

Epiphyllous liverworts from several recent collections from Taiwan, Thailand, and Vietnam

Rui-Liang ZHU^{a*} and Ming-Jou LAI^b

^a Department of Biology, East China Normal University,
3663 Zhong Shan North Road, Shanghai 200062, China

^b Department of Landscape Architecture, Tunghai University,
181 Taichung Road, Taichung, Taiwan, China

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Abstract – Forty three species belonging to 13 genera of epiphyllous liverworts from Taiwan, Thailand, and Vietnam are enumerated, including six species records new to Vietnam, two new to Thailand, and three new to Taiwan. The genus *Caudalejeunea* is recorded in Taiwan for the first time.

Hepaticae / epiphyllous liverworts / new records / Taiwan / Thailand / Vietnam

Epiphyllous liverworts are widely distributed in southeastern Asia. However, there is little literature dealing with the epiphyllous liverwort flora in Taiwan, Thailand, and Vietnam (e.g., Jovet-Ast & Tixier, 1958, 1962; Tixier, 1973a, b, 1981, 1985; Zhu & So, 2001). The second author (M.-J. Lai) of the present paper has had the opportunity to make several botanical expeditions to central and northern Thailand, and northern Vietnam. The present paper enumerates his collections of epiphyllous liverworts made in 2000-2001. Taxa are arranged in alphabetical order with specimen citation and habitat data. Six species, *Cololejeunea rotundilobula*, *C. yakusimensis*, *Leptolejeunea latifolia*, *Leucolejeunea turanica*, *Metzgeria consanguinea*, and *Radula gedena*, are newly reported for Vietnam. Two species, *Cololejeunea gottschei* and *Leptolejeunea latifolia*, new to Thailand. Three species, *Caudalejeunea recurvistipula*, *Cololejeunea gottschei*, and *C. yakusimensis*, new to Taiwan. All specimens cited below are deposited in HSNU.

Caudalejeunea recurvistipula (Gottsche) Schiffn. in Engler & Prantl *Pflanzenfam.* 1 (3): 129. 1893. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai 20006-90525-d*. **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai 20006-90525-d*. **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai 20010820-6*; Cuc Phuong National Park, Ha Long Bay, 17 July 2001, *Lai 20010717-5*.

Caudalejeunea reniloba (Gottsche) Steph. was reduced to a synonym of *C. recurvistipula*, which is widely distributed in the tropical regions of Oceania and Asia (Zhu & So, 2001). The genus *Caudalejeunea* is reported **new to Taiwan**.

Cheilolejeunea imbricata (Nees) S. Hatt., *Misc. Bryol. Linchenol.* 1: 1. 1911. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai 90525-c*. **Thailand**, Kha

* Correspondence and reprints: rlzhu@hotmail.com

National Park, 800 m, 19 June 2000, *Lai 2000619-16, 2000619-45, 2000619-20, 2000619-14, 2000619-43, 2000619-40*. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai 20010723-6, 20010723-9*; Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai 20010820-3*; Cat Bat National Park, Ha Long Bay National Park, 2001, *Lai 20010717-2*.

Cheilolejeunea longiloba (Steph. ex G. Hoffm.) J.J.Engel & B.C. Engler reduced to a synonym of *C. imbricata* by Zhu *et al.* (2002). The specimens above contain various intermediates between *Cheilolejeunea longiloba* and *C. imbricata*.

Cololejeunea appressa (A.Evans) Benedix, *Feddes Repert. Spec. Nov. Reipublicae Beih.* 134: 31. 1953. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai 90525-l*. **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai 2000619-37*. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai 20010723-14*.

Cololejeunea desciscens Steph., *Hedwigia* 34: 248. 1895. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai 2000619-25, 2000619-22, 2000619-7, 2000619-2*.

Cololejeunea desciscens is characterized and easily separated from other members of *Cololejeunea* by the synoicous sexuality, sigmoid marginal cell, large leaf lobe, 34-64-celled gemmae, and linear, uniseriate leaf lobules (Zhu & So, 2002).

Cololejeunea equalbi Tixier, *Ann. Fac. Sci. Univ. Phnom Penh* 3: 178. 1971. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai 20010820-3*.

Cololejeunea trichomanis (Gottsche) Steph., *Hedwigia* 34: 252. 1895. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai 90525-l*. **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai 2000619-6*. **Vietnam**, Cat Bat National Park, Ha Long Bay, 17 July 2001, *Lai 20010717-3*; Tam Dao National Park, 1100 m, 21 July 2001, *Lai 20010721-4*.

Cololejeunea trichomanis is one of the most common epiphyllous liverworts in southeastern Asia. It was recorded previously in Taiwan, Thailand, and Vietnam as *C. goebelii* (Gottesche ex Schiffn.) Schiffn. (cf. Zhu & So, 2001; Grolle, 2002).

Cololejeunea gottschei (Steph.) Pandé *et al.*, *J. Indian Bot. Soc.* 36: 345. 1959. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai 90525-o*. **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai 2000619-32, 2000619-39, 2000619-11, 2000619-6, 2000619-5*.

Cololejeunea gottschei is very similar to *C. longifolia* (Mitt.) Mizoguchi. It differs in large gemmae with 4 adhesive cells, small female bracts 1/4–1/2 as the perianth, and wider leaf lobes (Zhu & So, 2001). It is reported from **Taiwan and Thailand**.

Cololejeunea grushvitzkiana Pócs, *Bot. Zhurn. (Moscow & Leningrad)* 16: 10. 1971. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai 20010820-10, 20010820-13*.

Cololejeunea grushvitzkiana is known only from Vietnam. It differs from *C. trichomanis* in the oblong leaves, usually unicellular stylus, and elongate tooth of the leaf lobule (cf. Zhu & So, 2000).

Cololejeunea haskarliana (Lehm. & Lindenb.) Schiffn., *Consp. Hepat. Ar.* 244. 1898. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai 20010723-14*.

Cololejeunea inflata Steph., *Hedwigia* 34: 249. 1895. — **Taiwan**, Nantou Co., 25 May 2001, *Lai* 90525-j. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-8.

Cololejeunea lanciloba Steph., *Hedwigia* 34: 250. 1895. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-i.

Cololejeunea ocelloides (Horik.) S.Hatt., *J. Hattori Bot. Lab.* 24: 277. 1959. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-4; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-2.

Cololejeunea peraffinis (Schiffn.) Schiffn., *Consp. Hepat. Arch. Ind.*: 245. 1851. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-19, 20010723-20.

Cololejeunea peraffinis is variable in the size of the leaf lobule and the size of the basal papillae of leaf cells (Zhu & So, 2001). In one collection (*Lai* 20010723-20) the lobules are up to 1/2 as long as the leaf lobes as in the typical *Cololejeunea peraffinis papillosa* (Kamim.) P-C.Chen & P-C.Wu.

Cololejeunea planissima (Mitt.) Abeyw., *Ceylon J. Sci., Bio. Sci.* 2 (1): 73. 1937. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-8, 2000619-47, 2000619-38, 2000619-12, 2000619-29, 2000619-48, 2000619-13, 2000619-11.

Cololejeunea planissima is highly variable in the size and shape of the leaf lobule. In one specimen (*Lai* 2000619-47), stylii are sometimes two cells long. *C. planissima* is widely distributed in southeastern Asia, recently also known from the Himalaya (Zhu & Long, 2003).

Cololejeunea pseudofloccosa (Horik.) Benedix, *Feddes Repert. Spec. Nov. Veg. Beih.* 134: 36. 1953. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-13.

Cololejeunea raduliloba Steph., *Hedwigia* 34: 251. 1895. — **Vietnam**, Cat Ba National Park, Ha Long Bay, 17 July 2001, *Lai* 20010717-8.

Cololejeunea rotundilobula (P-C.Wu & P-J.Lin) Piippo, *J. Hattori Bot. Lab.* 134. 1990. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-1.

Cololejeunea rotundilobula was previously known only from China (Piippo & So, 2001). It is **newly recorded in Vietnam**. The leaf lobules in the collection cited above are usually smaller than those in the type material from Hainan, China.

Cololejeunea serrulata Steph., *Hedwigia* 34: 252. 1895. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-7, 20010820-11; Cat Bat National Park, Ha Long Bay, 17 July 2001, *Lai* 20010717-4.

Cololejeunea sigmoidea Ast & Tixier, *Rev. Bryol. Lichénol.* 31: 27. 1954. — **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-1.

Cololejeunea spinosa (Horik.) Pandé & Misra, *J. Indian Bot. Soc.* 22: 166. 1945. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-h.

Cololejeunea stylosa (Steph.) A.Evans, *Trans. Connecticut Acad. Arts Sci.* 10: 190. 1900. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-1.

Cololejeunea yakusimensis (S.Hatt.) Mizut., *J. Hattori Bot. Lab.* 57: 430. 1959. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-m. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-21, 20010723-2.

Cololejeunea yakusimensis was previously known only from China and Japan (Zhu & So, 2001). It is reported for **Taiwan and Vietnam for the first time**.

Colura conica (Sande Lac.) K.I.Goebel, *Ann. Jard. Bot. Buitenzorg* 39: 3. 1932. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-5.

Drepanolejeunea commutata Grolle & R.L.Zhu, *Nova Hedwigia* 70: 377. 1999. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-3, 20010721-1; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-9, 20010721-10.

Drepanolejeunea erecta (Steph.) Mizut., *J. Hattori Bot. Lab.* 40: 442. 1972. — **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-12.

Drepanolejeunea foliicola Horik., *J. Sci. Hiroshima Univ., Ser. B, Div. 2, Bot.* 1932. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-k. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-18.

Frullania muscicola Steph., *Hedwigia* 33: 146. 1894. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-10.

Lejeunea anisophylla Mont., *Ann. Sci. Nat., Bot., Sér.* 2, 19: 263. 1843. — **Taiwan**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-3.

Lejeunea flava (Sw.) Nees, *Naturgesch. Eur. Leberm.* 3: 277. 1838. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-f. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-15; Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-14.

Lejeunea infestans (Steph.) Mizut., *J. Hattori Bot. Lab.* 27: 143. 1964. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-11; Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-15.

As mentioned by Zhu & So (2001), *Lejeunea infestans* might be conspecific with *L. anisophylla*. The plants cited above have ribbon-like regenerative leaf margins, thus are provisionally assigned to *Lejeunea infestans*.

Lejeunea punctiformis Taylor, *London J. Bot.* 5: 398. 1846. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-g. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-5; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-7.

Leptolejeunea elliptica (Lehm. & Lindenb.) Schiffn. in Engler & Prantl, *Pflanzenfam.* 1 (3): 126. 1893. — **Taiwan**, Nantou Co., Xitou, 25 May 2001, *Lai* 90525-b. **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-42. **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-16; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-7.

Leptolejeunea epiphylla (Mitt.) Steph., *Sp. Hepat.* 5: 380. 1913. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-42, 2000619-30, 2000619-21.

Leptolejeunea latifolia Herzog, *Mem. Soc. Fauna Fl. Fennica* 26: 58. 1928. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-36, 2000619-28. **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-10.

Leptolejeunea latifolia is **new to Thailand and Vietnam**.

Leptolejeunea maculata (Mitt.) Schiffn., *Consp. Hep. Arch. Ind.*: 275. 1913. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-5.

Leucolejeunea turgida (Mitt.) Verd., *Ann. Bryol. Suppl.* 4: 71. 1934. — **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-17.

Leucolejeunea turgida is **newly recorded in Vietnam**. It was known previously from Bhutan, China, India, Nepal, Sikkim, and Thailand (Zhu & So, 2001).

Metzgeria consanguinea Schiffn., *Nova Acta Acad. Caes. Leop.-Carol. Ges. Nat. Cur.* 60: 271. 1893. — **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-10.

Metzgeria consanguinea is a pantropical species (Long & Grolle, 1990), however, it is **newly recorded in Vietnam**.

Metzgeria furcata (L.) Dumort., *Recueil Observ. Jungerm.*: 26. 1835. — **Vietnam**, Ba Vi National Park, 800 m, 23 July 2001, *Lai* 20010723-17; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-6, 20010721-18.

Radula acuminata Steph., *Sp. Hepat.* 4: 230. 1910. — **Taiwan**, Nantou Co., 25 May 2001, *Lai* 90525-e. **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-2; Cat Bat National Park, Ha Long Bay, 17 July 2001, *Lai* 20010717-1.

Radula assamica Steph., *Hedwigia* 23: 151. 1884. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-1.

Radula gedena Gottsche ex Steph., *Hedwigia* 23: 146. 1884. — **Vietnam**, Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-8, 20010721-11.

Radula gedena was recorded previously in China (Guizhou, Sichuan), Indonesia (Java), Japan, Malaysia, Philippines, and Thailand (cf. Yamada, Zhu & So, 2001). It is reported **new to Vietnam**.

Spruceanthus semirepandus (Nees) Verd., *Ann. Bryol., Suppl.* 4: 153. 1934. — **Thailand**, Khao Yai National Park, 800 m, 19 June 2000, *Lai* 2000619-35.

Tuyamaella molischii (Schiffn.) S.Hatt. var. *molischii*, *Bull. Tokyo Sci. Mus.* 76. 1944. — **Vietnam**, Cuc Phuong National Park, 400 m, 20 Aug. 2001, *Lai* 20010820-12; Tam Dao National Park, 1100 m, 21 July 2001, *Lai* 20010721-10.

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