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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 *Myricoleopsis* and *Cololejeunea* subg. *Protocolea* that the *C. minutissima* (Smith 1806: 1633) Schiffner (1893: 122) (the type species of *Cololejeunea* subg. *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*

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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 Scientífica 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, 15º39′N, 52º12′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. Independenica, 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 Maido, 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) gynoecial 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..... *M. gymnocolea*
2. Creeping stem with over 8 cortical cells 3
3. Creeping stem with 8−12 cortical cells; leaf loblues ussually distinct; known from Vietnam .....*M. vuquangensis*
3. Creeping stem with 10−20 cortical cells; leaf loblues ussually indistinct; known from Brazil..... *M. fluviatilis*
4. Leaf lobules absent or strongly reduced..... *M. minutissima* subsp. *myriocarpa*
4. Leaf lobules mostly well developed.....*M. minutissima* subsp. *minutissima*

**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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