ocelloides</i> (Horikawa) Mizt. | 36. <i>C. tenuicornis</i> (Evans) Steph. |
| 23. <i>C. omata</i> Evens | 37. <i>Diplasiolejeunea brachyclada</i> Evans |
| 24. <i>C. oshimensis</i> (Horikawa) Benedix | 38. <i>Drepanolejeunea angustifolia</i> (Mitt.) Grolle |
| 25. <i>C. plagiophylla</i> Benedix var. <i>grossipapillosa</i>
Chen & Wu | 39. <i>D. chiponensis</i> Horikawa |
| 26. <i>C. pluridentata</i> Wu & Lou | 40. <i>D. dactylophora</i> (Gottsche, Lindenberg &
Nees) Schiffn. |
| 27. <i>C. pseudocrystallina</i> Chen & Wu | 41. <i>D. emarginata</i> Horikawa |
| 28. <i>C. pseudofloccosa</i> (Horikawa) Benedix | 42. <i>D. formosana</i> Horikawa |
| 29. <i>C. pseudoplagiophylla</i> Wu & Lou | 43. <i>D. monophthalma</i> (Herz.) Mizt. |
| 30. <i>C. shikokiana</i> (Horikawa) Hatt. | 44. <i>D. tenuoides</i> Horikawa |
| 31. <i>C. spinosa</i> (Horikawa) Hatt. | 45. <i>D. tenuis</i> (Reinwardi, Blume & Nees) Schiffn. |
| 32. <i>C. verdoornii</i> (Hatt.) Mizt. | 46. <i>Euosmolejeunea fukiensis</i> Chen & Wu |
| 33. <i>C. tenella</i> Benedix | 47. <i>Frullania densiloba</i> Evans |

Table 1. The comparison of epiphyllous liverworts in Chinese Provinces.

Distribution	fam.	gen.	species
Fujian: Mt. Wuyishan	7	21	36
Taiwan: Taipei, Taitung, Taina	2	22	36
Yunnan: Jinghong, Hekou, Mengzhe, Yiwu, Mengyang, Funing, Mengla, Gongshan, Yingjiang, Lushui	2	10	35
Xizang: Medog	4	12	28
Hainan: all of natural forests	1	9	16
Hong Kong: Mt. Daiwu	5	10	12
Guangdong: Xinyi, Lechang, Zangcheng	1	2	2
Guangxi: Longsheng	-	-	-
Sichuan: Mt. Emei, Mt. Jinfo, Mt. Erlang Mt. Yaan, Mabin	2	11	13
Zhejiang: Suichong, Longquan	1	3	3
Jiangxi: Mt. Sangingshan, Mt. Jinggang	-	-	-
Anhui: Qimen	4	10	17

48. *F. moniliata* (Reinwardi, Blume & Nees) Mont.
 49. *F. muscicola* Steph.
 50. *F. nishiyamensis* Steph.
 51. *Heteroscyphus argutus* (Reinwardi, Blume & Nees) Schiffn.
 52. *H. bescherellei* (Steph.) Hatt.
 53. *Lejeunea boninensis* Steph.
 54. *L. flava* (Swartz) Nees
 55. *Lepidozia fauriana* Steph.
 56. *Leptocolea denticulata* (Horikawa) Chen & Wu
 57. *L. dolichostyla* Herz.
 58. *L. filicis* Herz.
 59. *L. goebelii* (Gottsche ex Schiffn.) Evans
 60. *L. oblonga* (Herz.) Chen & Wu
 61. *L. oblongiperiantha* Wu & Lou
 62. *L. magnilobula* (Horikawa) Chen & Wu
 63. *L. minuta* (Mitt.) Chen & Wu
 64. *L. yunnanensis* Chen
 65. *Leptolejeunea apiculata* (Horikawa) Hatt.
 66. *L. balansae* Steph.
 67. *L. hainanensis* Chen
 68. *L. revoluta* Chen
 69. *L. subacuta* (Steph.) Evans
 70. *Lopholejeunea subfusca* (Nees) Steph.
 71. *Metzgeria conjugata* Lindb.
 72. *Microlejeunea punctiformis* (Taylor) Spruce
 73. *M. subacuta* Horikawa
 74. *Neurolejeunea fukiensis* Chen & Wu
 75. *Pedinolejeunea aoshimensis* (Horikawa) Chen & Wu
 76. *P. formosana* var. *ceratilobula* (Mizt.) Chen & Wu
 77. *P. formosana* (Mizt.) Chen & Wu var. *formosana*
 78. *P. formosana* var. *linearilobula* Chen & Wu
 79. *P. himalayensis* var. *dentata* Chen & Wu
 80. *P. himalayensis* (Pande & Misra) Chen & Wu var. *himalayensis*

Table 2. The comparison count of species and altitude of distribution for each genus of epiphyllous liverwort in China

Genera	# of species	Altitude (200-2800 m)
1. <u>Metzgeria</u>	1-2	
2. <u>Calypogeia</u>	1	650
3. <u>Cephaloziella</u>	1	650
4. <u>Heteroscyphus</u>	2	650
5. <u>Lepidozia</u>	1	650
6. <u>Plagiochila</u>	1	760
7. <u>Scapania</u>	1	760
8. <u>Radula</u>	5	600-1300
9. <u>Porella</u>	1	760
10. <u>Frullania</u>	4	650-1200
11. <u>Ptychanthus</u>	2	700
12. <u>Tracholejeunea</u>	1	
13. <u>Lopholejeunea</u>	1	
14. <u>Thysananthus</u>	1	
15. <u>Spruceanthus</u>	1	760
16. <u>Neurolejeunea</u>	1	720
17. <u>Caudalejeunea</u>	2	800-1100
18. <u>Ceratolejeunea</u>	1	1300
19. <u>Euosmolejeunea</u>	1	720-1050
20. <u>Cheilolejeunea</u>	4	450-1350
21. <u>Drepanolejeunea</u>	7	650-1050
22. <u>Rhaphidolejeunea</u>	3	600-1700
23. <u>Leptolejeunea</u>	6	200-2100
24. <u>Lejeunea</u>	2	600-1000
25. <u>Microlejeunea</u>	2	650-1350
26. <u>Diplasiolejeunea</u>	1	
27. <u>Colura</u>	3	450-1000
28. <u>Cololejeunea</u>	21	450-2800
29. <u>Leptocolea</u>	9	200-2040
30. <u>Pedinolejeunea</u>	13	200-1300
31. <u>Aphanolejeunea</u>	2	1700-2000
32. <u>Brachiolejeunea</u>	1	

81. *P. himalayensis* var. *wuyiensis* Chen & Wu
 82. *P. lanciloba* (Steph.) Chen & Wu
 83. *P. liukuensis* (Horikawa) Chen & Wu
 84. *P. nakaii* (Horikawa) Chen & Wu
 85. *P. planissima* (Mitt.) Chen & Wu
 86. *P. pseudolatilobula* Chen & Wu
 87. *P. uchimae* (Amakawa) Chen & Wu
 88. *Plagiochila japonica* Sande Lac.
 89. *Porella perrottetiana* var. *ciliatodentata* (Chen & Wu) Hatt.
 90. *Ptychanthus integerrimus* Horikawa

91. *P. striatus* (Lehm. & Lindenb.) Nees
 92. *Radula acuminata* Steph.
 93. *R. cavifolia* Hampe
 94. *R. kojana* Steph.
 95. *R. platyglossa* Chen
 96. *R. protensa* Lindberg
 97. *Rhaphidolejeunea foliicola* (Horikawa) Chen
 98. *R. tibetana* Wu & Lou
 99. *R. yunnanensis* Chen
 100. *Scapania stephanii* K. Muell.
 101. *Spruceanthus semirepandus* (Nees) Verd.
 102. *Thysananthus oblongifolius* Chen & Wu

36. *C. tenuicornis* (Evans) Steph.
 37. *Diplasiolejeunea brachyclada* Evans
 38. *Drepanolejeunea angustifolia* (Mitt.) Grolle
 39. *D. chiponensis* Horikawa
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 84. *P. nakaii* (Horikawa) Chen & Wu
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Conclusion

1. The epiphyllous liverworts currently known in China represent 11 families, 32 genera, 102 species. Among them Lejeuneaceae is the largest family with 21 genera and 85 species. *Cololejeunea* is the largest genus with 21 species. The second largest genus is *Pedinolejeunea* with 13 species.

2. Some liverworts growing on soil, rock or tree trunks can sometimes be found growing on leaves, e.g. *Metzgeria*, *Calypogeia*, *Cephaloziella*, *Lepidozia*, *Plagiochila*, *Porella*, *Radula* and *Frullania*.

3. Epiphyllous liverworts in China are found up to 31° north latitude.

4. We now know that Chinese epiphyllous liverworts occur in Fujian, Taiwan, Yunnan, Xizang, Hainan, Guangdong, Hong Kong, Guangxi, Sichuan, Jiangxi, Zhejiang and Anhui Provinces. However, most of the epiphyllous liverworts are found in the South Yangtzi River areas at altitudes of 200-2800 meters (see map).

5. Our data shows that epiphyllous liverworts are not only found in tropical rain forests but also in subtropical evergreen forests in China. The fact that epiphyllous liverworts are abundant in southeast and southwest China is thought to be caused by the warm, moist air currents coming up from the Pacific and Indian Oceans, the dominant geographical relief of the area and several big rivers flowing from north to south.

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