# CLARIFYING THE IDENTITY OF THE ENIGMATIC MISTLETOE *CLADOCOLEA BIFLORA* (LORANTHACEAE)

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**Abstract.** Since its description almost 40 years ago, the mistletoe *Cladocolea biflora* (Loranthaceae) has been considered an extraordinary species due to its combinations of unique morphological characters, which made it difficult to confidently assign it to any of the extant genera of Neotropical Loranthaceae. In this contribution, we propose that the specimen from which *C. biflora* was described does not represent a mistletoe but instead the hemiparasitic tree *Schoepfia schreberi* (Schoepfiaceae). Morphological characters evaluated to justify this decision and taxonomic implications are discussed, and a synonymization of *C. biflora* under *S. schreberi* is proposed.

**Resumen.** Desde su descripción hace casi 40 años, el muérdago *Cladocolea biflora* (Loranthaceae) ha sido considerado una especie extraordinaria por su combinación de caracteres morfológicos únicos, los cuales han hecho difícil el posicionarlo con certeza dentro de uno de los géneros actuales de Lorantáceas neotropicales. En este trabajo, proponemos que el espécimen bajo el cual *C. biflora* se describió no representa un muérdago, sino el árbol hemiparasítico *Schoepfia schreberi* (Schoepfiaceae). Se discuten los caracteres morfológicos evaluados para justificar esta decisión y sus implicaciones taxonómicas, y se propone una sinonimización de *C. biflora* bajo *S. schreberi*.

**Keywords:** Mexico, parasitic plants, Santalales, *Schoepfia*, Schoepfiaceae

Almost 40 years ago, an intriguing mistletoe from Mexico showing an array of unusual characters was described as *Cladocolea biflora* Kuijt (Loranthaceae). In its original publication, Kuijt (1980) recognized the extraordinary nature of this species and placed it tentatively as a member of *Cladocolea* Tiegh. Since then, *C. biflora* has been highlighted as enigmatic, mainly due to its atypical floral morphology, and was considered the sole example of a Neotropical mistletoe with a gamopetalous corolla (Kuijt, 2009a,b; Kuijt and Hansen, 2015). In fact, the unique features shown by *C. biflora* led Kuijt (2013) to believe that the new species perhaps belonged in a new genus of Loranthaceae, but because of the lack of adequate material he never described it. Thereafter, the taxonomic status of *C. biflora* remained unsolved, awaiting additional material (Kuijt, 2013).

While studying Neotropical Loranthaceae, we noticed that the protologue of *Cladocolea biflora* contains a series of features that otherwise correspond with *Schoepfia* Schreb. (Schoepfiaceae), a member of hemiparasitic Santalales. The most evident characters are the presence of alternate leaves with plicate-falcate blades and angled cream or grayish stems, characters that are rare on Loranthaceous mistletoes but common in at least some *Schoepfia*, hence justifying the common name "graytwig" for species such as *S. schreberi* J.F. Gmel. (Wunderlin et al., 2017). Reproductive characters also suggest a better fit for *C. biflora* in *Schoepfia* than *Cladocolea*. These include fasciculate 2-flowered inflorescences, large cupules from the connation of bracts and bracteoles, gamopetalous corolla with monomorphic epipetalous, sessile anthers in the middle of the monomorphic corolla lobes, a conspicuous tuft of bristles inside the corolla tube directly behind the anthers, and a thick nectariferous disk (Sleumer, 1984; Kuijt and Hansen, 2015). Detailed drawings of the abovementioned features from the type specimen of *C. biflora* are presented in Kuijt (1980).

A possible reason behind the misidentification of this specimen of *Schoepfia* is its phenological status, which does not present flowers in full anthesis but mostly immature flower buds. The fragmented status of the type (*F. M. Liebmann 3147*, C) could have further masked its recognition, and its original identification as "*Loranthus*" seems to have misled identification efforts by assuming that it was a mistletoe. It is unfortunate that Frederick M. Liebmann did not provided any further description of the plant nor its locality within Mexico, although Standley (1927) points out that Liebmann's specimens were collected in the southern part of the country where *S. schreberi* has been reported (Sleumer, 1984). Efforts to locate the field notes of Liebmann or duplicates of the type specimen of *C. biflora* have been unsuccessful. Although Loranthaceae and Schoepfiaceae are not very distantly related families within Santalales (Su et al., 2015), specimens of *Schoepfia* in herbaria have been rarely misidentified as mistletoes. In a second case detected recently, Raymond M. Harley identified a specimen of *S. brasiliensis* A. DC. as an unknown species of *Struthanthus* Mart., describing it as "hemiparasitic in small tree" (*Harvey 21248*, US barcode 01335267). As far as we know, members of Schoepfiaceae comprise trees and shrubs that are exclusively root parasites and have never been suspected or confirmed to be aerial mistletoes.

Regarding the identity of the species of *Schoepfia*, the key provided by Sleumer (1984) in his taxonomic treatment of Olacaceae sensu lato led to two possible species:

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*S. schreberi* (corolla to 5 mm long) and *S. vacciniiflora* Planch. ex Hemsley (corolla 7–8 mm long). The holotype of *Cladocolea biflora* (examined and measured through JSTOR Global Plants: https://plants.jstor.org/ (accessed September 3, 2019, 07:30 GMT)) shows a few well-developed flower buds that do not exceed 3 mm long. Thus, we propose that the correct name for the type should be *S. schreberi*, rendering *C. biflora* a synonym of it. All of the other morphological characters observed in the holotype of *C. biflora* fit within the range of variation of *S. schreberi* described by Sleumer (1984), supporting our determination. A comprehensive taxonomic summary with synonyms of *S. schreberi* can be found in Sleumer (1984), and a representative illustration for the species can be found in Sagra (1850, t. 54) as the type of *S. chrysophylloides* (A. Rich.) Planch. (available at http://plantillustrations.org/illustration.php?id_illustration=48710 (accessed September 3, 2019, 07:30 GMT)).

***Schoepfia schreberi*** J. F. Gmel. Syst. 2: 376. 1791. TYPE: SANTA LUCIA (LESSER ANTILLES). Collected before 1810, *J. W. von Crudy s.n.* (Holotype: M [Schreber Herbarium, not seen]; Isotypes: BR [BR0000005942473, image], S [S07-9719, image]).

Heterotypic synonym: *Cladocolea biflora* Kuijt, Brittonia 32: 519–521, f. 1–6, 1980. TYPE: MEXICO. Collected 1841–1843, *F. M. Liebmann 3147* (Holotype: C [C10014032, image]), *syn. nov.*

By recognizing *Cladocolea biflora* as a member of Schoepfiaceae, the taxonomy of the small-flowered Neotropical mistletoes is less convoluted by excluding the occurrence of gamopetaly and other features inconsistent with their typical traits. Now, diagnostic characters for *Cladocolea* are more refined, although the genus as currently defined still shows a broad variability and will require further taxonomic efforts to test boundaries and clarify relationships with other close groups such as *Struthanthus*.

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