



Elucidating the controversial *Drosera montana* complex (Droseraceae): a taxonomic revision

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Abstract

The species of the affinity of *Drosera montana* (Droseraceae) are reviewed taxonomically and the complex is redefined to include only *D. montana*, *D. tentaculata*, *D. tomentosa* var. *tomentosa*, *D. tomentosa* var. *glabrata*, and *D. spirocalyx*. The latter is a newly described narrow endemic species from the Serra do Cipó in central Minas Gerais state, Brazil. The morphological characters distinguishing these five taxa from each other and from other similar species are discussed together with habitat and ecological information. Detailed illustrations, photographs, distribution maps and an identification key are provided. A lectotype for *D. tomentosa* is here designated.

Keywords: Brazil, carnivorous plants, *Drosera tentaculata*, *Drosera tomentosa*, *Drosera tomentosa* var. *glabrata*, *Drosera spirocalyx*, ecology, morphology, new species, lectotypification, taxonomy

Resumo

As espécies do complexo *Drosera montana* (Droseraceae) são revistas taxonomicamente e o complexo é redefinido, passando a incluir apenas *D. montana*, *D. tentaculata*, *D. tomentosa* var. *tomentosa*, *D. tomentosa* var. *glabrata* e *D. spirocalyx*. A última é uma espécie aqui descrita pela primeira vez, sendo endêmica da Serra do Cipó, região central de Minas Gerais, Brasil. Os caracteres morfológicos distinguindo estes cinco táxons entre si e de outras espécies similares são discutidos junto a informações sobre habitat e ecologia. Ilustrações detalhadas, fotografias, mapas de distribuição e uma chave são apresentados. Um lectótipo de *D. tomentosa* é aqui designado.

Palavras-chave: Brasil, *Drosera tentaculata*, *Drosera tomentosa*, *Drosera tomentosa* var. *glabrata*, *Drosera spirocalyx*, ecologia, morfologia, novas espécies, lectotipificação, plantas carnívoras, taxonomia

Introduction

The species complex of the *Drosera montana* Saint-Hilaire (1826: 260) affinity currently comprises a confusing list of 16 names proposed over nearly 200 years of taxonomic research on the genus *Drosera* in Brazil. This was initiated by the French naturalist Auguste de Saint-Hilaire (1824, 1826) who described the first Brazilian *Drosera* taxa. Since then, most botanists have applied a rather expansive taxonomic circumscription of *D. montana*, resulting in a classification that synonymized under this taxon several previously segregated species (e.g. Diels 1906, Correa & Silva 2005). The history of taxa associated with the *D. montana* complex is summarized below:

- Saint-Hilaire (1826) described *D. montana*, *D. parvifolia* Saint-Hilaire (1826: 263), *D. tomentosa* Saint-Hilaire (1826: 261) var. *tomentosa*, *D. tomentosa* var. *glabrata* Saint-Hilaire (1826: 262), *D. hirtella* Saint-Hilaire (1826: 262) var. *hirtella*, and *D. hirtella* var. *lutescens* Saint-Hilaire (1826: 263), together with six other *Drosera* taxa of different affinities (see Gonella *et al.* 2012, 2014).

References

- Brako, L. & Zaruchi, J.L. (1993) Catalogue of the flowering plants and gymnosperms of Peru. *Monographs in Systematic Botany from the Missouri Botanical Garden* 45: 1–1286.
- Brummer-Dinger, C.H. (1955) Notes on Guiana Droseraceae. *Acta Botanica Neerlandica* 4(1): 136–138.
<http://dx.doi.org/10.1111/j.1438-8677.1955.tb00321.x>
- Chodat, R. (1903) Droseraceae. In: Chodat, R. & Hassler, E. (eds.) *Plantae Hasslerianae* soit énumération des plantes récoltées au Paraguay. *Bulletin de l'Herbier Boissier* II(3): 538–552.
<http://dx.doi.org/10.5962/bhl.title.45112>
- Correa A., M.D. & Silva, T.R.S. (2005) *Drosera* (Droseraceae). *Flora Neotropica Monograph* 96. The New York Botanical Garden Press, Bronx, NY, 65 pp.
- Correa A., M.D. & Taylor, B. (1977) Flora of Panama: V. Family 76A. Droseraceae. *Annals of the Missouri Botanical Garden* 63: 389–392.
<http://dx.doi.org/10.2307/2395279>
- Diels, L. (1906) Droseraceae. In: A. Engler. (ed.) *Das Pflanzenreich* IV.112 (Heft 26). W. Engelmann, Leipzig, pp 1–136.
- Diels, L. (1914) Droseraceae. In: Pilger, R (ed.), *Plantae Uleanae novae vel minus cognitae* 1: 136. Botanischer Garten und Botanisches Museum, Berlin-Dahlem.
- Duno de Stefano, R. & Silva, T.R.S. (2001) Conservation status of the carnivorous plant genus *Drosera* in South America and the Caribbean. *Harvard Papers in Botany* 6: 253–260.
- Eichler, A.G. (1872) Droseraceae. In: Martius, C.F.P. von & Eichler, A.G. (eds.) *Flora Brasiliensis* 14(2). Typographia Regia, München, pp. 385–398.
- ESRI (2011) *ArcGIS Desktop: Release 10. Redlands, CA: Environmental Systems Research Institute.*
- Fernández-Pérez, A. (1965) Plantas Insectívoras, II Droseraceae de Colombia. *Caldasia* 11: 219–232.
- Ferrero, R. & Mello-Silva, R. (2011) Droseraceae do Parque Estadual do Ibitipoca, Minas Gerais, Brasil. *Boletim de Botânica da Universidade de São Paulo* 29(1): 13–18.
<http://dx.doi.org/10.11606/issn.2316-9052.v29i1p13-18>
- Fleischmann, A., Wistuba, A., McPherson, S. (2007) *Drosera solaris* (Droseraceae), a new sundew from the Guayana Highlands. *Willdenowia* 7: 551–555.
<http://dx.doi.org/10.3372/wi.37.37214>
- Gonella, P.M., Rivadavia, F. & Sano, P.T. (2012) Re-establishment of *Drosera spiralis* (Droseraceae), and a new circumscription of *D. graminifolia*. *Phytotaxa* 75: 43–57.
<http://dx.doi.org/10.11646/phytotaxa.75.1.4>
- Gonella, P.M., Rivadavia, F., Sano, P.T. & Fleischmann, A. (2014) Exhuming Saint-Hilaire: revision of the *Drosera villosa* complex (Droseraceae) supports 200 year-old neglected species concepts. *Phytotaxa* 156(1): 1–40.
<http://dx.doi.org/10.11646/phytotaxa.156.1.1>
- Hartmeyer, I. & Hartmeyer S. (2006) Clandestine diversity: snap-tentacles of the genus *Drosera*. *Carniflora Australis* 7: 4–18.
- Hooker, J.D. (1852) Nat. Ord. V. Droseraceae, DC. In: Hooker, J.D. (ed.) *Botany of the Antarctic Voyage 2: Flora novae-zelandiae, Part 1*. Reeve Brothers, London, pp. 19–21.
- IUCN (2001) *IUCN red list categories and criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK. Ii + 30 pp.
- Linnaeus, C. (1753) *Species Plantarum* 1. Impensis Laurentii Salvii, Holmiae, 572 pp.
- Maguire, B. & Laudon, J.R. (1957) *Drosera roraimae*. In: Maguire, B. & Wurdack, J.J. (eds.) *The Botany of the Guayana Highlands – Part II. Memoirs of the New York Botanical Garden* 9(3): 33–34.
- Maguire, B. & Wurdack, J.J. (1957) The botany of the Guayana Highland, Part II. *Memoirs of the New York Botanical Garden* 9: 331–336.
- Pignal, M., Romaniuc-Neto, S., De Souza, S., Chagnoux, S. & Lange Canhos, D.A. (2013) Saint-Hilaire virtual herbarium, a new upgradeable tool to study Brazilian botany. *Adansonia, séries* 3, 35 (1): 7–18.
<http://dx.doi.org/10.5252/a2013n1a1>
- Poiret, J.L.M. de (1804) Rossolis. *Drosera*. In: Poiret, J.L.M. de (ed.) *Encyclopedie Methodique. Botanique* 6(1). Chez Panckoucke, Paris, pp. 298–302.
- Pursh, F.T. (1813) *Drosera*. In: Pursh, F.T. (ed.) *Flora Americae Septentrionalis, or a systematic arrangement and description of the plants of North America* 1. White, Cochrane and Co., London, pp. 210–211.
<http://dx.doi.org/10.5962/bhl.title.6122>
- Rivadavia, F. (1999) Neblina expedition part 5. *Listserve Archives of the Carnivorous Plant Discussion Group Mailing List*. Available

- from: <http://www.omnisterra.com/botany/cp/list/cp99all.d/0609.htm> (accessed 22 October 2013).
- Rivadavia, F. (2003) Four new species of sundews, *Drosera* (Droseraceae), from Brazil. *Carnivorous Plant Newsletter* 32: 79–92.
- Rivadavia, F. (2005) New chromosome numbers for *Drosera* L. (Droseraceae). *Carnivorous Plant Newsletter* 34: 85–91.
- Rivadavia, F. (2008) The *Drosera montana* A.St.-Hil. (Droseraceae) complex: a new combination, *Drosera schwackei* (Diels) Rivadavia, is proposed. *Carnivorous Plant Newsletter* 37: 36–43.
- Rivadavia, F. (2009) *Drosera x fontinalis* (Droseraceae), the first natural sundew hybrid from South America. *Carnivorous Plant Newsletter* 38: 121–125.
- Rivadavia, F. & Gonella, P.M. (2011) *Drosera quartzicola* (Droseraceae), a new and threatened species from the Serra do Cipó, Brazil. *Phytotaxa* 29: 33–40.
- Rivadavia, F., Kondo, K., Kato, M. & Hasebe, M. (2003) Phylogeny of the sundews, *Drosera* (Droseraceae), based on chloroplast *rbcl* and nuclear 18S ribosomal DNA sequences. *American Journal of Botany* 90: 123–130.
<http://dx.doi.org/10.3732/ajb.90.1.123>
- Rivadavia, F., Miranda, V.F.O., Hoogenstrijd, G., Pinheiro, F., Heubl, G. & Fleischmann, A. (2012) Is *Drosera meristocaulis* a pygmy sundew? Evidence of a long-distance dispersal between Western Australia and northern South America. *Annals of Botany* 110: 11–21.
<http://dx.doi.org/10.1093/aob/mcs096>
- Saint-Hilaire, A.F.C.P. de (1824) *Plantes usuelles des brésiliens* 3. Grimbert, Paris, 300 pp.
- Saint-Hilaire, A.F.C.P. de (1826) *Histoire des plantes les plus remarquables du Brésil et du Paraguay* 1(6). A. Belin, Paris [exact content of part 6 unknown].
- Santos, E. (1986) O gênero *Drosera* L. no Brasil I – uma nova espécie. *Bradea* 4(38): 305–308.
- Santos, E. (1989) O gênero *Drosera* L. no Brasil II – sobre *D. montana* St.-Hil. *Bradea* 5(21): 249–256.
- Schulenberg, T. S. & K. Awbrey. (1997) A rapid assessment of the humid forests of South Central Chuquisaca, Bolivia. *RAP Working Papers* 8: 1–84.
- Seine, R. & Barthlott, W. (1993) On the morphology of trichomes and tentacles of Droseraceae Salisb. *Beiträge zur Biologie der Pflanzen* 67: 345–366.
- Silva, T.R.S. (1994) *Estudos Taxonômicos de Drosera (Droseraceae) do Brasil*. Master thesis. Universidade de São Paulo, São Paulo, Brazil, 127 pp.
- Silva, T.R.S. (1997) *Drosera graomogolensis* (Droseraceae), a new species from the campos rupestres of Minas Gerais, Brazil. *Novon* 7: 85–87.
<http://dx.doi.org/10.2307/3392080>
- Silva, T.R.S. (2002) Droseraceae. In: Wanderley, M.G.L., Sheperd, G.J., Giulietti, A.M., Melhem, T.S., Volker, B. & Kameyama, C. (eds.) *Flora Fanerogâmica do Estado de São Paulo* 2 FAPESP/HUCITEC, São Paulo, pp.101–102.
- Silva, T.R.S. (2007) Flora da Bahia – Droseraceae Salisb. *Sitientibus Série Ciências Biológicas* 7(4): 393–397.
- Silva, T.R.S. (2013) Droseraceae In *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB105> (accessed 03 June 2013).
- Silva, T.R.S. & Giulietti, A.M. (1997) Levantamento das Droseraceae do Brasil. *Boletim de Botânica da Universidade de São Paulo* 16: 75–105.
<http://dx.doi.org/10.11606/issn.2316-9052.v16i0p75-105>
- Steyermark, J.A. & Smith, L.B. (1974) A new *Drosera* from Venezuela. *Rhodora* 76: 491–493.
- Taubert, P. (1893) *Plantae Glaziovianae novae vel minus cognitae*. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 17: 502–506.
- Thiers, B. (2011) *Index herbariorum, a global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/> (accessed: 09 October 2013).