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Notes on the distribution of and the occurrence of asymmetrical underleaves associated with left-right symmetry in *Mastigolejeunea virens* (Ångstr.) Steph. (Lejeuneaceae).

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Mastigolejeunea (Spruce 1884: 100) Stephani (1889: 257) is a pantropical genus with 16 extant species (Sukkharak & Gradstein 2014a). The centre of diversity is Southeast Asia with 10 species occurring in the region. This genus is very similar to *Thysananthus* Lindenb. in Lehmann (1844: 24) and the two genera can be separated by the presence of an entire perianth in *Mastigolejeunea* and toothed in *Thysananthus* (Sukkharak 2014; Sukkharak & Gradstein 2014a). Three species, *M. humilis* (Gottsche in Gottsche *et al.* 1845: 299) Schiffner (1893: 129), *M. indica* Stephani (1912: 776) and *M. repleta* (Taylor 1846: 392) Evans (1902: 131), have so far been reported in China (He 1997; Mizutani 1986; Piippo 1990). In the course of our studies on Chinese Ptychanthoideae Mizutani (1961: 146), we found a new record of *M. virens* (Ångström 1873: 131) Stephani (1912: 776) for the ptychanthoid flora of China. *Mastigolejeunea virens* has been reported from Australia, Indomalesia, Seychelles and the tropical Pacific region (Sukkharak & Gradstein 2014a). We report the species here for Hainan, China, which is its northernmost locality. In addition, we newly report the occurrence of asymmetrical underleaves associated with left-right symmetry in *M. virens* based on our study of specimens collected in China and Thailand.

Mastigolejeunea virens was originally described by Ångström (1873) as a member of the genus *Thysananthus* and was transferred to the genus *Mastigolejeunea* by Stephani (1912). The species is characterized by the oblong leaf lobes with obtuse to rounded apex, the 3-keeled perianth and the elongated lobule tooth about 4–6 cells long (Sukkharak & Gradstein 2014a). In addition, the species is characterized by asymmetrically auriculate underleaves, one auricle being larger than the other one; sometimes, the smaller auricle is reduced (Fig. 1). The underleaf asymmetry of *M. virens* most closely resembles that of *M. frauenfeldii* (Reichardt 1866: 958) Verdoorn (1934: 230) (Sukkharak& Gradstein 2014b), being uniform on single shoots and varying among branches in a left-right pattern, the large auricle occurring on the right-hand side on left-hand branches and on the left-hand side on right-hand branches (Fig. 1G, H). However, *M. virens* differs from *M. frauenfeldii* by the occasional absence of one of the auricles. The asymmetrical base of underleaves was already shown in the illustrations of *M. virens* by Mizutani (1986: Fig. 4, n) but has not yet been described.

Left-right symmetry in Lejeuneaceae was first described by Sukkharak & Gradstein (2010). They found that underleaves in several species of *Thysananthus* were adnate to leaves on one side of the stem, on the left side on right-hand branches and on the right side on left-hand branches. Recently, they reported asymmetrically auriculate underleaves associated with left-right symmetry in *Mastigolejeunea frauenfeldii* (Sukkharak& Gradstein 2014b). Underleaf asymmetry associated with left-right symmetry is also seen in *Macrocolura sagittistipula* (Spruce 1884: 304) Schuster (1992: 346) (Grolle & Zhu 2002) and *Spruceanthus mamillilobulus* (Herzog in Nicholson *et al.* 1930: 44) Verdoorn (1936: 447) (Wang *et al*. submitted). In our study we found that the underleaf asymmetry occurs on *Lejeunea*-type branches with lejeuneoid leaf sequence (first lateral leaf is the basiscopic lateral leaf). Interestingly, the leaf sequence of the *Lejeunea*-type branches occurs also in a left-right symmetrical pattern: on right-hand branches the basiscopic lateral leaf is located on the right-hand side of the branch whereas on left-hand branches it is located on the left-hand side. The left-right pattern of the underleaf asymmetry seems thus to be correlated with the left-right symmetry of the leaf sequence of the *Lejeunea*-type branches.

Representative specimens examined: CHINA, Hainan: Qiongzhong Co., Wuzhishan Nature Reserve, on tree trunks, 830 m, 16 Nov. 1977, *D.-K. Li 04524* (SHM). THAILAND, Chiang Mai: DoiLaung Chiang Dao, 19°24’06.20’’N, 98°51’16.54’’E, on tree trunks, 1429 m, 18 Dec. 2011, *R.-L. Zhu 20111218-19C* (HSNU); Chom Thong District, Royal Agricultural Station Inthanon, 18°51’163’’N, 98°51’841’’E, on tree trunks, 1283 m, 20 Dec. 2011, *R.-L. Zhu 20111220-36* (HSNU).

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