

LECTOTYPIFICATION OF *DIDYMAEA MEXICANA* HOOK. F.
(RUBIACEAE, RUBIEAE) AND THE IDENTITY OF *D. ALSINOIDES*
(SCHLTDL. & CHAM.) STANDL.

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ABSTRACT

The name *Didymaea alsinoides* (Schltdl. & Cham.) Standl. has been incorrectly applied to a common and wide-ranging Mexican and Central American species whose correct identity is *Didymaea mexicana* Hook. f. In this paper a lectotype is selected and designated for *D. mexicana*. The characters separating these two frequently confused species are discussed. Further systematic studies of the genus *Didymaea* are suggested.

Key words: Central America, *Didymaea*, Mexico, Rubiaceae, typification.

RESUMEN

El nombre *Didymaea alsinoides* (Schltdl. & Cham). Standl. ha sido aplicado incorrectamente a una especie común y de amplia distribución en México y América Central, cuya identidad correcta es *Didymaea mexicana* Hook. f. Se selecciona y designa un lectotipo para *D. mexicana*. Se discuten los caracteres que separan estos dos taxa. Se sugieren estudios sistemáticos adicionales del género *Didymaea*.

Palabras clave: América Central, *Didymaea*, México, Rubiaceae, tipificación.

Didymaea Hook. f. (Rubiaceae, Rubieae) is a small genus of low perennial herbs found at relatively high elevations, and ranging from central Mexico to Panama in Central America (Burger & Taylor, 1993). Recent molecular-phylogenetic evidence places *Didymaea* in subfamily Rubioideae, tribe Rubieae, subtribe Rubiinae along with other genera having leaf-like stipules and pluricolpate pollen, including *Galium* L. (Robbrecht & Manen, 2006).

Species of *Didymaea* are characterized by their procumbent or climbing stems, opposite leaves with ovate, oblong-ovate, lanceolate, elliptic, or rarely linear blades, small, shallowly to deeply bilobed or geminate interpetiolar stipules, axillary inflorescences with small, bisexual homostylous flowers with calyces reduced or absent, small, white to purple corollas with short tubes and 4-valvate lobes, 4 stamens with dorsifixed anthers, 2-locular ovaries with one axillary ovule per locule, and black, drupaceous fruits that are dimidiate and deeply bisulcate or sometimes subglobose.

Although names of 12 species and infraspecies of *Didymaea* have been published (Anonymous, 2005), the actual number is probably fewer (Burger & Taylor, 1993). Lorence (1999) recognized seven species in his nomenclator of Mexican and Central American Rubiaceae. Various authors (e.g. Rzedowski, 1983; Standley & Williams, 1975) have traditionally used characters such as stem length, habit (e.g., climbing versus procumbent), degree and type of pubescence, leaf texture, number of secondary leaf veins, degree of inflorescence branching, flower number, and the ratio of corolla lobe to corolla tube length to delineate species and infraspecific taxa in *Didymaea*. For example, in his treatment for Flora of Guatemala Williams recognized four species, including three new ones, based largely on leaf shape, venation patterns, and pubescence (Standley & Williams, 1975). In his treatment of Mexican Rubiaceae Borhidi (2006) recognized six species. However, when a large number of collections are examined, these characters seem to vary independently or intergrade, making it difficult to delimit species. Comparable variation in habit, leaf size, shape, and pubescence, and inflorescence morphology occurs in various other herbaceous Rubiaceae genera such as *Houstonia* L., possibly in relation to habitat and microsite conditions and introgression (Terrell, 2006).

During the course of preparing a treatment of *Didymaea* for the Flora Mesoamericana project the author studied herbarium specimens from throughout the range of the genus, and types of all the described species were examined. This study shows that the name *Didymaea alsinoides* (Schltdl. & Cham.) Standl. has been incorrectly applied to a common and wide-ranging species, whose correct identity is *Didymaea mexicana* Hook. f. Consequently, the name *Didymaea alsinoides* correctly applies to a different species that is restricted to central Mexico (Veracruz, Puebla, and Queretaro). The two species can be separated by the following key.

- 1 Stipules entire to shortly bifid (divided less than half way); fruits globose (non-dimidiate) *Didymaea alsinoides*

- 1 Stipules deeply bifid, divided more than half way, often nearly to the base; fruits dimidiate and deeply bisulcate (rarely only one seed developing and fruit thus appearing subglobose) *Didymaea mexicana*

Didymaea alsinoides (Schltdl. & Cham.) Standl., Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 1291 (1938). Basionym: *Nertera alsinoides* Schltdl. & Cham., Linnaea 6: 413 (1831). Type: Mexico. “Cuesta Grande de Jalacingo”, *Schiede & Deppe 1271* (Holotype HAL!). Fig. 1.

The type of *Nertera alsinoides* was collected in central Veracruz at Cuesta Grande de Jalacingo near the border with Puebla. In their protologue Schlechtendal & Chamisso state “drupa succosa globosa,” a feature evident on the type (Fig. 1). Examination of the type collection clearly shows the entire to shortly bifid stipules (divided less than halfway) and globose (non-dimidiate) fruits, characters that differentiate this species from all other members of the genus. Additional collections examined from central Veracruz, Puebla, and Querétaro in central Mexico (but occurring nowhere else) also possess these features. Most herbarium collections annotated as *D. alsinoides* actually represent *D. mexicana*, a widespread species ranging from central Veracruz south to Panama.

In 1929 Standley described a second species *Didymaea linearis* Standl. characterized by pendant, vine-like stems and linear leaves based on a collection from Jalisco, Mexico, while also recognizing *D. mexicana* as a species ranging from south-central Mexico to Costa Rica (Standley, 1929). Subsequently he made the combination transferring *Nertera alsinoides* into *Didymaea*, and he placed *D. mexicana* in synonymy under *D. alsinoides* (Standley, 1938: 1291). Apparently he had not examined the type stating: “While I have seen no authentic material of *Nertera alsinoides*, the rather brief description seems to apply without any doubt to *Didymaea*, and I do not hesitate to make the transfer”. Unfortunately, Standley’s broad species concept of *D. alsinoides* and synonymy of *D. mexicana* have been widely adopted in the literature and have contributed to the confusion in this group. Lorence (1999) did recognize *D. alsinoides* and *D. mexicana* as distinct species without discussing the differences.

Didymaea mexicana Hook. f. in Benth. & Hook. f., Gen. Pl. 2: 150 (1873). Lectotype: Mexico. “Mexique, à Izhuatlancillo, région d’Orizaba, 12 Septemb. 1866, *E. Bourgeau 3050*” (K! right hand collection no. K000173295, here designated; isolecotype K! top collection, no. K000173298). Fig. 2.



Fig. 1. Holotype of *Nertera alsinoides* Schltdl. & Cham. (Schiede & Deppe 1271, HAL).



Fig. 2. Lectotype of *Didymaea mexicana* Hook. f. (right hand collection, Bourgeau 3050, K).

Hooker (1878) noted that *Didymaea mexicana* is characterized by having geminate stipules (divided nearly to the base) and didymous fruits, features that clearly separate this species from *D. alsinoides* as noted above. Hooker's (1878) diagnostic illustration in *Icones Plantarum* (p. 55, plate 1271) clearly shows these features.

Hooker (1873) based his generic description of *Didymaea* in *Genera Plantarum* on the species *D. mexicana*, but cited no exsiccatae. Subsequently, in his description of *D. mexicana* Hooker (1878) first typified the species citing seven collections from Veracruz, Mexico, all at Kew. They are as follows: two collections mounted on same sheet, "Pic d'Orizaba à 10000', Jun-Oct 1840, *H. Galeotti 4405*" (left hand collection K000173296) and "Mexique, à Izhuatlancillo, région d'Orizaba, 12 Septemb. 1866, *E. Bourgeau 3050*" (right hand collection K000173295); two collections mounted on same sheet, "Pce. de Veracruz, Pic d'Orizaba, fl. en août, 1838, *J. Linden 1403*" (top collection K000173293) and "Pic Orizaba, 10000', *Liebmann*, Pl. Mexic. Liebm. Rubiaceae n. 255" (bottom collection, K000173294); two collections mounted on same sheet, "région d'Orizaba, 12 septembre, 1865-1866, *Bourgeau 3050*" (top collection K000173298) and "Mexico, *M. Bates s.n.*" (bottom collection, K000173297); and "Vera Cruz to Orizaba, from Dr. Meisner, 1857, *Fred Muller 1519*" (K000173292). One cited collection, *Bourgeau 98*, was not located.

These collections must be regarded as syntypes and, according to the International Code of Botanical Nomenclature, a lectotype should be selected from among them. The *Bourgeau 3050* specimen collected in Veracruz with the label reading "Mexique, à Izhuatlancillo, region d'Orzaba, E. Bourgeau, 12 Septemb. 1866" (K000173295, mounted on the right-hand side of the same sheet as *Galeotti 4405*) is here designated as the lectotype of *Didymaea mexicana*. This specimen was selected because the collection is large, showing the plant's habit, and also is fertile with ample fruits and flower buds. Furthermore a duplicate (isolectotype) of *Bourgeau 3050* also exists at Kew (K000173298), mounted on the top half of the same sheet with an unnumbered *Bates* collection.

As here interpreted, *Didymaea mexicana* is a widespread and morphologically variable species ranging from central Veracruz to Panama. However, it is possible that additional taxa are represented in this complex. A detailed study of the genus using morphological and molecular techniques is needed to more accurately circumscribe species and understand evolutionary trends in *Didymaea*. Mr. Jaime Pacheco T. (Instituto de Biología, Universidad Nacional Autónoma de México) is currently studying the systematics of *Didymaea* focusing on morphology, anatomy, and palynology. This much needed work will undoubtedly increase our understanding of this fascinating genus.

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LITERATURE CITED

- Anonymous. 2005. International Plant Names Index. Published in internet: <http://www.ipni.org/index.html> (accessed 12 April 2008).
- Borhidi, A. 2006. Rubiaceas de México. Akadémiai Kiadó. Budapest. 512 pp.
- Burger, W. C. & C. M. Taylor. 1993. Rubiaceae. In: Flora Costaricensis. Fieldiana, Bot. n.s. 33: 1-333.
- Hooker, J. D. 1873. *Didymaea*. In: Hooker, J. D. & G. Bentham (eds.). Genera plantarum 2(1): 1-554.
- Hooker, J. D. 1878. *Didymaea mexicana* Hook. f. Hooker's Icones Plantarum. p. 55, plate 1271.
- Lorence, D. H. 1999. A nomenclator of Mexican and Central American Rubiaceae. Mo. Bot. Gard. Monogr. Ser. 73: 1-177.
- Robbrecht, E. & J.-F. Manen. 2006. The major evolutionary lineages of the coffee family (Rubiaceae, angiosperms). Combined analysis (nDNA and cpDNA) to infer the position of *Coptosapelta* and *Luculia*, and supertree construction based on *rbcL*, *rps16*, *trnL-trnF* and *atpB-rbcL* data. A new classification in two subfamilies, Cinchonoideae and Rubioideae. Syst. Geogr. Pl. 76: 85-146.
- Rzedowski, J. 1983. Dos nuevas especies mexicanas de la familia Rubiaceae. Bol. Soc. Bot. Méx. 44: 73-80.
- Standley, P. C. 1929. Studies on American plants (Rubiaceae). I. Publ. Field Mus. Nat. Hist., Bot. Ser. 4: 264-291.
- Standley, P. C. 1938. Rubiaceae. In: Flora of Costa Rica. Publ. Field Mus. Nat. Hist., Bot. Ser. 18: 1264-1380.
- Standley, P. C. & L. O. Williams. 1975. Rubiaceae. In: Flora of Guatemala. Fieldiana Bot. 24(11): 1-274.
- Terrell, E. E. 2006. Revision of *Houstonia* (Rubiaceae-Hedyotideae). Syst. Bot. Monogr. 48: 1-118.

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