



## *Moquiniastrum* (Gochnatieae, Asteraceae): disentangling the paraphyletic *Gochnatia*

GISELA SANCHO<sup>1</sup>, VICKI. A. FUNK<sup>2</sup> & NÁDIA ROQUE<sup>3</sup>

<sup>1</sup>División Plantas Vasculares, Museo de La Plata, Facultad de Ciencias Naturales y Museo, UNLP, Paseo del Bosque s/n, 1900 La Plata, Buenos Aires Argentina

E-mail: [sancho@fcnym.unlp.edu.ar](mailto:sancho@fcnym.unlp.edu.ar)

<sup>2</sup>US National Herbarium, Department of Botany, Smithsonian Institution-NMNH, MRC 166, Washington DC, 20560, USA

E-mail: [funkv@si.edu](mailto:funkv@si.edu)

<sup>3</sup>Instituto de Biologia, Universidade Federal da Bahia, Campus Universitário de Ondina, 40170-110 Salvador, Bahia, Brazil

E-mail: [nadiaroque@gmail.com](mailto:nadiaroque@gmail.com)

### Abstract

The new genus *Moquiniastrum*, the result of recent phylogenetic analyses, is described. Although these analyses are based on cpDNA and nDNA, they also involve documentation of the distinctive morphological characters supporting this new genus. The recognition of *Moquiniastrum* is necessary to accurately reflect the relationships of the taxa found in the tribe Gochnatieae. *Moquiniastrum* includes twenty-one species that are usually gynodioecious and found mainly in Brazil but with some species elsewhere in South America. A description of *Moquiniastrum*, together with the corresponding new combinations, new lectotypifications of three names and one new neotypification is here provided.

**Key words:** classification, Compositae, nomenclature, taxonomy

### Introduction

*Moquiniastrum* (Asteraceae/Compositae) was originally described by Cabrera (1971: 73) as a section of *Gochnatia* Kunth (1818: 15) which is placed in the tribe Gochnatieae (Panero & Funk 2002, Funk *et al.* 2009, Ortiz *et al.* 2009, Sancho & Freire 2009). Gochnatieae is the sister group of the large majority of the family (including the two largest subfamilies Cichorioideae and Asteroideae). *Moquiniastrum* is a morphologically well-defined genus and one of the results of our nearly completed studies of the tribe Gochnatieae (Funk *et al.*, MS). This new genus of twenty-one, usually gynodioecious species (Fig. 1A–C) includes shrubs, subshrubs and occasionally trees (Fig. 1D–F) mainly from eastern Brazil, but also extending into Argentina, Bolivia, Paraguay, Peru, Uruguay, and Venezuela (Cabrera 1971, Sancho 2000, Hind 2011, Basualdo 2013) (Fig. 2).

At the time of Cabrera *Gochnatia* was a large genus of about 70 species from Asia, southern North America, West Indies, and South America. The original *Gochnatia* sect. *Moquiniastrum* brought together species from several genera, including *Spadonia* Lessing (1832: 99), *Moquinia* Candolle (1838: 22) and *Gochnatia*. Lessing's *Spadonia* was an illegitimate name because of an earlier fungus name by Fries (1829: 203). De Candolle recognized this and proposed *Moquinia* as a new name. According to Cabrera (1950), *Gochnatia* and *Moquinia* were so similar that they needed to be merged, correctly giving priority to *Gochnatia*. Later, *Moquinia* was re-circumscribed (Cabrera 1969) to include only the type species *M. racemosa* (Sprengel 1826: 508) Candolle (1838: 23), whereas the other species were placed in *Gochnatia* (Cabrera 1971). The name *Moquiniastrum* reflects the similarity of this section to the genus *Moquinia*, from which many species were transferred.

**17. *Moquiniastrum polymorphum*** (Less.) G. Sancho, comb. nov.

Basionym: *Spadonia polymorpha* Lessing (1832: 101). Type:—BRAZIL. No date, *F. Sellow* s.n. (holotype B [destroyed], lectotype K 0000502518!, designated here).

**17.1. *Moquiniastrum polymorphum*** subsp. *ceanothifolium* (Less.) G. Sancho, comb. nov.

Basionym: *Spadonia polymorpha* var. *ceanothifolia* Lessing (1832: 102). Type:—BRAZIL. No date, *F. Sellow* s.n. (holotype B [destroyed], lectotype K 000502522!, designated here).

**17.2. *Moquiniastrum polymorphum*** subsp. *floccosum* (Cabrera) G. Sancho, comb. nov.

Basionym: *Gochnatia polymorpha* subsp. *floccosa* Cabrera (1971: 123). Type:—BRAZIL. Santa Catarina: Campo Novo, 11 December 1962, *R. Klein 3831* (holotype LP!)

**18. *Moquiniastrum pulchrum*** (Cabrera) G. Sancho, comb. nov.

Basionym: *Gochnatia pulchra* Cabrera (1971: 106). Type:—BRAZIL. São Paulo: 28 April 1923, *G. Gehrt* s.n. (holotype LP!, isotype NY!, SP!).

**19. *Moquiniastrum ramboi*** (Cabrera) G. Sancho, comb. nov.

Basionym: *Gochnatia ramboi* Cabrera (1971: 98). Type:—BRAZIL. Rio Grande do Sul: 30 January 1952, *B. Rambo 51961* (holotype LP!, isotype S!, US!).

**20. *Moquiniastrum sordidum*** (Less.) G. Sancho, comb. nov.

Basionym: *Spadonia polymorpha* var. *sordida* Lessing (1832: 102). Type:—BRAZIL. No date, *F. Sellow* s.n. (holotype B [destroyed], lectotype K 000502521!, designated here, isolectotypes P!, three sheets).

**21. *Moquiniastrum velutinum*** (Bong.) G. Sancho, comb. nov.

Basionym: *Moquinia velutina* Bongard (1839: 41). Type:—BRAZIL. São Paulo: no date, *G.H. von Langsdorff* s.n. (holotype LE, photo of LE sheet at LP!)

## Acknowledgements

We acknowledge the reviewers for useful comments on the manuscript. We are also deeply grateful to the curators of the herbaria who provided the specimens we examined (F, G, ICN, K, LP, MO, NY, S, SP, SPSF, US) and their online resources. We are grateful for funding of fieldwork and museum studies provided by several sources: the Smithsonian Institution's (SI) National Museum of Natural History small grant (VAF), the SI's Department of Botany's Cuatrecasas fund Fellowship (NR), research funds (GS) from Agencia Nacional de Promoción Científica y Tecnológica, SECYT, Argentina and Comisión Nacional de Investigaciones Científicas y Tecnológicas, CONICET, and research scholarships (NR) from CAPES (BEX 0509/13-2) and CNPq (PQ 371248/2001-6).

## References

- Baker, J.G. (1884) Compositae. IV. Helianthodeae, Helenioideae, Anthemideae, Senencionideae, Cynaroideae, Ligulatae, Mutisiaceae. In: Martius, C.F.P. & Eichler, A.G. (eds), *Flora Brasiliensis* 6(3). Oldenbourg, Monachii et Lipsiae (Munich & Leipzig), pp. 135–398.
- Basualdo, I. (coord.) (2013) *Inventario Biológico de Paraguay*. Tropicos, Missouri Botanical Garden, St. Louis. Available from: <http://www.tropicos.org/projectwebportal.aspx?pagename=Home&projectid=44&langid=66> (accessed 19 May 2013)
- Bongard, A.G.H. von (1839) Compositae Brasilienses Novae. *Mémoires de l'Académie Impériale des Sciences de St.-Petersbourg* (6 sér.) 5(2, Bot.): 31–45.
- Cabrera, A.L. (1935) Mutisieas Argentinas nuevas o interesantes. *Notas del Museo de La Plata. Botánica* 1: 55–69.
- Cabrera, A.L. (1950) Observaciones sobre los géneros *Gochnatia* y *Moquinia*. *Notas del Museo de La Plata. Botánica*

- Cabrera, A.L. (1969) El género *Moquinia* (Compositae). *Boletín de la Sociedad Argentina de Botánica* 11: 255–261.
- Cabrera, A.L. (1971) Revisión del Género *Gochnatia*. *Revista del Museo de La Plata. Sección botánica* 12: 1–160.
- Cabrera, A.L. (1974) Tres Compositae nuevas de Minas Gerais (Brasil). *Boletim do Museu Botânico Municipal* 15: 1–3.
- Candolle, A.P. de (1838) *Prodromus systematis naturalis regni vegetabilis* 7(1). Sociorum Treuttel et Wu?rtz, Parisii (Paris), 807 pp.
- Don, D. (1825) *Prodromus florum Nepalensis*. Gale, Londini (London), 256 pp.
- Don, D. (1830) Descriptions of the new genera and species of the class belonging to the Floras of Peru, Mexico, and Chile. *Transactions of the Linnean Society of London. Botany* 16: 169–303.  
<http://dx.doi.org/10.1111/j.1095-8339.1829.tb00136.x>
- Don, D. (1832) Descriptive catalogue of the Compositae contained in the herbarium of Dr. Gillies; with some additions from other sources. *Philosophical Magazine, or Annals of Chemistry, Mathematics, Astronomy, Natural History and General Science* 11: 387–392.
- Endlicher, S. (1838) *Genera plantarum secundum ordines naturales disposita*. Beck, Vienna, 1483 pp.  
<http://dx.doi.org/10.5962/bhl.title.442>
- Field Museum website (2012) *Department of Botany, Botany Collections Database, Berlin Negatives*. The Field Museum, Chicago. Available from: [http://emuweb.fieldmuseum.org/botany/search\\_berlin.php](http://emuweb.fieldmuseum.org/botany/search_berlin.php) (accessed 15 May 2013).
- Freire, S.E., Katinas, L. & Sancho, G. (2002) *Gochnatia* (Asteraceae: Mutisieae) and the *Gochnatia* complex: taxonomic implications from morphology. *Annals of the Missouri Botanical Garden* 89: 525–550.  
<http://dx.doi.org/10.2307/3298594>
- Fries, E.M. (1829) *Systema mycologicum* 3. Mauritii, Greifswald, 524 pp.
- Funk, V.A., Susanna, A., Stuessy, T., & Robinson, H. (2009) Classification of Compositae. In: Funk, V.A., Susanna, A., Stuessy, T., & Bayer, R. (eds) *Systematics, Evolution and Biogeography of Compositae*. IAPT, Vienna, pp. 171–189.
- Gardner, G. (1847) Contribution towards a Flora of Brazil, being the characters of several new species of Compositae, belonging to the tribes Mutisiaceae and Nassauvieae. *The London Journal of Botany* 6: 449–463.
- GPI (2003) *Global Plants Initiative*. Jstor Plant Science, Michigan & New York. Available from: <http://plants.jstor.org/> (accessed 19 May 2013).
- Grisebach, A. (1874) *Plantae Lorentzianae*. Bearbeitung der ersten und zweiten Sammlung argentinischer Pflanzen des Professor Lorentz zu Cordoba. *Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen* 19: 49–279.
- Hassler, E. (1919) VII. Ex herbario Hassleriano: Novitates paraguarienses. XXII. (Originaldiagnosen). Compositae. IV. Addenda et corrigenda ad Compositae I–III. *Repertorium Specierum Novarum Regni Vegetabilis* 16: 25–29.  
<http://dx.doi.org/10.1002/fedr.4870160108>
- Hiepko, P. (1987) The collections of the Botanical Museum Berlin-Dahlem (B) and their history. *Englera* 7: 219–252.
- Hind, D.J.N. (2007) Tribe Mutisieae. In: Kadereit, J.W. & Jeffrey, C. (eds) *Kubitzki's Families and Genera of Vascular Plants* 8. Springer-Verlag, Berlin, pp. 90–123.
- Hind, D.J.N. (2011) *An annotated preliminary checklist of the Compositae of Bolivia (Version 2)*. Available from: <http://www.kew.org/science/tropamerica/boliviacompositae/> (accessed 20 May 2013)
- Hooker, J.D. & Arnott, G.A.W. (1835) Contributions towards a Flora of South America and the islands of the Pacific. *Companion to the Botanical Magazine* 1: 102–111.
- Kunth, C.S. (1818) Compositae. In: Humboldt, F.W.H.A. von, Bonpland, A.J.A. & Kunth, K.S. *Nova genera et species plantarum*, Folio Ed. Librariae Graeco-Latino-Germanico, Lutetiae Parisiorum (Paris), 247 pp.
- Kuntze, O. (1891). *Revisio generum plantarum vascularium* 1. Felix, Leipzig, 374 pp.
- Lessing, F. (1830) *Synanthereis herbarii Regii Berolinensis, dissertatio tertia*. *Linnaea* 5: 237–298.
- Lessing, F. (1832) *Synopsis generum Compositarum earumque dispositionis novae tentamen monographis multarum capensium interjectis*. Dumckeri et Humblotii, Berolinii (Berlin), 473 pp.  
<http://dx.doi.org/10.5962/bhl.title.51470>
- Malme, G.O.A. (1899) Die Compositen der Ersten Regnell'schen Expedition. *Kongliga Svenska Vetenskapsakademiens Handlingar* (ser. 2) 32: 1–90.
- Malme, G.O.A. (1933) Compositae Paranenses Dusenianae. *Kongliga Svenska Vetenskapsakademiens Handlingar* (ser. 3) 12: 1–122.
- 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. (2012) *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011*. Koeltz Scientific Books, Königstein, XXX + 208 pp. [Regnum Vegetabile 154]
- Ortiz, O., Bonifacino, J.M., Crisci, J.V., Funk, V.A., Hansen, H., Hind, D.J.N., Katinas, L., Roque, N., Sancho, G., Susanna, A. & Tellería, M.C. (2009) The basal grade of Compositae: Mutisieae (sensu Cabrera) and Carduoideae.

- In: Funk, V.A., Susanna, A., Stuessy, T., & Bayer, R. (eds) *Systematics, Evolution and Biogeography of Compositae*. IAPT, Vienna, pp. 193–213.
- Panero, J.L. & Funk, V.A. (2002) Toward a phylogenetic subfamilial classification for the Compositae (Asteraceae). *Proceedings of the Biological Society of Washington* 115: 909–922.
- Roque, N. & Pirani, R. (2001) Reinstatement of the name *Richterago* Kuntze and recircumscription of the genus to include species formerly treated as *Actinoseris* (Endl.) Cabrera (Compositae, Mutisieae). *Taxon* 50: 1155–1160. <http://dx.doi.org/10.2307/1224734>
- Rusby, H.H. (1907) An enumeration of the plants collected in Bolivia by Miguel Bang, Part 4, with descriptions of new genera and species. *Bulletin of the New York Botanical Garden* 4: 309–479.
- Sancho, G. (1999) Novedades taxonómicas en *Gochnatia* (Asteraceae, Mutisieae). *Novon* 9: 557–561.
- Sancho, G. (2000) Revisión y filogenia de la sección *Moquiniastrum* Cabrera del género *Gochnatia* Kunth (Asteraceae, Mutisieae). *Fontqueria* 54: 61–122.
- Sancho, G. & Otegui, M. (2000) Secretory tissues in florets of *Gochnatia polymorpha* (Asteraceae, Mutisieae). Evolutionary considerations. *Phytomorphology* 50: 172–179.
- Sancho, G. & Freire, S.E. (2009) Gochnatieae (Gochnatioideae) and Hyalideae (Wunderlichioideae p.p.). In: Funk, V.A., Susanna, A., Stuessy, T., & Bayer, R. (eds.) *Systematics, Evolution and Biogeography of Compositae*. IAPT, Vienna, pp. 249–265.
- Sprengel, K. (1826) *Systema vegetabilium* (ed. 16) 3. Librariae Dieterichianae, Göttingae (Göttingen), 936 pp. <http://dx.doi.org/10.5962/bhl.title.822>
- Tellería, M.C., Sancho, G., Funk, V.A., Ventosa, I. & Roque, N. (2013) Pollen morphology and its taxonomic significance in the tribe Gochnatieae (Compositae, Gochnatioideae). *Plant Systematics and Evolution* 299: 935–948. <http://dx.doi.org/10.1007/s00606-013-0774-1>
- Ventosa-Rodríguez, I. & Herrera Oliver, P.P. (2011) Do the Antillean species of *Gochnatia* Kunth (Asteraceae) truly belong in that genus? A phylogenetic analysis based on morphological characters. *Compositae Newsletter* 49: 8–22.