



Notes on Early Land Plants Today. 13. New names and synonyms in *Diplophyllum* (Scapaniaceae, Marchantiophyta)

JIŘÍ VÁŇA¹, LARS SÖDERSTRÖM^{2,4}, ANDERS HAGBORG³ & MATT VON KONRAT³

¹Department of Botany, Charles University, Benátská 2, CZ-12801 Praha 2, Czech Republic; email: vana@natur.cuni.cz

²Department of Biology, Norwegian University of Science and Technology, N-7491 Trondheim, Norway; lars.soderstrom@bio.ntnu.no

³Department of Botany, The Field Museum, 1400 South Lake Shore Drive, Chicago, IL 60605–2496, USA; hagborg@pobox.com, mvonkonrat@fieldmuseum.org

⁴Author for correspondence

Schuster (1974, 2002) classified the genus *Diplophyllum* Dumortier (1835: 15) into four subgenera, subgen. *Diplophyllum*, subgen. *Macrodipllophyllum* Buch (1928: 29), subgen. *Austrodipllophyllum* Schuster (1968: 18) and subgen. *Protodipllophyllum* Schuster (1974: 192). Subgenus *Macrodipllophyllum* was shown by Vilnet *et al.* (2011) and Hentschel *et al.* (2012) to be heterogeneous. Of the three species assigned to it, two species nest with *Douinia* Buch (1928: 13) and the other is basal to *Scapania* (Dumortier 1831: 38) Dumortier (1835: 14). Of the three remaining subgenera, subgen. *Austrodipllophyllum* seems to differ most from the rest while subgen. *Diplophyllum* and subgen. *Protodipllophyllum* do not differ in the same degree. The main differences between the latter are in the stem cortex (sharply defined vs. ill defined) and the conspicuous vitta vs. not conspicuous. We therefore think subgen. *Protodipllophyllum* is better treated as a section under subgenus *Diplophyllum*.

The complex of paroicous species of the genus has not been treated consistently by various authors. Three years after the description of the first paroicous species from the Southern Hemisphere (*Jungermannia domestica* from Australia), Mitten (1860) presented the opinion that it is inseparable from the Holarctic *Diplophyllum obtusifolium* (Hooker 1816: 26) Dumortier (1835: 16). Hodgson (1965) treated *Diplophyllum domesticum* as a synonym of *Diplophyllum obtusifolium* and this has been followed by some Australian and New Zealand authors (e.g. Scott 1985).

Arnell (1953), describing *Diplophyllum marionense*, overlooked the existence of two other known paroicous subantarctic taxa of *Diplophyllum*. Four years later he (Arnell 1957) considered *Diplophyllum marionense* to be a synonym of the South American *Diplophyllum acutilobum* (erroneously transcribed as *D. acutifolium*), but this opinion was not followed by other authors.

In several publications, Schuster argues about the identity of *D. obtusifolium*, *D. domesticum*, *D. acutilobum* and *D. marionense*. Schuster (1963) accepted *D. domesticum* as a separate species being “very like” *D. obtusifolium*, but “differing primarily in being freely gemmiparous”; *D. marionense* (here as *D. randii*) “must be the same” as *D. domesticum*. However, Schuster (1968) regarded “the arbitrary synonymy” proposed in Hodgson (1965) “as inadequately founded”; he (l.c.) kept *D. domesticum* as separate and discussed the question of gemmae production. Schuster (1974) wrote about *D. domesticum*, *D. acutilobum* and *D. marionense* that they “appear nearly identical to *D. obtusifolium*”. However, he (l.c.) also wrote that “species limits in the *D. obtusifolium-domesticum-acutilobum* complex are ill defined” and finally (l.c.) he considered the synonymization of *D. obtusifolium* and *D. domesticum* as “clearly premature”. Grolle (1971a) also wrote that the relationship of the subantarctic paroicous *Diplophyllum* taxa (i.e. *D. marionense*, *D. acutilobum* and *D. domesticum* in this time) and *D. obtusifolium* should be clarified; however, he used Arnell’s name *D. marionense* for Marion I. populations (also used in Grolle 2002).

In contrast to these opinions, Engel & Merrill (1998) enlarged this critical group from four to nine species by describing five new taxa from Australasia: *D. novum* Engel & Merrill (1998: 274), *D. gemmiparum* Engel & Merrill (1998: 255) from New Zealand and *D. angustifolium* Engel & Merrill (1998: 262), *D. androgynum* Engel & Merrill (1998: 277), and *D. incrassatum* Engel & Merrill (1998: 265) from Tasmania. The first two species, as well as *D. domesticum*, were accepted as separate species in the New Zealand flora by Engel & Glenn (2008). Schuster (2002), the only author who has discussed the newly described taxa in relation to the earlier known taxa of this complex, considers “the criteria separating them [the newly described taxa], taken from the Engel & Merrill key, fail to be wholly convincing”. He had problems separating e.g. *D. domesticum* from *D. novum*, and *D. marionense* from *D. angustifolium*. About *D. acutifolium*, *D. domesticum* and *D. obtusifolium* (*D. marionense* was not taken into consideration at this time) Schuster (2002) wrote that they are “so close that subspecies treatment may prove necessary”. Finally, Schuster (2002) stated that the entire complex needs critical study; it is possible that some of these taxa are synonymous. However, while expressing some doubts about the taxonomic concept of this group, Schuster did not change the specific status of any of the species. None of the newly described species have been restudied by us and they are not discussed further here.

After examining type specimens of *D. domesticum*, *D. acutilobum* and *D. marionense* and some other available specimens especially from southern South America and Marion Island we find no reliable differences between the taxa. *D. marionense* is for example described (in Schuster 2002) as pale green, with almost smooth cell surfaces (see also Arnell 1953), plants are “superfertile”, androecium forming a “compact tube”, whereas other specimens from Marion I. are deeply brown, with rather coarsely papillose surfaces of the leaf cells, with fertile plants not so common and androecia not compact etc. Similarly the type of *D. acutilobum* is green and has almost smooth cell surface, but some other specimens from Patagonia are tinged with red and have coarsely papillose leaf cell surfaces like many populations of *D. domesticum*. Gemma production, used by Schuster in his discussion, was not characteristic, as already stated by Hodgson (1965). For other examples see Paton (1999) and Damsholt (2002) who describe gemmae production of European plants.

However, subantarctic populations (*D. obtusifolium* subsp. *domesticum*) differ from *D. obtusifolium* subsp. *obtusifolium* in the form of the leaf lobes (narrower, commonly falcate and squarrose, with mostly acute to apiculate, rarely rounded apex), orientation of the dorsal lobe (spread at ca 45° in subsp. *domesticum*, suberect in subsp. *obtusifolium*), usually closely spinulose ventral leaf bases and perianth mouth cilia (longer teeth in subsp. *domesticum*, 2-3-celled cilia in subsp. *obtusifolium*). Moreover, subantarctic populations (subsp. *domesticum*) commonly produce male and female gametangia on subfloral innovations, whereas in holarctic populations (subsp. *obtusifolium*) subfloral innovations are mostly sterile or produce only androecia (plants are heteroicous). On the above mentioned facts and geographic separations, the subantarctic populations are here classified at the subspecific level under *D. obtusifolium*.

Formal treatment

The format of this note follows what is outlined in Söderström *et al.* (2012).

Diplophyllum sect. *Protodiplophyllum* (R.M.Schust.) Váňa et L.Söderstr., *comb. et stat. nov.*

Basionym:—*Diplophyllum* subgen. *Protodiplophyllum* R.M.Schust., *Hepat. Anthocerotae N. Amer.* 3: 192, 1974 (Schuster 1974).

Type:—*Diplophyllum obtusifolium* (Hook.) Dumort.

Diplophyllum (sect. *Protodiplophyllum*) *obtusifolium* (Hook.) Dumort. subsp. *domesticum* (Gottsche) Váňa, *comb. et stat. nov.*

Basionym:—*Jungermannia domestica* Gottsche, *Linnaea* 28: 548, 1856 [1857] (Gottsche 1857).

Lectotype (Stephani 1910):—AUSTRALIA. New South Wales: in Bogang Range, 1855, *F. Müller s.n.* (G-264232!).

- ≡ *Diplophyllum domesticum* (Gottsche) Steph., *Hedwigia* 33: 6, 1894 (Stephani 1894).
- = *Diplophyllum acutilobum* Steph., *Kungl. Svenska Vet.-Akad. Handl.* 46(9): 83, 1911 (Stephani 1911), **syn. nov.**
Type:—CHILE. Magallanes: Tierra del Fuego, W end of Lago Fagnano, 1908, *Halle et Skottsberg s.n.* (holotype S, isotypes G-60871! [=G-18332]¹, UPS!).
- = *Diplophyllum marionense* S.W. Arnell, *Svensk Bot. Tidskr.* 47: 415, 1953 (Arnell 1953), **syn. nov.**
Holotype:—MARION I. Between Station and Skau Ridge, 19 April 1952, *R.W. Rand* 3782 (BOL!).
- = *Diplophyllum randii* S.W. Arnell ex R.M.Schust., *J. Hattori Bot. Lab.* 26: 272, 1963 (Schuster 1963) **nom. inval.** (Art. 32.1.d; no description), **syn. of** *D. marionense* in Engel & Glenny (2008).

References

- Arnell, S. (1953) List of Hepaticae collected in Marion Island by Mr. R. W. Rand Dec. 1951–April 1952. *Svensk Botanisk Tidskrift* 47: 411–425.
- Buch, H. (1928) Die *Scapanien* Nordeuropas und Sibiriens - Systematischer Teil. *Commentationes Biologicae. [Societas Scientiarum Fennica]* 3: 1–177.
- Dumortier, B.C. (1831) *Sylloge Jungermannidearum Europae indigenarum, earum genera et species systematice complectens*. J. Casterman, Tournay, 100 pp. <http://dx.doi.org/10.5962/bhl.title.22343>
- Dumortier, B.C. (1835) *Recueil d'Observations sur les Jungermanniacées. I. Révision des genres*. J.-A. Blanquart, Tournay, 27 pp.
- Engel, J.J. & Glenny, D. (2008) *A flora of the liverworts and hornworts of New Zealand, Volume 1*. Missouri Botanical Garden, St. Louis, 897 pp.
- Gottsche, C.M. (1857 “1856”) *Plantae Muellerianae: Hepaticae Australiae a Dre. Ferd. Müller lectae*. *Linnaea* 28: 547–561.
- Heinrichs, J., Bombosch, A., Feldberg, K., Kreier, H.-P., Hentschel, J., Eckstein, J., Long, D., Zhu, R.-L., Schäfer-Verwimp, A., Schmidt, A.R., Shaw, B., Shaw, A.J. & Váňa, J. (2012) A phylogeny of the northern temperate leafy liverwort genus *Scapania* (Scapaniaceae, Jungermanniales). *Molecular Phylogenetics and Evolution* 62: 973–985. <http://dx.doi.org/10.1016/j.ympev.2011.11.029>
- Hooker, W.J. (1816) *British Jungermanniae: being a history and description, with figures, of each species of the genus, and microscopical analysis of the parts, vol. 20-22*. Longmans, London, pp. 77–84.
- Schuster, R.M. (1963) Studies on antipodal Hepaticae I. Annotated key to the genera of antipodal Hepaticae with special reference to New Zealand and Tasmania. *Journal of the Hattori Botanical Laboratory* 26: 185–309.
- Schuster, R.M. (1968) Studies on Antipodal Hepaticae X. Subantarctic Scapaniaceae, Balantiopsidaceae and Schistochilaceae. *Bulletin of the National Science Museum, Tokyo. Series B, Botany* 11: 13–31.
- Schuster, R.M. (1974) *The Hepaticae and Anthocerotae of North America. vol. III*. Columbia University Press, New York, 880 pp.
- Schuster, R.M. (2002) Austral Hepaticae, part II. *Beihefte zur Nova Hedwigia* 119: 1–606.
- Söderström, L., Hagborg, A. & von Konrat, M. (2012) Notes on Early Land Plants Today. *Phytotaxa* 65: 41–42.
- Stephani, F. (1894) Hepaticarum species novae V. *Hedwigia* 33: 1–10.
- Stephani, F. (1910) *Species Hepaticarum* 4. George & Cie: Genève & Bale, pp. 97–464.
- Stephani, F. (1911) Botanische Ergebnisse der schwedischen Expedition nach Patagonien und dem Feuerlande 1907–1909. II. Die Lebermoose. *Kungliga Svenska Vetenskapsakademiens Handlingar, ny följd* 46 (9): 1–92.
- Vilnet, A.A., Konstantinova, N.A. & Troitsky, A.V. (2011 “2010”) Molecular insight on phylogeny and systematics of the Lophoziaceae, Scapaniaceae, Gymnomitriaceae and Jungermanniaceae. *Arctoa* 19: 31–50.

1. Citation of specimens in G should preferably use the barcode (M. Price, pers. comm.) but for comparability the numbers printed on the specimen, which have often been cited by previous authors, are also given here in square brackets.