



Lectotypification of the spikemosses *Selaginella denticulata* and *S. ornithopodioides* (Selaginellaceae, Lycopsidea)

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Abstract

The typification of the names *Selaginella denticulata* (L.) Spring (\equiv *Lycopodium denticulatum* L.) and *S. ornithopodioides* (L.) Spring (\equiv *L. ornithopodioides* L.) (Selaginellaceae) is discussed. A specimen at LINN is designated as the lectotype of *S. denticulata*, and a specimen at BM is designated as the second-step lectotype of the name *S. ornithopodioides*.

Key words: Lectotype, Linnaeus, *Lycopodium*, nomenclature, Selaginellaceae.

Introduction

Selaginella Palisot-Beauvois (1804: 478) (Selaginellaceae) is a highly diversified genus of lycopodes including about 700 species with a long phylogenetic history dating back to the Carboniferous Period (Jermy 1986, 1990; Raubeson *et al.* 1992; Kenrick & Crane 1997; Thomas, 1997; Judd *et al.* 1999; Korall & Kenrick, 2002, 2004; Banks 2009, Banks *et al.* 2011). *Selaginella* has a cosmopolitan distribution with species adapted to very different ecological conditions but with the greatest diversity located in the tropics (Judd *et al.* 1999; Korall & Kenrick, 2002; Banks 2009). Most show delicate dichotomously branching stems and minute leaves in ranks of two distinct sizes (Jermy 1990). The sporophytes vary greatly in size, with the larger ones reaching 50 cm long or more (Tryon & Tryon 1982). *Selaginella* is heterosporous (micro- and megaspores formed in the respective micro- and megasporangiums), with the male and female gametophytes extremely reduced. Recently, the study of its genome has illuminated some crucial steps in the evolution of vascular plants (Banks *et al.* 2011). *Selaginella* has been used in traditional medicine around the world and new active compounds have been recently identified (Banks 2009).

Selaginella denticulata (L.) Spring (1838: 149), grows on wet and shadow habitats in the Mediterranean basin (specially in the western Mediterranean) and adjacent Atlantic regions, being considered a not threatened species (Daoud-Bouattur *et al.* 2010). *Selaginella ornithopodioides* (L.) Spring (1838: 216) seems endemic of Sri Lanka where it grows at low elevations marshy places in the wetter part of the island (Alston 1945; Chandra *et al.* 2008) being considered a threatened species.

From a nomenclatural standpoint *S. denticulata* has not been previously typified (Jarvis 2007: 647) and for *S. ornithopodioides* although previously typified (Alston 1945: 222) a second-step lectotypification is proposed. This paper proposes the designation of the lectotypes for these two names based on the protologues and consultation of Linnaeus's original material.

Typification

Selaginella denticulata (L.) Spring (1838: 149)

The *nomen specificum legitimum* in the Linnaean protologue (1753: 1106) “*Lycopodium foliis bifariis: superficialibus imbricatis, surculis repentibus, floribus sparsis*” (*Lycopodium* leaves of two types: superficial overlapping, creeping

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References

- Alston, A.H.G. (1945) An enumeration of the Indian species of *Selaginella*. *Proceedings of the Indian National Science Academy* 11: 211–235.
- Banks, J.A. (2009) *Selaginella* and 400 million years of separation. *Annual Review of Plant Biology* 60: 223–238.
<http://dx.doi.org/10.1146/annurev.arplant.59.032607.092851>
- Banks, J.A., Nishiyama, T., Hasebe, M., Bowman, J.L., Bribosko, M., Depamphilis, C., Albert, V.A., Aono, N., Aoyama, T., Ambrose, B.A., Ashton, N.W., Axtell, M.J., Barker, E., Barker, M.S., Bennetzen, J.L., Bonawitz, N.D., Chapple, C., Cheng, C., Correa, L.G., Dacre, M., DeBarry, J., Dreyer, I., Elias, M., Engstrom, E.M., Estelle, M., Feng, L., Finet, C., Floyd, S.K., Frommer, W.B., Fujita, T., Gramzow, L., Gutensohn, M., Harholt, J., Hattori, M., Heyl, A., Hirai, T., Hiwatashi, Y., Ishikawa, M., Iwata, M., Karol, K.G., Koehler, B., Kolukisaoglu, U., Kubo, M., Kurata, T., Lalonde, S., Li, K., Li, Y., Litt, A., Lyons, E., Manning, G., Maruyama, T., Michael, T.P., Mikami, K., Miyazaki, S., Morinaga, S., Murata, T., Mueller-Roeber, B., Nelson, D.R., Obara, M., Oguri, Y., Olmstead, R.G., Onodera, N., Petersen, B.L., Pils, B., Prigge, M., Rensing, S.A., Riaño-Pachón, D.M., Roberts, A.W., Sato, Y., Scheller, H.V., Schulz, B., Schulz, C., Shakirov, E.V., Shibagaki, N., Shinohara, N., Shippen, D.E., Sørensen, I., Sotooka, R., Sugimoto, N., Sugita, M., Sumikawa, N., Tanurdzic, M., Theissen, G., Ulvskov, P., Wakazuki, S., Weng, J.K., Willats, W.W., Wipf, D., Wolf, P.G., Yang, L., Zimmer, A.D., Zhu, Q., Mitros, T., Hellsten, U., Loqué, D., Otiillar, R., Salamov, A., Schmutz, J., Shapiro, H., Lindquist, E., Lucas, S., Rokhsar, D. & Grigoriev, I.V. (2011) The *Selaginella* genome identifies genetic changes associated with the evolution of vascular plants. *Science* 332: 960–963.
<http://dx.doi.org/10.1126/science.1203810>
- Bauhin, C. (1623) *Pinax theatri botanici*. L. König, Basel, 522 pp.
<http://dx.doi.org/10.5962/bhl.title.712>
- Chandra, S., Fraser-Jenkins, C.R., Kumari, A. & Srivastava, A. (2008) A summary of the status of threatened Pteridophytes of India. *Taiwania* 53: 170–209.
- Clusius, C. (1601) *Rariorum plantarum Historia, et Appendix ad Historiam plantarum*. C. Plantini. Antwerpen, 364 pp.
- Daoud-Battour, A., Gammar-Grabi, Z., Limam-Ben Saad, S. & Muller, S.D. (2010) *Selaginella denticulata*. The IUCN Red List of Threatened Species. Version 2014.2. Available from: <http://www.iucnredlist.org> (accessed 6 October 2014).
- Dillenius, J.J. (1742) *Historia Muscorum*. Sheldon, Oxford, 576 pp.
- Hermann, P. (1698) *Paradisus batavus*. A. Elzevier's widow, Leiden, 247 pp.
- Jarvis, C. (2007) *Order out of chaos: Linnaean plant names and their types*. Linnean Society of London and the Natural History Museum, London, 1016 pp.
- Jermey, A. (1986) Subgeneric names in *Selaginella*. *Fern Gazette* 13: 117–118.
- Jermey, A. (1990) *Selaginellaceae*. In: Kramer, K. & Green, P. (Eds.) *The families and genera of vascular plants. Vol. 1. Pteridophytes and Gymnosperms*. Springer, Berlin, 404 pp.
- Judd, W.S., Campbell, C.S., Kellogg, E.A. & Stevens, P.F. (1999) *Plant Systematics: A phylogenetic approach*. Sinauer Associates, Sunderland, 620 pp.
- Kenrick, P. & Crane, P.R. (1997) The origin and early evolution of plants on land. *Nature* 389: 33–39.
<http://dx.doi.org/10.1038/37918>
- Korall, P. & Kenrick, P. (2002) Phylogenetic relationships in Selaginellaceae based on *rbcL* sequences. *American Journal of Botany* 89: 506–517.
<http://dx.doi.org/10.3732/ajb.89.3.506>
- Korall, P. & Kenrick, P. (2004) The phylogenetic history of Selaginellaceae based on DNA sequences from the plastid and nucleus: extreme substitution rates and rate heterogeneity. *Molecular Phylogenetics and Evolution* 31: 852–864.
<http://dx.doi.org/10.1016/j.ympev.2003.10.014>
- Linnaeus, C. (1747) *Flora Zeylanica*. L.Salvius, Stockholm, 311 pp.
- Linnaeus, C. (1753) *Species Plantarum*. L.Salvius, Stockholm, 1200 pp.
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J. (Eds.) (2012) *International Code of Nomenclature for*

- algae, fungi, and plants (Melbourne Code)*. Regnum Vegetabile 154. Königstein: Koeltz Scientific Books, 240 pp.
- Ooststroom, S.J. van (1937) Hermann's collection of Ceylon plants in the Rijksherbarium (National herbarium) at Leyden. *Blumea* 1 (Supplement): 193–209.
- Palisot-Beauvois, A.M.F.J. (1804) Suite de l'Aethéogamie. *Magasin Encyclopédique* 9 (5): 472–483.
- Raubeson, L.A. & Jansen, R.K. (1992) Chloroplast DNA evidence on the ancient evolutionary split in vascular land plants. *Science* 255: 1697–1699.
<http://dx.doi.org/10.1126/science.255.5052.1697>
- Ray, J. (1704) *Historia plantarum generalis. Tomus tertius*. S. Smith & B. Walford, London, 913 pp.
- Simpson, M.G. (2006) *Plant Systematics*. Elsevier Academic Press, Burlington/San Diego/London, 590 pp.
- Spring, A.F. (1838) Beiträge zur Kenntniss der Lycopodien. *Flora* 21 (1): 145–158, 161–175, 177–191, 193–206, 209–222.
- Thomas, B.A. (1997) Upper Carboniferous herbaceous lycopsids. *Review of Palaeobotany and Palynology* 95: 129–153.
[http://dx.doi.org/10.1016/S0034-6667\(96\)00032-2](http://dx.doi.org/10.1016/S0034-6667(96)00032-2)
- Trimen, H. (1887) Hermann's Ceylon herbarium and Linnaeus's Flora Zeylanica. *The Journal of the Linnean Society. Botany* 24: 129–155.
- Tryon, R.M. & Tryon, A.F. (1982) *Ferns and Allied Plants with Special Reference to Tropical America*. Springer, Berlin/Heidelberg/New York, 857 pp.
<http://dx.doi.org/10.1007/978-1-4613-8162-4>