

Notes on the taxonomy and distribution of *Cololejeunea platyneura* (Hepaticae, Lejeuneaceae)

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Cololejeunea astyla Mizut., previously known only from North Borneo, is proposed as a synonym of *C. platyneura* (Spruce) A. Evans, which was known from Africa, South America and Vietnam and is here reported for the first time for China (Yunnan). The taxonomy of *C. platyneura* and related species is discussed and a distribution map of it is provided.

Key words: Borneo, China, *Cololejeunea astyla*, *C. platyneura*, distribution, epiphyllous liverworts, Lejeuneaceae

Cololejeunea platyneura (Spruce) A. Evans, an epiphyllous hepatic, was first described from Brazil by Spruce (1884) as *Lejeunea platyneura* Spruce. Stephani (1916) described an African species, *Physocolea vittata* Steph., which was rejected by Jones (1954) as a *nomen confusum*. Jones introduced a new name, *Cololejeunea usambarica* E. W. Jones. Pócs (1992) reported *Cololejeunea bichiana* Tix. for Madagascar and the Mascarene Islands. Tixier (1992) reduced *C. bichiana* Tix. and the African *C. usambarica* to synonyms of *C. platyneura*. In Asia this species was known only from Vietnam (Tixier 1992, 1994). In the course of our recent studies on epiphyllous hepatics, we found that *C. astyla* Mizut. of North Borneo is conspecific with *C. platyneura*. We report it also for Yunnan, China, which is its northernmost locality.

Cololejeunea platyneura (Spruce) A. Evans (Fig. 1)

Mem. Torrey Bot. Club. 8: 172. 1902. — *Lejeunea platyneura* Spruce, Trans. Proc. Bot. Soc. Edinburgh 15: 299. 1884. — Type: Brazil. Rio Negro, S. Gabriel, *Spruce L 516* (holotype, MANCH-18835!).

Physocolea vittata Steph., Spec. Hepat. 5: 873.1916. — Type: Tanzania. Usambara or., ad flumen Siga, in Hort. Botan. Amani, 600 m. alt., *P. Joshi*, Herb. E. Levier no. 4530 (holotype, G-17499!).

Cololejeunea usambarica E. W. Jones, Trans. Brit. Bryol. Soc. 2: 434. 1954, *nom. illeg.* — Type: Tanzania. Usambara or., ad flumen Siga, in Hort. Botan. Amani, 600 m alt., *P. Joshi*, Herb. E. Levier no. 4530 (holotype, G-17499!).

Cololejeunea astyla Mizut., J. Hattori Bot. Lab. 29: 156. 1966, *syn. nov.* — Type: Malaysia. Sabah, Kinabalu area, between Sosopodon and S. Kelinggen, 1 350–1 400 m, 26.V.1963, *M. Mizutani* 253895 (holotype, NICH!).

Cololejeunea bichiana Tixier, Ann. Hist.-Nat. Mus. Nat.

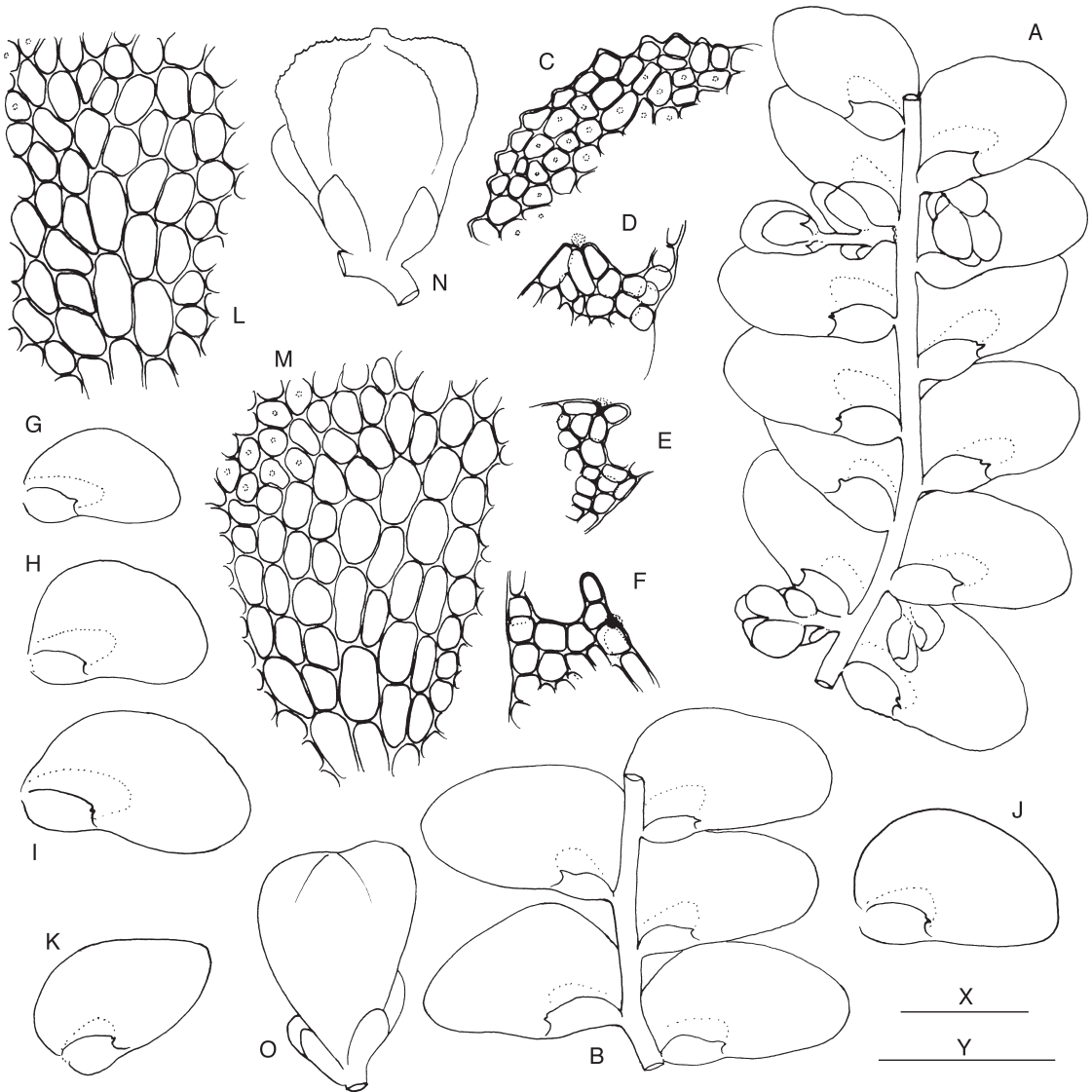


Fig. 1. *Cololejeunea platyneura* (Spruce) A. Evans (A, C–H, M and N from *Spruce L 516*, MANCH; B, J–L and O from *Zhu 88020b*, HSNU; I from *Mizutani 253895*, NICH). — A and B: Portion of plant, ventral view. — C: Keel margin of perianth. — D–F: Apices of leaf lobules. — G–K: Leaves, ventral view. — L and M: Basal cells of leaf lobe (vitta-like area). — N and O: Female inflorescence, ventral view. — Scales: X = 0.3 mm (A, B, G–K, N and O), E = 0.1 mm (C–F, L and M).

Hungarici 66: 94. 1974. — Type: Vietnam. Ninh Binh, Parc national de Cuc Phuong, épiphyte dans les forêt Bông, 21.XII.1965, T. Pócs, Nguyễn Bích & Trần Ninh 3064 (holotype PC, not available on loan).

Illustrations: Jones 1954: 432 (fig. 10a–f as *Cololejeunea usambarica*); Mizutani 1966: 155 (fig. 1: 10–17 as *C. asylya*); Pócs 1975: figs. 44–58, 60–63 as *C. usambarica*; Tixier 1974: fig. 8 as *C. bichiana*; Tixier 1985: 213, fig. 13 as *C. usambarica*; Tixier 1992: figs. 2–4.

As mentioned by Jones (1954), there are three specimens under the name *Cololejeunea vittata* in Stephani's herbarium. The first one is from New Guinea (*leg. Nyman*), and it clearly belongs to *Cololejeunea peraffinis* (Schiffn.) Schiffn. The second (*Brunnthaler 25* from Usambara, Tanzania) contains scanty material of *C. obliqua* (Nees & Mont.) Schiffn., and the third (Herb. E. Levier

4530, G-17499) is the holotype of *Physocolea vitata*. Jones (1954) erroneously introduced a new name *Cololejeunea usambarica*, based on that specimen. Therefore, *C. usambarica* E. W. Jones is an illegitimate name.

Cololejeunea platyneura is well characterized and easily recognized by (1) absence of a stylus, (2) presence of a vitta-like area in the leaf lobe, (3) a hyaline papilla which is situated on the proximal side of the first tooth, (4) small and low papillae on the dorsal side of the leaf lobe, (5) large leaf cells usually with distinct trigones, (6) an epiphyllous habitat, (7) a free margin consisting of one row of 4–6 elongated cells, and (8) usually 16–18-celled gemmae.

Pócs (1975) described *Cololejeunea platyneura* in detail as *C. usambarica*, based on African material. The species shows slight variations in several features. In the type material from Brazil, the keel margins of the perianth are more or less serrulate or papillose (Fig. 1C and N). However, they are nearly entire in Vietnamese and Chinese material as well as in most specimens from Africa. The leaf shape also varies. Usually the leaves are more or less falcate and rounded at the apex, but in Chinese specimens the ventral margin is mostly straight (Fig. 1B, J and K). The first tooth of the leaf lobule varies from one to two cells. It usually points towards the apex of leaf lobe (Fig. 1E and F), but sometimes also towards the stem apex, as shown in Fig. 1D. A vitta-like area is developed more strongly in Malaysian, Brazilian and African material than in Chinese material (Fig. 1M). The Chinese plants have numerous perianths. The spores in the Chinese material are irregular in shape, usually rectangular, $22\text{--}41 \times 20\text{--}22 \mu\text{m}$, minutely papillose under light microscope, but densely beset with verruca-like processes without rosettes under scanning electron microscope. *C. astyla* is identical with *C. platyneura* except for the relatively smaller leaf lobules (Fig. 1I).

Cololejeunea platyneura is closely related to *C. tenella* Benedix, which is known from Australia, Cambodia, China, Indonesia, Malaysia, Sri Lanka and Vietnam (Benedix 1953, Tixier 1985, Thiers 1988). They share the same habit, apical structure of leaf lobule, position of hyaline papilla and basal cells of leaf lobe which are usually elongated. However, they can be separated by the following key:

1. Dorsal protrusion of leaf lobe small and low; median cells of leaf lobe $17\text{--}30 \times 10\text{--}20 \mu\text{m}$; perianth wall cells with low papillae; leaves slightly falcate; ocellus-like basal cells absent; epiphyllous *C. platyneura*
1. Dorsal protrusion of leaf lobe large and high; median cells of leaf lobe $8\text{--}18 \times 6\text{--}10 \mu\text{m}$; perianth wall cells with high papillae; leaves usually strongly falcate; ocellus-like basal cells usually present (1 or 2 per leaf lobe); epiphyllous or epiphloeodic *C. tenella*

As pointed out by Pócs (1993), *Cololejeunea magillii* Pócs, which is known from the Comoro Islands, is similar to *C. platyneura*. However, the former differs in its hyaline papilla which is situated on the inner surface of base of the first tooth of the leaf lobule.

Pócs (1975) compared *Cololejeunea platyneura* with *C. elegans* Steph. The latter lacks a vitta-like area, has large papillae on dorsal side of leaf lobe, a 1-celled stylus, a dental hyaline papilla, and large leaf lobules (with 7–16 free marginal cells). Tixier's (1985) illustration of *C. elegans* may not be correct, because a distinct vitta-like area was illustrated.

Pócs (1975) placed *Cololejeunea platyneura* in the subgenus *Taeniolejeunea* (Zwickel) Benedix. However, we think it belongs to the subgenus *Cololejeunea* because of its large leaf cells, inflated perianths with 4–5 keels, and absence of a stylus and true ocelli.

Cololejeunea platyneura is a pantropical epiphyllous species, and the total range is shown in Fig. 2. Yanjiang (ca. 25°N , 98°E), China is the northernmost locality for this species. Though widely distributed in Africa (Grolle 1995, Wigginton et al. 1996), it seems to be rare in Asia. Only the two Chinese specimens cited below were available for examination.

Selected specimens examined. — **Brazil.** Bombonna, Spruce s.n. (MANCH-18836). **China.** Yunnan, Daweishan Nature Reserve, 1 800 m, *Zhu 88020b* (HSNU); Yingjiang County, Tongbiguan Commune, *Wang 82477* (HSNU, PC). **Vietnam.** Ninh Binh, parc de Cuc Phuong, 400 m, 18.XII.1965, *T. Pócs & N. Bich 3040* (labeled as type of *Cololejeunea bichiana*, PC). **Zaire.** Prov. Kivu. Kahuzi-Biega Nat. Park, Mt. Biega, secondary montane forest dominated by Loc. 139 Macaranga, 2 250–2 270 m alt., *E. Fischer 8504* (PC).

Additional specimens examined. — *Cololejeunea tenella*: **Cambodia.** Sré Ambel, epiphyllous in forêt dégradée, 19.IV.1968, *Tixier 3713-3714-3715* (FH). **China.** Anhui, Qimen, 400 m, *Zhao 12* (HSNU). Fujian, Nanping, *Gao*

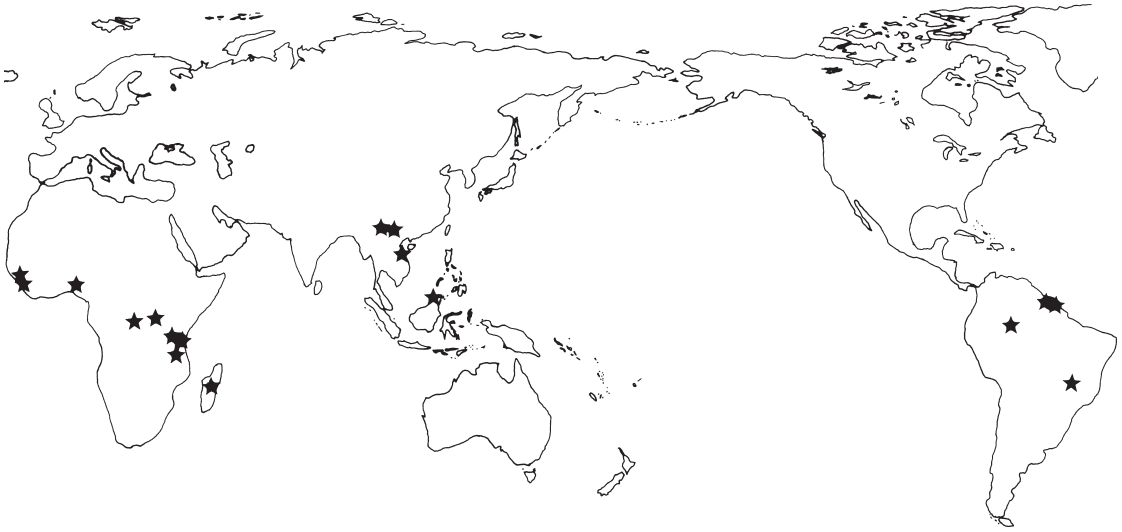


Fig. 2. Distribution of *Cololejeunea platyneura* (Spruce) A. Evans. Modified from Tixier (1994).

25449 (HSNU, IFP). Hainan, Wuzhishan, 850 m, *Li 4494* (HSNU, SHM). Yunnan, Daweishan Nature Reserve, 1 800 m, *Zhu 88017* (HSNU). Zhejiang, Baishanzu Nature Reserve, 710 m, *Zhu 90679* (HSNU). **Indonesia**. Java, G. Salak, 800 m, *Schiffner 3328* (holotype, JE). **Sri Lanka**. Galle dist., ca. 1 500 m, 19. VIII. 1977, *Onraedt 77.L.4723* (Herb. Onraedt). — *Cololejeunea elegans*: **Cameroon**. Bomana, 670 m, 18.XII.1890, *P. Dusén 133* (holotype, G-026522).

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