



## Notes on Early Land Plants Today. 62. A synopsis of *Myriocoleopsis* (Lejeuneaceae, Marchantiophyta) with special reference to transfer of *Cololejeunea minutissima* to *Myriocoleopsis*

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The segregate of *Myriocoleopsis* was firstly proposed by Schiffner (1944: 234) based on some remarkable characters, such as dimorphic stems, long male spikes, erect leafy axes arising from a creeping stolon and reduced lobules (Gradstein & Vital 1975; Reiner-Drehwald & Gradstein 1995). Hitherto a total of three species are recognized in this genus: *Myriocoleopsis fluviatilis* (Stephani 1895: 248) Reiner & Gradstein (1997: 639) known from Argentina, Brazil and Ecuador (Reiner-Drehwald & Gradstein 1997; Gradstein & da Costa 2003), *M. gymnocolea* Spruce (1884: 296) Reiner & Gradstein (1997: 640) known only from Brazil (Reiner-Drehwald & Gradstein 1997) and *M. vuquangensis* (Pócs & Ninh 2005: 156) Pócs (2010: 124) known only from Vietnam (Pócs 2010). *Myriocoleopsis* shares substantial resemblance with *Cololejeunea* (Spruce 1884: 291) Stephani (1891: 208) (particular subgen. *Protocolea* Schuster (1963: 171)) in the stem structure, absence of underleaves, lobular form, leaf margin, oil bodies and sporophytes (Gradstein & Vital 1975; Schuster 1980; Reiner-Drehwald & Gradstein 1995). Although the rigid stem and large size of *Myriocoleopsis* was also found in some rheophytic taxa of *Cololejeunea* such as subgen. *Chlorolejeunea* Benedix (1953: 81), it had been interpreted as adaption to similar habitats (Reiner-Drehwald & Gradstein 1995).

In spite of above hypotheses proposed based on morphology, a recent molecular study (Yu *et al.* 2013) provided evidence not only of the close relationship between *Myriocoleopsis* and *Cololejeunea* subgen. *Protocolea* that the *C. minutissima* (Smith 1806: 1633) Schiffner (1893: 122) (the type species of *Cololejeunea* subgen. *Protocolea*) and its subspecies *C. minutissima* subsp. *myriocarpa* (Montagne 1842: 473) Schuster (1955: 232) were nested in *Myriocoleopsis* clade, but also of the ecological convergence hypothesis that *Chlorolejeunea* was paraphyletic and resolved in the *Cololejeunea* lineage.

Since both morphological and molecular evidence supported the inclusion of *Cololejeunea minutissima* and its subspecies *C. minutissima* subsp. *myriocarpa* in *Myriocoleopsis*, we suggest that *C. minutissima* and its subspecies *C. minutissima* subsp. *myriocarpa* should be transferred to *Myriocoleopsis*. Therefore, the following new combinations are necessary:

### Formal treatment

The format of this note follows Söderström *et al.* (2012).

***Myriocoleopsis minutissima* (Sm.) R.L.Zhu, Y.Yu & Pócs, *comb. nov.***

Basionym:—*Jungermannia minutissima* Sm. in Sowerby, *Engler. Bot.*: 1633, 1806 (Smith 1806).

Type:—U.K. Hampshire, New Forest, on holly and beech, 1806, *C. Lyell s.n.* (holotype: LINN).

≡ *Lejeunea minutissima* (Sm.) Spreng., *Syst. Nat.* 4(1): 234, 1827 (Sprengel 1827) ≡ *Cololejeunea minutissima* (Sm.) Steph., *Bot. Gaz.*

17: 171, 1892 (Stephani 1892) ≡ *Physocolea minutissima* (Sm.) Steph., *Sp. Hepat.* 5: 914, 1916 (Stephani 1916) ≡ *Aphanolejeunea*

*minutissima* (Sm.) Horik., *J. Sci. Hiroshima Univ. Ser. B, Div. 2*: 283, 1934 (Horikawa 1934).

= *Physocolea orbiculata* Herzog in Handel-Mazzetti, *Symb. Sin.* 5: 56, 1930 (Herzog 1930). Type:—CHINA. Yunnan. Rinde von *Sohoepfia jasminodora* in Schattigen Gräben der wtp st. Im Kateleeria-Walde beim Tempel Djindien-se nächst Yünnanfu. 2050 m, *H. Handel-Mazzetti 13067* (holotype: W).

For further synonyms, see Mizutani (1961), Schuster (1980) and Thiers (1988).

Illustrations (selective):—Mizutani (1961 as *Cololejeunea minutissima*, p. 256, fig. XXXII-25-33), Schuster (1980 as *C. minutissima* ssp. *minutissima*, p. 1250, fig. 758 (1–5)), Zhu (1995 as *Cololejeunea minutissima*, p. 93, fig. 7).

Range:—widespread.

Representative specimens examined:—AUSTRALIA. Northern Territory, Coastal Plain, Howard Springs Nature Park, 25 km ESE of Darwin, 12°27.8'N, 131°04'E, on twigs, 10–20 m, *S. & T. Pócs 01034/A* (EGR). NEW CALEDONIA. Dumbea, maquis sur sol serpentineux corticole, 50 m, 1 August 1986, *Mac Kee 43205* (PC). CHINA. Hainan: Haikou, Crater Park, on trunk of *Ficus*, 130 m, 25 March 2011, *L.-N. Zhang H-008* (HSNU); Hubei: Shennongjia Nature Reserve, 31°32'175"N, 110°20'035", 1734 m, 31 July 2011, *J. Wang 20110731-1* (HSNU); Yunnan: Gongshan, Maji countryside, Dashiluo, epiphyllous, 22 September 2010, *Y. Yu 20100922-11* (HSNU); Xishuangbanna, Banhe, Naban Primary School, on tea branches, 750 m, *T. Cao & G.-Y. Song 060330A* (HSNU). ECUADOR. Imbabura, Laguna Cuicocha bei Cotacachi, lückige Strauchvegetation am Gratweg auf dem östlichen Kraterrand, an Strauch, 3200 m, 23 August 2004, *A. Schäfer-Verwimp et al. 24473* (GOET). FRANCE. Angers, Maine-et-Loire, sur un tronc de tilleul, on tree bark, 1892, no collector (NY). JAPAN. Kiushiu, Hyuge, Obi, 20 m, on the branches of *Rhododendron*, April 1950, *S. Hattori s.n.* (NY as *Cololejeunea orbiculata*). PORTUGAL. Estremadura: Caldas da Rainha, Parque das Temas, 26 January 2013, *C. Sérgio 26.01.2013* (HSNU). THAILAND. Phang Nga, Ao Phang Nga National, in the Phang Nga Bay, 08°24'22.13"N, 98°30'27.71"E, on decaying branches, 0–2 m, 28 January 2007, *S. & T. Pócs 07010/A* (EGR); Chiang Mai, Doi Luang Chiang Dao, camping area, on tree trunk, 19°39'247"N, 99°89'034"E, 2012 m, 19 December 2011, *R.-L. Zhu 20111219-20C* (HSNU). SAMOA. Without detailed collection data. (NY). SPAIN. La Palma, No-Abhang oberhalb Las Lomadas, am Weg zur Casa Dei Monte, Erica arborea vegetation und Laurisilva, an totem Baum, sonnig, 840 m, 28 March 2005, *Schäfer-Verwimp & Verwimp 24798* (GOET). U.K. Wales: Carmarthenshire, Las Fach Lane, on tree trunk by road, 140 m, 13 March 2013, *S. Bosanquet SN251118* (HSNU). U.S.A. Florida: Volusia County, 1988, *W. Buck 16849* (NY). VENEZUELA. Edo Bolivar, Municipio Gran Sabana, Estación Científica Parupa, 05°40.36'N, 61°32.7'W, on the barks, 4 December 2000, *T. Pócs & M. S. Ussher 00221/B* (EGR). YEMEN. Governorate Al Mahra, Jebel Fartak, Ras Fartak NE Khadifud, 15°39'N, 52°12'E, 780 m, epiphytic on *Acokanthera schimperi*, 10 October 2001, *H. Kürschner 01-1415 p.p.* (GOET).

***Myriocoleopsis minutissima* subsp. *myriocarpa* (Nees & Mont.) R.L.Zhu, Y.Yu & Pócs, *comb. nov.***

Basionym:—*Lejeunea myriocarpa* Nees & Mont. in Ramon de la Sagra, *Hist. Fis. Pol. Y Natur. Cuba* 9: 473, 1842 (Montagne 1842)

Type: Lectotype [designated by Reiner-Drehwald (1995)]:—CUBA. “in corticibus et Lichenibus frondosis repens prope S. Marcos” (PC).

≡ *Cololejeunea myriocarpa* (Nees & Mont.) A.Evans., *Bull. Torrey Bot. Club* 38: 256, 1911 (Evans 1911) ≡ *Cololejeunea minutissima* subsp. *myriocarpa* (Nees & Mont.) R.M.Schust., *J. Elisha Mitchell Sci. Soc.* 71: 232, 1955 (Schuster 1955)

= *Physocolea myriantha* Herzog, *Memoranda Soc. Fauna Fl. Fenn.* 27: 102, 1952 (Herzog 1952) ≡ *Cololejeunea myriantha* (Herzog) S.Arnell, *Bot. Notiser.* 106: 164, 1963 (Arnell 1963) ≡ *Cololejeunea minutissima* subsp. *myriantha* (Herzog) R.M.Schust., *J. Elisha Mitchell Sci. Soc.* 71: 232, 1955 (Schuster 1955). Type:—SOUTH AFRICA. Cape: Tafelberg, 600–900 m, 16 April 1922, *L. Rolfes s.n.* (holotype: JE).

For further synonyms, see Schuster (1980), Miller *et al.* (1983), Reiner-Drehwald (1994) and Pócs *et al.* (2014).

Illustrations (selective):—Herzog (1952 as *Physocolea myriantha*, p. 103, fig. 47), Schuster (1980 as *Cololejeunea minutissima* subsp. *myriocarpa*, p. 1248, fig. 757), Reiner-Drehwald (1994, p. 81, fig. 1 as *Cololejeunea minutissima* ssp. *myriocarpa*).

Range:—pantropical.

Representative specimens examined:—AUSTRALIA. Northern Territory, Coastal Plain, Fogg Dam Conservation Reserve, 52 km ESE of Darwin, 12°30'N, 131°17'E, on twigs, 10 m, 16 May 2001, *S. & T. Pócs 01035/C* (EGR). BRAZIL. State of Rio de Janeiro, Mun. Novo Friburgo, ca. 10 km NE of town, on branches of small trees along road, 800 m, 23 July 1996, *S. R. Gradstein 9800* (GEOT). DOMINICAN REPUBLIC. Independencia, ca. 18°15'N, 71°34'W, 1987, *W. Buck 14475* (NY). KENYA. South foothills of Aberdare (Nyandarua) Mts., along Kijabe-Thika

road, on branches, fallen from canopy, 2400 m, 27 January 2003, *M.S. Chuah, T. Pócs & Nairobi University students 03002/R* (EGR). RÉUNION ISLAND. Ravine Divon on the W slope of Piton Mado, 21°03'47"S, 55°21'59"E, or rocky cliff, 1740–1750 m, 17 September 2008, *T. Pócs 08070/G* (EGR); Cap Méchant on the S coast, near Basse Vallée, 21°22'26.1"S, 55°42'41.3"E, on *Pandanus* stem, 8 September 2008, *T. Pócs 08057/A* (EGR). SINGAPORE. Sungei Buloh Nature Park, Mature mangrove forest, “back mangrove”, on tree branch, 11 Nov. 1998, *A. Juslén 625* (SINU). U.S.A. Florida, Jackson County, Black Spring, swamp forest, 1988, *W. Buck 16660* (NY).

Notes:—With the present transfer, *Myriocoleopsis* is recognized by the combination of a set of morphological characters: 1) absence of underleaves, 2) copious branching in ramicolous conditions with horizontal “rhizomes” and upright branches, 3) thin-walled and smooth leaf cells, 4) ovate to oblong leaf lobules usually strongly reduced or to a flat fold along the dorsal margin of the leaf, without a real keel, 5) crenulate leaf margin, 6) stem in transverse section with 5–30 cortical cells, and 7) gynoeical innovations repeatedly floriferous with very abundant, inflated perianths sometimes with an elongated neck.

At present *Myriocoleopsis* comprises four known species and one subspecies, which can be keyed out in the following key\*.

- |    |  |   |
|----|--|---|
| 1. | Rhizome-like shoot usually present, leaf margin entire to slightly crenulate; male bracts usually 6–30 pairs; usually rheophytic.. | 2   |
| 1. | Rhizome-like shoot absent; leaf margin crenulate; male bracts 2–8 pairs; epiphytic .....   | 4   |
| 2. | Creeping stem with 5 cortical cells; known from Argentina, Brazil and Ecuador .....  | <i>M. gymnocolea</i>                            |
| 2. | Creeping stem with over 8 cortical cells .....   | 3   |
| 3. | Creeping stem with 8–12 cortical cells; leaf lobules usually distinct; known from Vietnam .....                                    | <i>M. vuquangensis</i>                          |
| 3. | Creeping stem with 10–20 cortical cells; leaf lobules usually indistinct; known from Brazil .....                                  | <i>M. fluviatilis</i>                           |
| 4. | Leaf lobules absent or strongly reduced .....  | <i>M. minutissima</i> subsp. <i>myriocarpa</i>  |
| 4. | Leaf lobules mostly well developed .....   | <i>M. minutissima</i> subsp. <i>minutissima</i> |

\**Cololejeunea conchifolia* (Gottsche 1864: 163) Gradstein (Gradstein & Hekking 1979: 109), *C. dauphinii* Zhu (2006: 277), *C. disciflora* Tixier (1979: 604), *C. minutissima* subsp. *utriculifera* Vanden Berghen (1961: 55), and *C. chuahiana* Pócs (2002: 11), are all poorly known species, and may belong to *Myriocoleopsis* (Pócs *et al.* 2014). The exact status of these taxa is unclear owing to the lack of molecular data.

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