

Two newly recorded species of the genus *Cheilolejeunea* (Lejeuneaceae, Hepaticae) in Hong Kong and China

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Abstract. *Cheilolejeunea nipponica* (Hatt.) Hatt. and *Cheilolejeunea obtusifolia* (Steph.) Hatt., previously endemic to Japan, are newly found in Hong Kong and Zhejiang of China, respectively. Some variations of local plants and detailed illustrations based on Chinese material of the two species are provided. Five other *Cheilolejeunea* species are discussed. A preliminary checklist of Chinese *Cheilolejeunea* species with their distributional ranges in China is included. A preliminary key to the Chinese species of the genus *Cheilolejeunea* is also presented.

Keywords: *Cheilolejeunea nipponica*; *Cheilolejeunea obtusifolia*; China; Hong Kong; Lejeuneaceae; New records.

The genus *Cheilolejeunea* is widely distributed in subtropical to tropical regions of the world. Fourteen species of this genus have been reported for China (Piippo, 1990; So and Zhu, 1996). In the present study, we report two additional species previously known only from Japan, *Cheilolejeunea nipponica* (Hatt.) Hatt. and *Cheilolejeunea obtusifolia* (Steph.) Hatt. The former species was surprisingly found at Victoria Peak, a famous tourist spot in Hong Kong, while *Cheilolejeunea obtusifolia* is apparently common in Zhejiang of China.

According to the published literature and the present study, the flora of the genus *Cheilolejeunea* is very rich in Hong Kong and China. A total of sixteen species including three endemic to China has been reported. The number of species is apparently higher than that of the Philippines, Japan, Bhutan and Western Melanesia, but only second to that of Borneo as shown in Table 1.

1. *Cheilolejeunea nipponica* (Hatt.) Hatt., Misc. Bryol. Lichenol. 1(14): 1. 1957.

In Hong Kong, *Cheilolejeunea nipponica* occurred in large patches on somewhat wet sandy rocks, along Mt. Austin Road at Victoria Peak at 500 m above sea level. Compared with the original description (Hattori, 1944) and that of Mizutani (1982), local plants are dark-green, relatively large, mostly 0.5–0.64 mm wide with leaves, leaf-lobes are orbicular, and leaf-lobules are ovate, about 2/5 to 1/2 the length of the leaf-lobe. Local material cited above has abundant androecia and gynoecia. The androecium usually has an apical innovation, male bracts are up to 12 pairs (Figure 1), and male bracteoles are 2–3, and occur only at the basal portion of androecium. The gynoecium is on a long branch and has 1–2

Table 1. Number of *Cheilolejeunea* species in China and adjacent areas.

Country/region	Number of species	Sources of data
China	16	Present study
Japan	12	Mizutani (1982)
Bhutan	2	Long and Grolle (1990)
Philippines	12	Tan and Engel (1986)
Western Melanesia	13	Grolle and Piippo (1984)
Borneo	21	Menzel (1988)

subinnovations, and innovation leaf sequence is pycnolejeuneoid. Oil bodies in local fresh material are 1–2 per leaf-cell, rarely 3 (one large and the others small), mostly elliptical, rarely cashew-shaped, 16–23 × 7–10 μm, of the grape-cluster type.

In the field, the plant size of *Cheilolejeunea nipponica* is similar to the poorly developed form of *Cheilolejeunea trifaria* (Reinw. et al.) Mizut. in being smaller, with scarcely branched stems. But the former is immediately separated from the latter by the large lobules and the creeping habit. The pycnolejeuneoid innovation leaf sequence, the smaller trigones of leaf-cells and the small underleaves with a transverse to subtransverse insertion in *C. nipponica* are features which distinguish it from *C. trifaria*.

The range of *Cheilolejeunea nipponica* now includes Japan (Mizutani, 1982) and Hong Kong. Hong Kong is at the southernmost distributional locality of this species. *Cheilolejeunea nipponica* is also the sixth member of the genus *Cheilolejeunea* in Hong Kong (So and Zhu, 1996).

Specimen examined. **HONG KONG.** Victoria Peak (22°15' N, 114°10' E), 11 Feb 1996, M.L. So & R.-L. Zhu 96211L9 (HKBU, HSNU).

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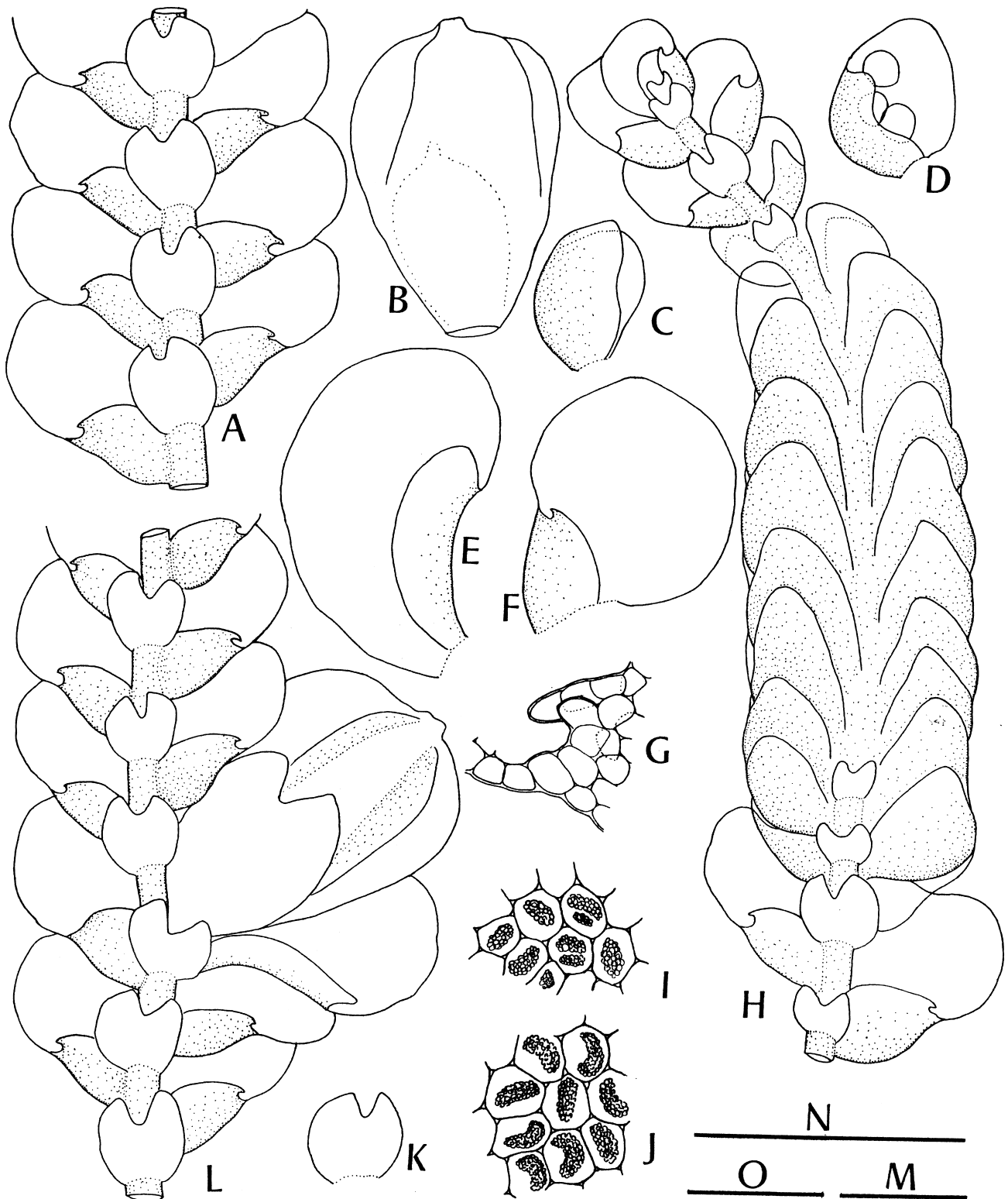


Figure 1. *Cheilolejeunea nipponica* (Hatt.) Hatt. A: Portion of plant, ventral side; B: Perianth; C, D: Male bracts; E: Female bract; F: Leaf; G: Apex of leaf-lobule; H: Portion of plant with androecium, ventral side; I: Median cells of leaf-lobe with oil bodies; J: Perianth-wall cells with oil bodies; K: Underleaf; L: Portion of plant, with gynoecium, ventral side. All drawn from *M. L. So & R.-L. Zhu 96211L9*. Scales: M=0.05 mm (G, I, J), N=0.5 mm (A, B, H, L), O=0.20 mm (C-F, K).

2. *Cheilolejeunea obtusifolia* (Steph.) Hatt., Misc. Bryol. Lichenol. 1(14): 1. 1957.

This species was found on wet rocks, sandy rocks, and soils at 670–1,415 m above sea level in evergreen broad-leaved forests and needle-broad-leaved mixed forests in Zhejiang of China. It is usually associated with *Lejeunea clavifolia* (Steph.) Hatt., *Frullania moniliata* (Reinw. et al.) Mont., *Herbertus aduncus* (Dicks.) Gray and *Scapania* sp. *Cheilolejeunea obtusifolia* differs from other Chinese species of the genus *Cheilolejeunea* in its elongate unicellular angular tooth of leaf-lobule (Figure 2).

Cheilolejeunea obtusifolia is likely to be confused with *Lejeunea parva* (Hatt.) Mizut. because of the scarcely branched stem, the large leaf-lobules, the small size of plant and the more or less incurved leaf apices. Specimens kept in several Chinese herbaria were erroneously identified as *L. parva*. However, *C. obtusifolia* is readily distinguished from the latter by its unicellular, elongate angular tooth of leaf-lobules, its hyaline papilla distal to the tooth on the leaf-lobule and its pycnolejeuneoid innovation leaf sequence.

Cheilolejeunea obtusifolia was previously thought to be endemic to Japan. According to Mizutani (1982), this species was recorded in Hokkaido, Honshu, Shikoku and Kyushu. Wuyanling Nature Reserve (27°41' N, 119°40' E) in China is therefore at the southernmost range for this species. That this species can be found in other provinces of China, which lie between Zhejiang and Hokkaido, is highly probable.

Representative specimens examined. CHINA. ZHEJIANG: Mt. Jiulong (28°21' N, 118°52' E), Z.-L. Liu 1152 (HSNU 03788); Baishanzu Nature Reserve (27°45' N, 119°40' E), 23 Jul 1990, R.-L. Zhu 90038; Wuyanling Nature Reserve (27°41' N, 119°40' E), R.-L. Zhu 497 (HSNU 15085), R.-L. Zhu 266 (HSNU 014865).

3. *Cheilolejeunea ryukyuensis* Mizut., J. Hattori Bot. Lab. 51: 162. 1982.

Up to now, *Cheilolejeunea ryukyuensis* is known only from Hong Kong and Japan (So and Zhu, 1996). It is fairly common on tree-trunks, wet rocks, and living leaves at low elevations in Hong Kong. This species is rather variable

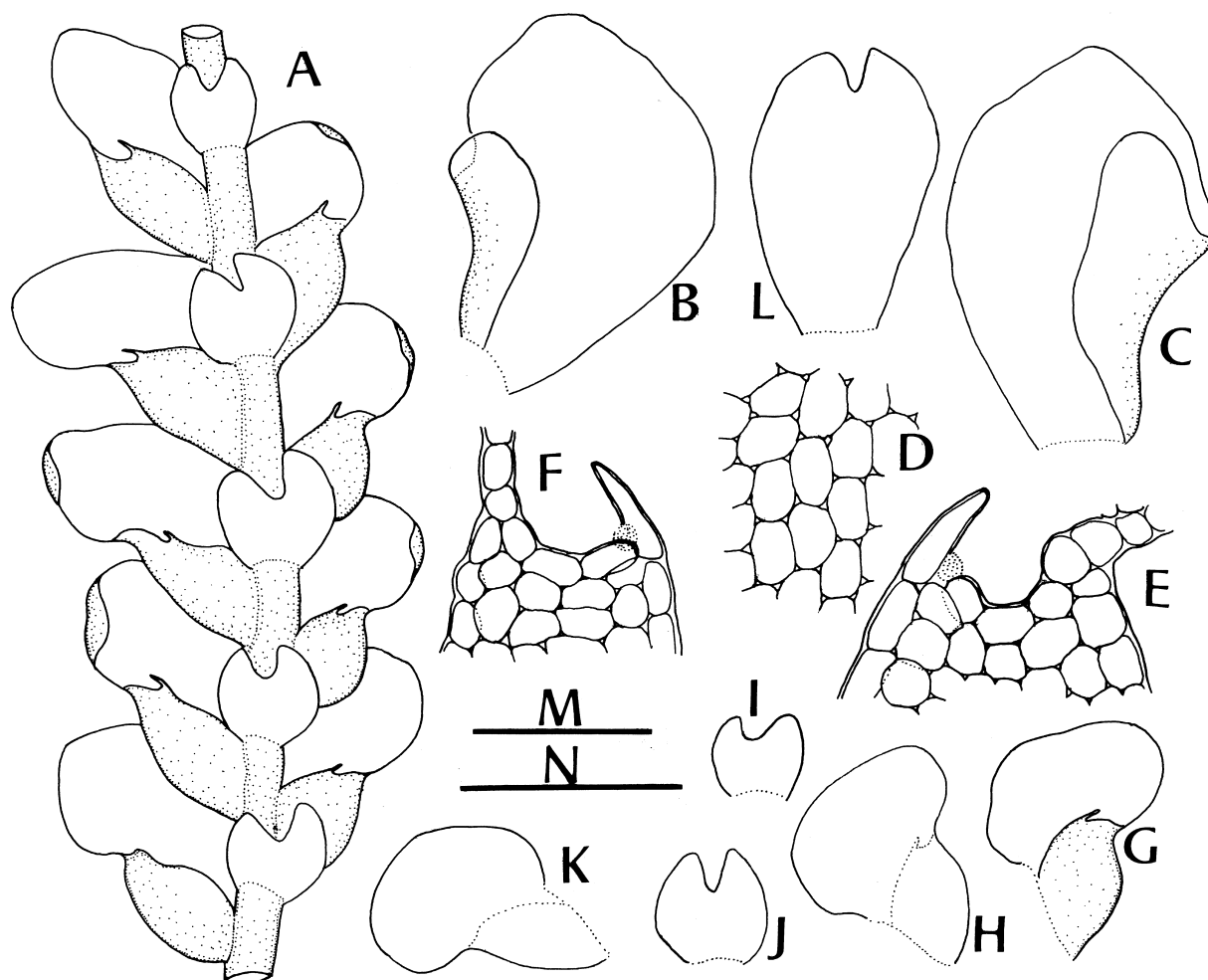


Figure 2. *Cheilolejeunea obtusifolia* (Steph.) Hatt. A: Portion of plant, ventral side; B, C: Female bracts; D: Median cells of leaf-lobule; E, F: Apices of leaf-lobules; G, H, K: Leaves; I, J: Underleaves; L: Female bracteole. All drawn from R.-L. Zhu 497. Scales: M=0.25 mm (A–C, G–L), N=0.05 mm (D–F).

in size of plant, leaf-lobule, and underleaf. *Cheilolejeunea ryukyensis* is very similar to *Pycnolejeunea minutilobula* (Amak.) Amak. found in Japan. However, *C. ryukyensis* is characterized by the absence of basal ocelli, the presence of subfloral innovations, and the distal hyaline papilla. In the type description of *C. ryukyensis* (Mizutani, 1982), the trigones are large. But, from our study on the type specimen and Hong Kong material, the trigones are quite variable. Most material has small, rather indistinct trigones. *Cheilolejeunea ryukyensis* is also similar to *Cheilolejeunea rigidula* (Nees ex Mont.) Schust. But the former is autoicous while the latter is dioicous.

Representative specimen examined. **HONG KONG.** Tai Po Kau. M.L. So & R.-L. Zhu 96 213L (HKBU).

4. *Cheilolejeunea osumiensis* (Hatt.) Mizut., Misc. Bryol. Lichen. 8: 148. 1980.

Outside Japan, the present species was previously known only from Hong Kong (So and Zhu, 1996). It is also found in Guangdong and Hainan as a new record. The range of this species has now extended southward considerably, with Bawangling Nature Reserve (19°20' N, 109°10' E) at the southernmost end. In all Chinese material examined, the innovation leaf sequence is often lejeuneoid. This species usually grows on tree-trunks and decaying logs at 800–1,700 m above sea level. In Hong Kong, it is sometimes found on living leaves.

Representative specimens examined. **CHINA.** GUANGDONG: Babaoshan Nature Reserve (24°48' N, 112°56' E), R.-L. Zhu 891033 (HSNU). HAINAN: Bawangling Nature Reserve, (19°20' N, 109°10' E), R.-L. Zhu 891600 (HSNU).

5. *Cheilolejeunea khasiana* (Mitt.) N. Kitag., Hikobia Suppl. 1: 68. 1981.

The present species usually grows on tree-trunks, rotten branches, wet rocks, and occasionally on living leaves. In *Cheilolejeunea khasiana*, the following two forms of leaf-lobules can be observed. In the first form, the angular tooth of leaf-lobule is small and indistinct, and the apex of leaf-lobule is more or less truncate. In the second form, the angular tooth of leaf-lobule is triangular, 1-2-celled, and the apex of leaf-lobule is constricted. The material from Sichuan (R.-L. Zhu 88162) bears leaf-lobules of the first form, while the other material cited above has the leaf-lobules of the second form.

Lejeunea compacta (Steph.) Steph. somewhat resembles *Cheilolejeunea khasiana* in having large underleaves with strongly sinuate insertions, strongly incurved leaf-apices and large trigones of leaf-cells. *Lejeunea compacta* differs in that the hyaline papilla is on the proximal side of the angular-tooth of leaf-lobule, and the male bracteoles occur throughout the androecium. Outside China, *C. khasiana* is known from Assam, Japan (Kitagawa, 1981), Himalaya and Bhutan (Long and Grolle, 1990).

Representative specimens examined. **CHINA.** JIANGXI: Sanqingshan. X.-M. Shao 1352 (HSNU

016979). SHAANXI: Mt. Kuan-ton-san, Jul 1894, P.G. Girdaldi s.n.— isotype of *Euosmolejeunea giraldiana* (G). SICHUAN: Emeishan (29°5' N, 103° E), R.-L. Zhu 88162 (HSNU). ZHEJIANG: Wuyanling Nature Reserve (27°41' N, 119°40' E), R.-L. Zhu 451 (HSNU 015042).

6. *Cheilolejeunea ceylanica* (Gott.) Schust. & Kachr., J. Linn. Soc. Bot. 56: 509. 1961.

Cheilolejeunea ceylanica is often found on living leaves in Hainan. It is easily recognized by its obliquely spreading leaves, arched, 5-6-celled long angular tooth of leaf-lobule and the presence of weak vitta. Outside China, this species was reported for Borneo, Ceylon, Japan, the Philippines, Sumatra, Thailand (Mizutani, 1980), and Northern Queensland (Thiers, 1992).

Representative specimens examined. **TAIWAN.** Botel Tabago. s. c. 115. (JE). **CHINA.** HAINAN: Bawangling Nature Reserve (19°20' N, 109°10' E), R.-L. Zhu 89304K (HSNU). YUNNAN: Daweishan Nature Reserve (22°58' N, 103°51' E), R.-L. Zhu 8801a (HSNU).

7. *Cheilolejeunea longiloba* (Hoffm.) Kachr. & Schust., J. Linn. Soc. Bot. 56: 509. 1961.

Cheilolejeunea longiloba is a common epiphyllous liverwort in Hainan. It is similar to *Cheilolejeunea imbricata* (Nees) Hatt. But the former differs in having the cortical cells of the stem being 7 rows in cross-section, and the plants are usually epiphyllous.

Cheilolejeunea longiloba was recorded from Fujian (Zhang et al., 1993) and Taiwan (Yamada et al., 1986). Outside China, this species is known from Borneo, Java, Philippines, Sumatra and Thailand (Mizutani, 1980).

Representative specimens examined. **CHINA.** HAINAN: Bawangling Nature Reserve (19°20' N, 109°10' E), R.-L. Zhu 89X (HSNU). YUNNAN: Daweishan Nature Reserve (22°58' N, 113°51' E), R.-L. Zhu 8801b (HSNU).

The following is a preliminary checklist of the known *Cheilolejeunea* species in Hong Kong and China with their distributional ranges. New records are marked with an a, b, or c.

1. *Cheilolejeunea ceylanica* (Gott.) Schust. & Kachr. Hainan, Taiwan and Yunnan.
2. *Cheilolejeunea falsinervis* (Sande Lac.) Kachr. & Schust. Hainan (Lin et al., 1992).
3. *Cheilolejeunea fukiensis* (Chen & Wu) Piippo. Fujian (Piippo, 1990), Jiangxi (Zhang et al., 1993). Previous records for Zhejiang (Zhu, 1990; Zhu and Hu, 1991; Zhang et al., 1993) were incorrect identifications.
4. *Cheilolejeunea imbricata* (Nees) Hatt. Widely distributed in China except for northern China.
5. *Cheilolejeunea intertexta* (Lindenb.) Steph. Hong Kong (So and Zhu, 1996), Taiwan (Piippo, 1990).
6. *Cheilolejeunea khasiana* (Mitt.) N. Kitag. Hunan (Piippo, 1990), Jiangxi^a, Shaanxi, Sichuan and Zhejiang.

7. *Cheilolejeunea latidentata* Chen & Wu. Yunnan (Chen and Wu, 1964).
 8. *Cheilolejeunea longiloba* (Hoffm.) Kachr. & Schust. Hainan^a, Yunnan^a and Taiwan (Yamada et al., 1986).
 9. *Cheilolejeunea nipponica* (Hatt.) Hatt. Hong Kong^a.
 10. *Cheilolejeunea obtusifolia* (Steph.) Hatt. Zhejiang^a.
 11. *Cheilolejeunea obtusilobula* (Steph.) Hatt. Taiwan (Inoue, 1961).
 12. *Cheilolejeunea osumiensis* (Hatt.) Mizut. Guangdong^a, Hainan^a and Hong Kong.
 13. *Cheilolejeunea rigidula* (Nees ex Mont.) Schust. Yunnan (Piippo, 1990). This record in Yunnan appears to be somewhat doubtful, because it was based on the unpublished literature titled “Checklist of bryophytes of the Kunming area” compiled by Botany section of the Biology Department of Yunnan University in 1981.
 14. *Cheilolejeunea subplaniloba* Chen & Wu. Yunnan (Chen and Wu, 1964).
 15. *Cheilolejeunea ryukyensis* Mizut. Hong Kong.
 16. *Cheilolejeunea trifaria* (Reinw et al.) Mizut. Hainan, Hong Kong.

The 16 Chinese species listed above are separated in the following preliminary key:

1. Vitta more or less present 2
 1. Vitta absent 3
 2. Leaf apex obtuse, often incurved *C. falsinervis*
 2. Leaf apex rounded, flat *C. ceylanica*
 3. Leaf-lobule over 1/2 the length of leaf-lobe 4
 3. Leaf-lobule less than 1/3 the length of leaf-lobe 10
 4. Cortical cells of stem (7-) 9–24 rows in cross section *C. imbricata*
 4. Cortical cells of stem 7 rows in cross section 5
 5. Proximal tooth of leaf-lobule unicellular, elongate *C. obtusifolia*
 5. Proximal tooth of leaf-lobule 1–3 (-4) cells long, apical cell not elongate 6
 6. Proximal tooth of leaf-lobule strongly incurved, 3–5 cells wide at base *C. latidentata*
 6. Proximal tooth of leaf-lobule flat, 1(-2) cells wide at base 7
 7. Autoicous 8
 7. Dioicous 9
 8. Stem 0.5–0.7 mm wide with leaves, proximal tooth of leaf-lobule 1–2(-3) cells long
 *C. nipponica*
 8. Stem over 1.0 mm wide with leaves, proximal tooth of leaf-lobule obsolete *C. obtusilobula*
 9. Leaf decurrent at base *C. subplanilobula*^b
 9. Leaf not or slightly decurrent at base *C. longiloba*
 10. Leaf-lobe ovate or oblong 11
 10. Leaf-lobe orbicular 15
 11. Leaf apex obtuse or acute, often incurved 12
 11. Leaf apex rounded, flat 13
 12. Male bracteoles present throughout androecium *C. osumiensis*
 12. Male bracteoles present only at the basal portion of androecium *C. khasiana*
 13. Intermediate thickenings of leaf cell-walls often large *C. fukiensis*^c
 13. Intermediate thickenings of leaf cell-walls indistinct 14
 14. Autoicous *C. ryukyensis*
 14. Dioicous *C. rigidula*
 15. Underleaves about 5 times as wide as the stem, insertion of underleaf strongly arched *C. trifaria*
 15. Underleaves about 2–3 times as wide as the stem, insertion of underleaf subtransverse *C. intertexta*

^b According to the original description and illustration (Chen and Wu, 1964), this species is closely related to *Cheilolejeunea longiloba*. The exact distinction between the two species still awaits revision.

^c In the original description and illustration (Chen and Wu, 1964), the hyaline papilla was not mentioned and the plants were sterile. The position of this species is still open to question.

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中國新記錄的兩個唇鱗苔屬植物 (苔綱、細鱗苔科)

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日本唇鱗苔 *Cheilolejeunea nipponica* (Hatt. Hatt. 和鈍葉唇鱗苔 *Cheilolejeunea obtusifolia* (Steph.) Hatt. 為細鱗苔科 Lejeuneaceae 植物，以前被認為日本特有。在香港維多利亞山頂發現了日本唇鱗苔，而在浙江烏岩嶺自然保護區、百山祖自然保護區以及九龍山等地發現了大量鈍葉唇鱗苔。本文除了對這兩個中國新記錄的種作了詳細的圖解和特徵評論外，還對其它五個種作了討論，同時也提供了一份具有分布資料的中國唇鱗苔屬植物名錄以及檢索表。

關鍵詞：日本唇鱗苔；鈍葉唇鱗苔；細鱗苔科；新記錄；中國；香港。