



Two new species of *Cosmos* section *Discopoda* (Coreoideae: Asteraceae) from Jalisco, Mexico

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Abstract

Recent botanical explorations in western Mexico, as part of a taxonomic revision and a phylogenetic analysis of the genus *Cosmos*, have resulted in the discovery of two new species. The novelties belong to *Cosmos* section *Discopoda* and are described and illustrated. Morphologically, *Cosmos pseudoperfoliatus* resembles *C. jaliscensis*, *C. peucedanifolius*, *C. palmeri* and *C. scabiosoides*, but differs from them in having 4–7 leaf pairs on the stem, leaves tomentose on both faces, trullate external phyllaries, yellow disk florets with 4–5 lobes, and corky-tuberculate achenes. On the other hand, *Cosmos ramirezianus* is morphologically similar to *C. montanus*, but differs by its coriaceous and pinnatisect leaves, yellow internal phyllaries, yellow disk florets with light purple lobes, and by the persistence of paleae during fruiting. Phenology, distribution and habitat are provided as well as a key for the identification of the species in *Cosmos* section *Discopoda*.

Resumen

Exploraciones botánicas recientes en el occidente de México, como parte del estudio taxonómico y filogenético del género *Cosmos*, han resultado en el descubrimiento de dos especies nuevas. Las novedades pertenecen a *Cosmos* sección *Discopoda* y son descritas e ilustradas. Morfológicamente, *Cosmos pseudoperfoliatus* se asemeja a *C. jaliscensis*, *C. palmeri*, *C. peucedanifolius* y *C. scabiosoides*, pero difiere de ellas por poseer 4–7 pares de hojas en el tallo, sus hojas tomentosas en ambas caras, filarias externas truladas, flores del disco amarillas con 4–5 lóbulos, y aquenios tuberculado-suberosos. Por otro lado, *Cosmos ramirezianus* es similar a *C. montanus* pero se distingue por sus hojas coriáceas y pinnatisectas, filarias internas amarillas, flores del disco amarillas con lóbulos ligeramente púrpuras y por la persistencia de las páleas durante la fructificación. Por último, se incluyen observaciones sobre fenología, distribución y hábitat, además de una clave dicotómica para la identificación de las especies en *Cosmos* sección *Discopoda*.

Key words: Compositae, endemism, Heliantheae, Nueva Galicia

Introduction

The circumscription of the tribe Coreoideae Lindley (1829: 1074), Asteraceae Berchtold & Presl (1820: 73), has been modified by various authors (Panero & Funk 2002, Kimball & Crawford 2004, Mort *et al.* 2008, and Crawford *et al.* 2009). However, the distinct series of phyllaries, the conspicuous resiniferous ducts in the internal phyllaries and the presence of flavonoid pigments were recognized as diagnostic characters for Coreoideae (Crawford & Stuessy 1981, Robinson 1981, Ryding & Bremer 1992). Based on Panero & Funk (2002) and Crawford *et al.* (2009), Coreoideae includes 24 genera and more than 590 species. Although the tribe is cosmopolitan, the greatest diversity is concentrated in the New World. In Mexico, there are 12 genera of Coreoideae: *Bidens* Linnaeus (1753: 831), *Chrysanthellum* Richard (1807: 471), *Coreocarpus* Benth

References

- Berchtold, F.G. & Presl, J.S. (1820) *O přirozenosti rostlin*. Prague, Czechoslovakia, 324 pp.
- Bentham, G. (1844) *Coreocarpus*. In: Hinds, R.B. (ed.) *The Botany of the voyage of H.M.S. Sulphur, under the command of captain Sir Edward Belcher, R.N., C.B., F.R.G.S., etc. during the years 1836–42*. Smith, Elder & Co., London, pp. 28.
- Candolle, A.P. de (1836) *Prodromus systematis naturalis regni vegetabilis* 5. Treuttel & Würtz, Paris, 706 pp.
- Cavanilles, J.S. (1791) *Icones et descriptiones plantarum, quae aut sponte in Hispania crescunt* 1. Lazaro Gayguer, Madrid, 67 pp.
- Cavanilles, J.S. (1794) *Icones et descriptiones plantarum, quae aut sponte in Hispania crescunt* 3. Lazaro Gayguer, Madrid, 169 pp.
- Crawford, D.J. & Stuessy, T.F. (1981) The taxonomic significance of anthochlors in the subtribe Coreopsidinae (Compositae, Heliantheae). *American Journal of Botany* 68: 107–117.
<http://dx.doi.org/10.2307/2442998>
- Crawford, D.J., Tadesse, M., Mort, M.E., Kimball, R.T. & Randle, C.P. (2009) *Coreopsidaeae*. In: Funk, V.A., Susanna, A., Stuessy, T.F. & Bayer, R.J. (eds.) *Systematics, evolution and biogeography of Compositae*. International Association for Plant Taxonomy, Vienna, pp. 713–730.
- Gray, A. (1854) *Plantae Novae Thurberianae: the characters of some new genera and species of plants in a collection made by George Thurber, Esq., of the late Mexican boundary commission, chiefly in New Mexico and Sonora*. *Memoirs of the American Academy of Arts and Sciences, New Series* 5: 297–328.
<http://dx.doi.org/10.2307/25058183>
- Greenman, J.M. (1908) The generic name *Goldmania*. *Botanical Gazette* 45: 198.
- Hernández-López, L. (1995) *The endemic flora of Jalisco, Mexico, centers of endemism and implications for conservation*. MS Thesis. University of Wisconsin, Madison, 76 pp.
- Hooker, J.D. (1861) *Cosmos diversifolius*; var. *atro-sanguineus*. *Curtis Botanical Magazine* (3rd ser.) 87: ad tab. 5227.
- IUCN (2008) *IUCN red list categories and criteria*, ver. 7. IUCN, Gland, Switzerland and Cambridge, U. K.
<http://www.iucnredlist.org/>
- Jeffrey, C. (1977) *Corolla forms in Compositae – some evolutionary and taxonomic speculations*. In: Heywood, V.H., Harborne, J.B. & Turner, B.L. (eds.) *The biology and chemistry of the Compositae*. Academic Press, London, pp. 111–118.
- Kimball, R.T. & Crawford, D.J. (2004) Phylogeny of Coreopsidaeae (Asteraceae) using ITS sequences suggests lability in reproductive characters. *Molecular Phylogenetics and Evolution* 33:127–139.
<http://dx.doi.org/10.1016/j.ympev.2004.04.022>
- Kunth, C.S. (1820) *Nova genera et species plantarum*. N. Maze, Paris, 412 pp.
- La Llave, P. de (1824) *Hidalgoa*. In: La Llave, P. de & Martínez de Lexarza, J. (eds.) *Novorum vegetabilium descriptiones*. Martinum Riveram, Mexico, pp. 15.
- Lessing, C.F. (1831) De plantis in expeditione romanzoffiana observatis disserere pergitur. Synthereae addendae. *Linnaea* 6: 501–526.
- Lindley, J. (1841) Natural Arrangement. Part II. In: Loudon, J.C. *An encyclopedia of plants: comprising the specific character, description, culture, history, application in the arts, and every other desirable particular respecting all the plants indigenous, cultivated in, or introduced to Britain*. London, 1334 pp.
- Linnaeus, C. (1753) *Species Plantarum*. Salvius, Stockholm, 1200 pp.
- McVaugh, R. (1984) *Compositae*. In: Anderson, W.R. (ed.) *Flora Novo-Galiciana, a descriptive account of the vascular plants of Western Mexico* 12. The University of Michigan Press, Michigan, 1157 pp.
- Melchert, T.E. (1975) New combinations in the Coreopsidinae. *Phytologia* 32: 291–298.
- Mort, E.M., Randle, C.P., Kimball, R.T., Tadesse M. & Crawford, D.J. (2008) Phylogeny of Coreopsidaeae (Asteraceae) inferred from nuclear and plastid DNA sequences. *Taxon* 57: 109–120.
- 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.
- Richard, P.C. (1807) *Chrysantellum*. In: Persoon, C.H. (ed.) *Synopsis plantarum* 2. J.G. Cottam, Paris, pp. 471.
- Robinson, B.L. (1909) Diagnoses and transfers of the Tropical American phanerogams. *Proceedings of the American Academy of Arts and Sciences* 44: 613–626.
- Robinson, H. (1981) A revision of the tribal and subtribal limits of the Heliantheae (Asteraceae). *Smithsonian Contributions to Botany* 51: 1–102.
- Rodríguez, A., Harker, M., Quezada-Solís, A. & Casillas-Gaeta, S. (2006) *Diversidad y potencial ornamental del género Cosmos Cav. (Asteraceae) en Jalisco*. In: Carvajal, S. (ed.) *Avances en la investigación Científica en el CUCBA: XVII Semana de la Investigación Científica*. Centro Universitario de Ciencias Biológicas y Agropecuarias, Universidad de Guadalajara. Jalisco, México. 610–619 pp.

- Ryding, O. & Bremer, K. (1992) Phylogeny, distribution and classification of the Coreoideae (Asteraceae). *Systematic Botany* 17: 649–659.
- SEMARNAT (2013) Base de datos estadísticos. Abreviaturas y símbolos. Entidades federativas. Mode of access: <http://www.semarnat.gob.mx/informacionambiental/documents/sniarn/estadistica/abreviaturas.html>
- Sherff, E.E. (1932) Revision of the genus *Cosmos*. *Field Museum of Natural History, Botanical Series* 8: 401–447.
- Sherff, E.E. (1955) *Cosmos*. In: Sherff, E.E. & Alexander, E.J. (eds.) *North American Flora* 2. The New York Botanical Garden, New York, pp. 149.
- Sherff, E.E. (1964) Some new or otherwise noteworthy Coreoideae (Compositae) from Mexico. *Brittonia* 16: 58–73.
- Turner, B.L. (1977) *Henricksonia* (Asteraceae: Coreoideae), a newly discovered genus with a palaceous pappus from North Central Mexico. *American Journal of Botany* 64: 78–80.
- Vargas-Amado, G., Castro-Castro, A., Harker, M., Villaseñor, J.L., Ortiz, E. & Rodríguez, A. (2013) Distribución geográfica y riqueza del género *Cosmos* (Asteraceae, Coreoideae). *Revista Mexicana de Biodiversidad* 84: 122–155.
- Voss, A. (1894) *Vilmorin's Blumengärtnerei. Beschreibung, Kultur und Verwendung des gesamten Pflanzenmaterial für Deutsche Garten* 1. Parey, Berlin, 450 pp.
- Wedell, H.A. (1856) *Chloris Andina* 1(3). P. Bertrand, Paris, pp. 57–80.