

Liverworts and hornworts of Shangsi County of Guangxi (Kwangsi), with an updated checklist of the hepatic flora of Guangxi Province of China

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(Received 28 February 2003, accepted 24 May 2003)

Abstract – Guangxi (Kwangsi), one of China's five autonomous provinces, is located between 20°54'-26°23' N and 104°28'-112°04' E. A hepatic checklist of the province comprising 225 species (excluding one *nom. nud.* and a doubtful species) belonging to 58 genera and 32 families is provided based on all published literature and our recent studies of specimens, including a field collection from Shangsi County in southwestern Guangxi. The largest family is Lejeuneaceae, with 58 species in 15 genera. The genera with over 10 species are *Cololejeunea* (22 spp., excluding one *nom. nud.*), *Frullania* (22 spp.), *Plagiochila* (21 spp., excluding a doubtful species), *Radula* (14 spp.), *Bazzania* (13 spp.) and *Jungermannia* (11 spp.). Twenty-four species are new records for this province. Thirty species are added to the epiphyllous flora of the province and a total of 38 species of epiphyllous liverworts are known from this province. *Cheilolejeunea khasiana* (Mitt.) N.Kitag. and *Leucolejeunea turgida* (Mitt.) Verd. are newly reported as an epiphyllous record. An intensive field search reveals *Cheilolejeunea gaoi* R.L.Zhu *et al.*, a liverwort endemic to Guangxi, is extremely rare and the continued existence of the species may be threatened.

Hepaticae / epiphyllous liverworts / Guangxi / Shangsi Co. / endangered liverwort / China

INTRODUCTION

Guangxi, covering an area of 230,000 km², is one of China's five autonomous provinces (Fig. 1). It is situated in the southern part of the country (20°54'-26°23' N and 104°28'-112°04' E) and bordered by the Chinese provinces of Guangdong on the southeast, Guizhou on the north, Hunan on the northeast, and Yunnan on the west, the Gulf of Tonkin to the south and Vietnam to the southwest. It has a subtropical to north tropical monsoon climate and the highest peak is Miaoershan (2,142 m above sea level). Most of the province is covered by hills and mountains and more than half of the province is covered by karsts. Owing to its very complex, diverse topography and peculiar geographic position, the province has a great diversity of plants. The flora of vascular plants has been

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relatively well studied (Su & Zhang, 1994). The hepatic flora, however, has not been thoroughly investigated. The first record of hepatics is that of Reimers (1931), in which *Frullania jackii* Gottsche (= *Frullania davurica* Hampe subsp. *jackii* (Gottsche) S.Hatt.) was recorded from the province. Only 49 species were listed in Piippo's (1990) annotated catalogue of Chinese Hepaticae and Anthocerotae. Recently several papers have dealt with some interesting hepatics of the province (Zhu & So, 1999a; Gao, 2000; Zhu *et al.*, 2000) and more bryologists are paying attention to the hepatic flora of this province (Wang, 1993; Gao, 2000; Gao *et al.*, 2003).

The epiphyllous liverworts of the province, however, are obviously under-collected, because only seven species were recognized by Zhu & So (2001). During the period of 23 April - 2 May 2001, the first author investigated mainly the epiphyllous liverwort flora of Shangsi Co. in southwestern Guangxi, which has one national forest park and one provincial nature reserve. A total of 320 specimens of liverworts were collected. The Shangsi Co., situated between 21°43'–22°04' N and 107°32'–108°14' E (Fig. 1), has a north tropical monsoon climate and is the type locality of several taxa endemic to Guangxi, such as *Cheilolejeunea gaoi* R.L. Zhu *et al.*



Fig. 1. A map showing Guangxi (hatched area) and the explored area of Shangsi County (double hatched area).

The present paper enumerates the taxa made from the field collection mentioned above, and presents an updated checklist of liverworts and hornworts of Guangxi Province based upon the studies of additional specimens from the province.

ENUMERATION OF HEPATICS FROM SHANGSI COUNTY, GUANGXI

The following liverworts and hornworts were collected from Shangsi Co., including representative specimens with their habitat data. New records for Guangxi are marked with asterisks. The localities of the area investigated are abbreviated as follows: Changlongcun: CLC; Heishi: HS; Jilongshan: JLS; Naban Reservoir: NBR; National Forest Park: NFP; Pinglongshan: PLS; Shiwanshan Forest Station: SFS; Yingtianfu: YTF. All specimens cited below are kept in HSNU.

**Acrolejeunea pusilla* (Steph.) Grolle & Gradst. - NFP, 380 m, on tree trunk, *Zhu 20010426-29*; SFS, 240 m, on tree trunk, *Zhu 20010428-4*.

**Aphanolejeunea angustiloba* Horik. - NFP, 360 m, epiphyllous, *Zhu 20010426-6*, 380 m, *Zhu 20010426-19*; PLS, 440 m, epiphyllous, *Zhu 20010430-35*.

Bazzania japonica (Sande Lac.) Lindb. - NFP, 380 m, on tree trunk, *Zhu 20010426-72*, 360 m, on soil, *Zhu 20010426-16*.

Bazzania tridens (Reinw. *et al.*) Trevis. - NFP, 380 m, on soil, *Zhu 20010426-15*, 350 m, on rock, *Zhu 20010426-4*, 300 m, on soil, *Zhu 20010426-57*, 360 m, on soil, *ZHU 20010426-63*.

Calypogeia arguta Nees & Mont. - HS, 700 m, on soil, *Zhu 20010428-46*.

**Calypogeia tosana* (Steph.) Steph. - HS, 580 m, on wet soil, *Zhu 20010428-62*, 700 m, on soil, *Zhu 20010428-45*.

Cheilolejeunea gaoi R.L. Zhu *et al.* - NFP, 400 m, on tree trunk, *Zhu 20010426-58*.

Cheilolejeunea imbricata (Nees) S. Hatt. - HS, 680 m, on tree trunk, *Zhu 20010428-16*; CLC, 750 m, on tree trunk, *Zhu 20010428-63*; NFP, 360 m, epiphyllous, *Zhu 20010426-61*; PLS, 440 m, epiphyllous, *Zhu 20010430-1*.

**Cheilolejeunea khasiana* (Mitt.) N.Kitag. - PLS, 440 m, epiphyllous, *Zhu 20010430-54*, on tree trunk, *Zhu 20010430-21*.

**Cheilolejeunea osumiensis* (S. Hatt.) Mizut. - NFP, 380 m, on tree base, *Zhu 20010426-24*.

Cololejeunea appressa (A. Evans) Benedix - JLS, epiphyllous, 1,000 m, *Zhu 20010429-1*.

**Cololejeunea haskarliana* (Lehm. & Lindenb.) Schiffn. - PLS, 440 m, epiphyllous, *Zhu 20010430-29*.

**Cololejeunea inflata* Steph. - NFP, 360 m, epiphyllous, *Zhu 20010426-3*; HS, 580 m, on wet rock, *Zhu 20010428-26*.

Cololejeunea lanciloba Steph. - PLS, 440 m, epiphyllous, *Zhu 20010430-30*; between NBR and YTF, 300 m, epiphyllous, *Zhu 20010501-2*.

Cololejeunea ocelloides (Horik.) S. Hatt. - HS, 750 m, on tree base, *Zhu 20010428-42*; PLS, 440 m, on tree trunk, *Zhu 20010430-18*, epiphyllous, *Zhu 20010430-33*; JLS, 1,000 m, epiphyllous, *Zhu 20010429-4*.

Cololejeunea peraffinis (Schiffn.) Schiffn. - PLS, 440 m, epiphyllous, *Zhu 20010430-40*; between NBR and YTF, 300 m, epiphyllous, *Zhu 20010501-3*.

Cololejeunea planissima (Mitt.) Abeyw. - NFP, 360 m, epiphyllous, *Zhu 20010426-2*; SFS, 240 m, on tree trunk, *Zhu 20010428-2*; YTF, 300 m, epiphyllous, *Zhu 20010501-4*.

**Cololejeunea pseudofloccosa* (Horik.) Benedix - PLS, on liana, 440 m, *Zhu 20010430-23*.

**Cololejeunea raduliloba* Steph. - SFS, 240 m, on tree trunk, *Zhu 20010428-1*; Heishi, 580 m, on dead branch, *Zhu 20010428-14*, epiphyllous, 580 m, *Zhu 20010428-22*, 580 m, on rock, *Zhu 20010428-37*.

**Cololejeunea rotundilobula* (P.C. Wu & P.J. Lin) Piippo - PLS, 440 m, epiphyllous, *Zhu 20010430-28*.

**Cololejeunea schmidtii* Steph. - NFP, 360 m, epiphyllous, *Zhu 20010426-53*; PLS, 440 m, epiphyllous, *Zhu 20010430-41*.

**Cololejeunea serrulata* Steph. - PLS, 440 m, epiphyllous, *Zhu 20010430-38*.

Cololejeunea tenella Benedix - JLS, epiphyllous, 1,000 m, *Zhu 20010429-5*.

Cololejeunea trichomanis (Gottsche) Steph. - JLS, epiphyllous, 1,000 m, *Zhu 20010429-2*, *Zhu 20010429-3*.

Conocephalum conicum (L.) Dumort. - NFP, 300 m, on wet soil, *Zhu 20010426-128*.

Conocephalum japonicum (Thunb.) Grolle - NFP, 350 m, on wet soil, *Zhu 20010426-140*.

Drepanolejeunea angustifolia (Mitt.) Grolle - CLC, 750 m, on rock, *Zhu 20010428-7*; 750 m, on tree base, *Zhu 20010428-36c*.

Drepanolejeunea commutata Grolle & R.L. Zhu - NFP, 360 m, epiphyllous, *Zhu 20010426-52*; HS, 750 m, epiphyllous, *Zhu 20010429-8*.

**Drepanolejeunea erecta* (Steph.) Mizut. - HS, 580 m, epiphyllous, *Zhu 20010428-35 p.p.*; HS, 580 m, on rock, *Zhu 20010428-29*; PLS, 440 m, epiphyllous, *Zhu 20010430-37*.

**Drepanolejeunea spicata* (Steph.) Grolle & R.L. Zhu - NFP, 360 m, epiphyllous, *Zhu 20010426-5*; PLS, 440 m, epiphyllous, *Zhu 20010430-27*.

**Drepanolejeunea ternatensis* (Gottsche) Schiffn. - NFP, 380 m, on decaying log, *Zhu 20010426-5*.

Dumortiera hirsuta (Sw.) Nees - HS, 580 m, on soil, *Zhu 20010428-33*; PLS, 440 m, on soil, *Zhu 20010430-44*.

**Fossombronina cristula* Austin. - NBR, 200 m, on tree trunk, *Zhu 20010501-111*.

Frullania apiculata (Reinw. et al.) Nees - NFP, 380 m, on tree trunk, *Zhu 20010426-56*; HS, 580 m, on stump, *Zhu 20010428-28*; epiphyllous, *Zhu 20010428-35 p.p.*

Frullania moniliata (Reinw. et al.) Mont. - NFP, 380 m, on rock, *Zhu 20010426-25*; on tree trunk, *Zhu 20010426-55*; HS, epiphyllous, 240 m, *Zhu 20010428-5*; PLS, 440 m, epiphyllous, *Zhu 20010430-53*.

Frullania muscicola Steph. - NFP, 360 m, epiphyllous, *Zhu 20010426-34*; HS, 580 m, on rock, *Zhu 20010428-60*.

Heteroscyphus argutus (Reinw. et al.) Schiffn. - NFP, 390 m, on rock, *Zhu 20010426-35*; CLC, 750 m, on soil, *Zhu 20010428-32*; HS, 750 m, on rock, *Zhu 20010428-11*.

Heteroscyphus coalitus (Hook.) Schiffn. - HS, on soil on rock, 580 m, *Zhu* 20010428-12.

Jungermannia comata Nees - PLS, 440 m, on soil, *Zhu* 20010430-16.

Jungermannia infusca (Mitt.) Steph. - HS, 580 m, on rock, *Zhu* 20010428-13.

**Jungermannia subulata* A. Evans - HS, 750 m, on wet soil, *Zhu* 20010429-9.

**Jungermannia tetragona* Lindenb. - Heishi, 580 m, on soil, *Zhu* 20010428-10, *Zhu* 20010428-20.

Kurzia gonyotricha (Sande Lac.) Grolle - HS, 580 m, on soil, *Zhu* 20010428-30; NBR, 200 m, on soil, *Zhu* 20010501-8.

Lejeunea anisophylla Mont - HS, 240 m, epiphyllous, *Zhu* 20010428-5; PLS, 440 m, epiphyllous, *Zhu* 20010430-32.

Lejeunea curviloba Steph. - NFP, 380 m, on rock, *Zhu* 20010426-20.

Lejeunea flava (Sw.) Nees - PLS, 440 m, epiphyllous, *Zhu* 20010430-26; on decay-ing log, 440 m, *Zhu* 20010430-50.

Lejeunea pallide-virens S. Hatt. - NFP, 360 m, epiphyllous, *Zhu* 20010426-1; CLC, 750 m, on tree trunk, *Zhu* 20010428-21; 750 m, on tree trunk, *Zhu* 20010428-24; PLS, on tree trunk, 440 m, *Zhu* 20010430-22.

Lejeunea punctiformis Taylor - HS, on tree trunk, 700 m, *Zhu* 20010428-19; JLS, 1,000 m, epiphyllous, *Zhu* 20010430-6.

Lepidozia fauriana Steph. - NFP, 350 m, on soil, *Zhu* 20010426-46.

Leptolejeunea elliptica (Lehm. & Lindenb.) Schiffn. - PLS, 440 m, epiphyllous, *Zhu* 20010430-48; YTF, 300 m, epiphyllous, *Zhu* 20010501-1.

Leucolejeunea turgida (Mitt.) Verd. - CLC, 750 m, on tree base, *Zhu* 20010428-36a; PLS, 440 m, epiphyllous, *Zhu* 20010430-36.

Leucolejeunea xanthocarpa (Lehm. & Lindenb.) A. Evans - NFP, 380 m, on tree base, *Zhu* 20010426-23; PLS, 440 m, epiphyllous, *Zhu* 20010430-31.

**Lopholejeunea nigricans* (Lindenb.) Schiffn. - HS, 580 m, epiphyllous, *Zhu* 20010428-35 p.p.

Lopholejeunea subfusca (Nees) Schiffn. - NFP, 380 m, on tree trunk, *Zhu* 20010426-26; HS, 580 m, on rock, *Zhu* 20010428-43.

Mastigolejeunea auriculata (Wils.) Schiffn. - PLS, 440 m, on tree trunk, *Zhu* 20010430-51.

Megaceros flagellaris (Mitt.) Steph. - HS, 580 m, on wet rock, *Zhu* 20010428-64.

Metalejeunea cucullata (Reinw. *et al.*) Grolle - NFP, 380 m, on rock, *Zhu* 20010426-21; on rock, *Zhu* 20010426-73.

Metzgeria furcata (L.) Dumort. - NFP, 390 m, on tree trunk, *Zhu* 20010426-60.

Notoscyphus lutescens (Lehm. & Lindenb.) Mitt. - HS, 580 m, on soil, *Zhu* 20010428-49; YTF, 300 m, on soil, *Zhu* 20010501-10.

Nowellia curvifolia (Dicks.) Mitt. - HS, on rock, 750 m, *Zhu* 20010428-23.

**Odontoschisma denudatum* (Mart.) Dumort. - HS, 750 m, on rock, *Zhu* 20010428-11, 580 m, on soil, *Zhu* 20010428-31; PLS, 440 m, on rock, *Zhu* 20010430-15.

**Otolejeunea semperiana* (Gottsche *ex* Steph.) Grolle - PLS, 440 m, epiphyllous, *Zhu* 20010430-34.

Pallavicinia subciliata (Austin) Steph. - HS, on wet rock, 580 m, *Zhu* 20010428-26; on soil, *Zhu* 20010428-39.

- **Pellia epiphylla* (L.) Corda - HS, 580 m, on wet soil, *Zhu 20010428-27*.
- Phaeoceros laevis* (L.) Prosk. - HS, 700 m, on soil, *Zhu 20010428-45*.
- Plagiochila sciophila* Nees ex Lindenb. - NFP, 380 m, on rock, *Zhu 20010426-27*; CLC, 750 m, on rock, *Zhu 20010428-8*; between NBR and YTF, 300 m, epiphyllous, *Zhu 20010501-6*.
- Radula cavifolia* Hampe ex Gottsche *et al.* - NBR, 200 m, on tree trunk, *Zhu 20010501-11*.
- Radula javanica* Gottsche - NFC, 380 m, on tree trunk, *Zhu 20010426-17*; 390 m, on rock, *Zhu 20010426-37*; HS, 580 m, on decaying log, *Zhu 20010428-61*; on tree trunk, *Zhu 20010428-38*.
- **Radula oyamensis* Steph. - NFP, 360 m, on tree trunk, *Zhu 20010426-36*; HS, 680 m, on tree trunk, *Zhu 20010428-15*.
- Riccia fluitans* L. - YTF, 300 m, on soil, *Zhu 20010501-101*.
- Spruceanthus polymorphus* (Sande Lac.) Verd. - NFP, 390 m, on tree trunk, *Zhu 20010426-48*; CLC, 750 m, on rock, *Zhu 20010428-9*; PLS, 440 m, on tree trunk, *Zhu 20010430-20*.
- Spruceanthus semirepandus* (Nees) Verd. - NFP, 380 m, on tree trunk, *Zhu 20010426-71*, *Zhu 20010426-59*; HS, 680 m, on tree trunk, *Zhu 20010428-18*.
- Trichocolea tomentella* (Ehrh.) Dumort. - PLS, 440 m, on rock, *Zhu 20010430-14*.
- Trocholejeunea sandvicensis* (Gottsche) Mizut. - NFP, 380 m, on tree trunk, *Zhu 20010426-28*; SFS, 240 m, on tree trunk, *Zhu 20010428-3*.
- Tuyamaella molischii* var. *molischii* (Schiffn.) S.Hatt. - NFP, 360 m, epiphyllous, *Zhu 20010426-4*.

EPIPHYLLOUS LIVERWORTS OF GUANGXI PROVINCE

Epiphyllous liverworts are poorly known from Guangxi and only eight species have been recorded (Hu *et al.*, 1981; Zhu & So, 2001). Based on previous literature and the present study, the total number of epiphyllous liverworts is now raised to 38 (see checklist below). It is noteworthy that *Cheilolejeunea khasiana* and *Leucolejeunea turgida* are newly reported as epiphyllous records. Furthermore, *Otolejeunea semperiana*, an obligate epiphyllous, was quite rare in China and previously only two scanty collections of this species were known, one each from Hainan and Fujian (Zhu & So, 2001). In the present investigation, we found several luxuriant populations with rich perianths.

OVERVIEW OF THE HEPATIC FLORA OF GUANGXI PROVINCE

The known hepatic flora of Guangxi consists of 225 species (excluding one *nom. nud.* and a doubtful species) representing 58 genera and 32 families. The largest family is Lejeuneaceae ((58 spp. of 15 genera). The six genera each with over 10 species are *Cololejeunea* (22 spp., excluding one *nom. nud.*: *Pedinolejeunea*

minilobula P.C.Wu), *Frullania* (22 spp.), *Plagiochila* (21 spp., excluding one doubtful species: *Plagiochila clavatosaccata* Steph.), *Radula* (14 spp.), *Bazzania* (13 spp.), and *Jungermannia* (11 spp.). The following five species are known only from Guangxi, and may be endemic to the province: *Cheilolejeunea gaoi*, *Frullania changii*, *Isotachis chinensis*, *Jubula kwangsiensis*, and *Lophocolea chinensis*. It is interesting to note that the genera endemic to East Asia have not been recorded in the province.

CONSERVATION OF *CHEILOLEJEUNEA GAOI*

Cheilolejeunea gaoi is very remarkable owing to its delicate, thin-walled leaf cells, indistinct second tooth of the leaf lobule, absence of gynoeical innovations, and presence of *Allorgella*-type denticulations at underleaf and leaf margins. It was described by Zhu *et al.* (2000) based upon a single specimen from Hongqilinchang (now renamed as the National Forest Park) collected by C. Gao in 1974. Few original forest remnants, however, have remained in the type locality after 27 years. The first author of this paper made an intensive search for *Cheilolejeunea gaoi* in the National Forest Park and its neighbouring areas and only a single population was successfully recollected on 26 April 2001. The population was found on the trunk of a deciduous tree by a river in the National Forest Park at an elevation of 400 m. It contains androecia and juvenile perianths. Despite the intensive search, no additional population was found. The National Forest Park is now one of the most famous national forest parks in southwestern Guangxi and has attracted more and more tourists. The locality of *Cheilolejeunea gaoi* is near the most beautiful waterfall in the park and the habitat of *Cheilolejeunea gaoi* is apparently threatened. We recommend that this species be protected locally and placed in the IAB world red list of bryophytes. An intensive search for *Cheilolejeunea gaoi* throughout Vietnam, Burma, Cambodia, and Thailand, however, would be desirable to unravel further occurrences and potential habitats and to determine the actual range and conservational status of this species.

CHECKLIST OF LIVERWORTS AND HORNWORTS OF GUANGXI PROVINCE

The checklist below is based on published literature and the present study, and is arranged in alphabetical order with references cited. The accepted synonyms follow the updated literature. Epiphyllous records are marked with asterisks.

Acrolejeunea pusilla (Steph.) Grolle & Gradst. - present study.

Acrolejeunea pycnoclada (Taylor) Schiffn. - He (1997).

**Aphanolejeunea angustiloba* Horik. - present study.

Bazzania appendiculata (Mitt.) S. Hatt. - Gao (2000).

Bazzania assamica (Steph.) S. Hatt. - Gao (2000).

- Bazzania bilobata* N. Kitag. - Mizutani & Zhang (1986), Piippo (1990), Gao (2000).
- Bazzania fauriana* (Steph.) S. Hatt. - Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000).
- Bazzania himalayana* (Mitt.) Schiffn. - Mizutani & Chang (1986), Piippo (1990), Gao (2000).
- Bazzania japonica* (Sande Lac.) Lindb. - Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000), present study.
- Bazzania mayabarae* S. Hatt. - Mizutani & Chang (1986), Piippo (1990), Gao (2000).
- Bazzania ovistipula* (Steph.) Mizut. - Mizutani & Chang (1986), Piippo (1990), Gao (2000).
- Bazzania pearsonii* Steph. - Mizutani & Chang (1986), Piippo (1990), Gao (2000).
- Bazzania praerupta* (Reinw. *et al.*) Trevis. - Mizutani & Chang (1986), Lin *et al.* (1992).
- Bazzania sikkimensis* (Steph.) Herzog - Mizutani & Chang (1986), Piippo (1990).
- Bazzania tridens* (Reinw. *et al.*) Trevis. - Hattori (1944) and Hu *et al.* (1981) as *B. albicans* (Steph.) Horik.; Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993); Wang & Jia (1993) as *B. tridens* var. *cornutistipula* (Steph.) Pócs; Gao (2000); Hu *et al.* (1981), Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993), and Gao (2000) as *B. oshimensis* (Steph.) Horik.; present study.
- Bazzania vietnamica* Pócs - Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000).
- Blepharostoma minus* Horik. - Gao (2000).
- Calycularia crispula* Mitt. - Gao (2000).
- Calypogeia arguta* Nees & Mont. - Wang & Jia (1993), Gao (2000), Yi & Cao (2001), present study.
- Calypogeia azurea* Stotler & Crotz - Wang (1993), Wang & Jia (1993), Cao (2000), and Yi & Cao (2001) as *C. trichomanis* (L.) Corda.
- Calypogeia muelleriana* (Schiffn.) Müll.Frib. - Wang (1993), Wang & Jia (1993), Yi & Cao (2001).
- Calypogeia sphagnicola* (H.W. Arnell & J. Perss.) Warnst. & Loeske - Cao (2000), Yi & Cao (2001).
- Calypogeia tosana* (Steph.) Steph. - present study.
- Cephalozia bicuspidata* (L.) Dumort. - Wang (1993), Wang & Jia (1993).
- Cephalozia catenulata* (Huebener) Lindb. - Gao (2000).
- Cephalozia connivens* (Dicks.) Lindb. - Wang (1993), Gao (2000), Wang & Jia (1993).
- Cephalozia lacinulata* J.B. Jack *ex* Spruce - Gao (2000).
- Cephalozia leucantha* Spruce - Gao (2000).
- Cephalozia lunulifolia* (Dumort.) Dumort. - Wang & Jia (1993), Gao (2000).
- Cephalozia macounii* (Austin) Austin - Gao (2000).
- Cephalozia otaruensis* Steph. - Wang & Jia (1993), Gao (2000).
- Cephaloziella microphylla* (Steph.) Douin. - Gao (2000).
- Cephaloziella papillosa* (Douin) Schiffn. - Hu *et al.* (1981).
- Chandonanthus birmensis* Steph. - Horikawa (1934), Miller *et al.* (1983), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000).
- Cheilolejeunea ceylanica* (Gottsche) R.M. Schust. & Kachroo - Zhu & So (2001), Zhu *et al.* (2002).
- Cheilolejeunea gaoi* R.L. Zhu *et al.* - Zhu *et al.* (2000, 2002), present study.

- **Cheilolejeunea imbricata* (Nees) S. Hatt. - Hu *et al.* (1981); Hu *et al.* (1981) as *C. tosana* (Steph.) Kachroo & R.M.Schust.; Wang (1993), Wang & Jia (1993); Zhu (2000) and Zhu & So (2001) as *C. longiloba* (Steph. ex G.Hoffm.) J.J. Engel & B.C. Tan; Zhu *et al.* (2002), present study.
- **Cheilolejeunea khasiana* (Mitt.) N. Kitag. - present study
- **Cheilolejeunea osumiensis* (S. Hatt.) Mizut. - present study
- Cheilolejeunea ryukyuensis* Mizut. - Zhu *et al.* (2002).
- Cheilolejeunea trifaria* (Reinw. *et al.*) Mizut. - Zhu & So (2001), Zhu *et al.* (2002).
- **Cololejeunea appressa* (A. Evans) Benedix - Hu *et al.* (1981), Zhu & So (2001), present study.
- Cololejeunea bhutanica* Grolle & Mizut. - Zhu & So (1999a).
- Cololejeunea chenii* Tixier - Wang (1993) and Wang & Jia (1993) as *C. plagio-phylla* Benedix var. *grossipapillosa* P.C. Chen & P.C. Wu; Zhu & So (2001).
- **Cololejeunea haskarliana* (Lehm. & Lindenb.) Schiffn. - present study.
- **Cololejeunea inflata* Steph. - present study.
- **Cololejeunea kodamae* Kamim. - Hu *et al.* (1981).
- **Cololejeunea lanciloba* Steph. - Zhu & So (2001), present study.
- **Cololejeunea macounii* (Spruce ex Underw.) A. Evans - Zhu & So (2001).
- Cololejeunea madothecoides* (Steph.) Benedix - Zhu (2003).
- **Cololejeunea ocellata* (Horik.) Benedix - Wang (1993), Wang & Jia (1993), Zhu (2000), Zhu & So (2001).
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- **Cololejeunea planissima* (Mitt.) Abeyw. - Zhu & So (2001), present study.
- **Cololejeunea pseudofloccosa* (Horik.) Benedix - present study.
- **Cololejeunea raduliloba* Steph. - present study.
- **Cololejeunea rotundilobula* (P.C. Wu & P.J. Lin) Piippo - present study.
- **Cololejeunea schmidtii* Steph. - present study.
- **Cololejeunea serrulata* Steph. - present study.
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- **Cololejeunea tenella* Benedix - Zhu & So (1999a), Zhu & So (2001), present study.
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- Cololejeunea wightii* Steph. - Zhu & So (1999a).
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- **Drepanolejeunea commutata* Grolle & R.L. Zhu - Grolle & Zhu (2000), Zhu & So (2001), present study.
- **Drepanolejeunea erecta* (Steph.) Mizut. - present study.
- **Drepanolejeunea spicata* (Steph.) Grolle & R.L. Zhu - present study.
- Drepanolejeunea ternatensis* (Gottsche) Schiffn. - present study.
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Fossombronina cristula Austin - present study.
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Frullania fuscovirens var. *fuscovirens* Steph. - Hattori & Lin (1985), Piippo (1990), Bai (2000).
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Frullania nepalensis (Spreng.) Lehm. & Lindenb. - Horikawa (1934, 1935) and Hu *et al.* (1981) as *F. nishiyamensis* Steph.; Hattori & Lin (1985), Piippo (1990), Bai (2000), Zhu & So (2001).
Frullania pallide-virens Steph. - Hattori & Lin (1985), Piippo (1990), Bai (2000).
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* *Lejeunea punctiformis* Taylor - Wang (1993), Hu *et al.* (1981) and Wang & Jia (1993) as *Microlejeunea punctiformis* (Taylor) Spruce; Zhu & So (2001), present study.
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Lepidozia trichodes (Reinw. *et al.*) Nees - Mizutani & Chang (1986), Piippo (1990), Gao (2000), Gao & Bai (2002).
Lepidozia wallichiana Gottsche - Mizutani & Chang (1986), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000), Gao & Bai (2002).
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- Metalejeunea cucullata* (Reinw. *et al.*) Grolle - Zhu & So (2001), present study.
- Metzgeria conjugata* Lindb. - Wang (1993), Wang & Jia (1993).
- Metzgeria fruticulosa* (Dicks.) A. Evans - Wang & Jia (1993).
- Metzgeria furcata* (L.) Dumort. - Wang (1993), Wang & Jia (1993), present study.
- Notoscyphus lutescens* (Lehm. & Lindenb.) Mitt. - Gao *et al.* (1999), Gao (2000), present study.
- Nowellia aciliata* (P.C. Chen & P.C. Wu) Mizut. - Gao (2000).
- Nowellia curvifolia* (Dicks.) Mitt. - Gao & Zhang (1981), Piippo (1990), Wang (1993), Wang & Jia (1993), Gao (2000), present study.
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- Phaeoceros laevis* (L.) Prosk. - Wang (1993), Wang & Jia (1993), present study.
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- Plagiochila semidecurrans* (Lehm. & Lindenb.) Lindenb. - Wang (1993), Wang & Jia (1993), So (2001).
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- Porella caespitans* (Steph.) S. Hatt. var. *nipponica* S. Hatt. - Piippo (1990), Wang (1993), Wang & Jia (1993), Bai (2000).
- Porella caespitans* (Steph.) S. Hatt. var. *reflexigastria* (Pócs) S. Hatt. - Wang & Jia (1993).
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- Porella longifolia* (Steph.) S. Hatt. - Wang (1993).
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Radula obtusiloba Steph. - Wang (1993), Wang & Jia (1993).
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Acknowledgments. We thank the National Natural Science Foundation of China (no. 30270117), the Hong Kong Baptist University (FRG/00-01/II-49), and the Ministry of Education, P. R. China for support of the present study.

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