



A new combination and lectotypification in the genus *Desmodium* (Papilionoideae: Desmodieae) of Mexico

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Abstract

During the review of the genus *Desmodium* for the different regional floras of Mexico, we have identified problems of nomenclature and typification such as the case of *Meibomia karwinskii*, wrongly cited in the list of Legumes of Oaxaca as *Desmodium karwinskii* and thus invalidly published. Also, in this list the attached illustration exhibits incorrect interpretations on its floral characters that does not agree with usage of this species. In this proposal, the nomenclature of the species name is discussed and justified here the designation of a lectotype and three isolectotypes. In addition, a more detailed description of the species is given based on recent field collections and illustrated with images of the habit and morphological characters.

Keywords: Leguminosae, *Meibomia*, nomenclature, Oaxaca

Introduction

Traditionally the tribe Desmodieae (Hutch. 1964: 477–478 emend: Ohashi 1981: 292–300) has been divided into 3 groups, *Lespedeza* Michaux (1803: 39), *Phyllodium* Desvaux (1813: 123) and *Desmodium* Desvaux (1813: 122); however, in recent molecular studies polyphyly has been demonstrated within the *Desmodium* group (Jabbour *et al.* 2018, Ohashi *et al.* 2018 a, b), which has led to the separation of many *Desmodium* species as independent genera such as *Bouffordia* H. Ohashi & K. Ohashi (2018: 179); *Hylodesmum* H. Ohashi & R.R. Mill (2000: 173), *Tateishia* H. Ohashi & K. Ohashi (2018: 178) and others (Ohashi *et al.* 2019 and references therein). With these morphological and phylogenetical studies, a new delimitation has been proposed for the genus *Desmodium* (Ohashi *et al.* 2019), where the still highly diverse genus *Desmodium* comprises two subgenera: subg. *Desmodium* with mostly New World taxa and subg. *Sagotia* with species distribute in Asia and Oceania (Ohashi 2019). These studies and our participation in taxonomical treatments of *Desmodium* for Mexican floras (i.e., Torres-Colín *et al.* 2015) and description of new species (i.e., Torres-Colín & Delgado-Salinas, 2008) has allowed us to recognize the type of *Meibomia karwinskii* Schindler and recent collections, as a member of this genus (subgenus *Desmodium*; section *Desmodium*).

Materials and methods

Revision of *Desmodium* material at ENCB, IEB, FCME, and MEXU, brought to our attention a group of relevant specimens at MEXU concerning the species of this study. Also specimen images of this name available online (JSTOR Global Plants: <https://plants.jstor.org/>; herbarium M, and W), including type material and authentic collections were examined (Herbarium acronyms follow Thiers, 2018). The recommendations for lectotype designation were followed according to the International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) (Turland *et al.* 2018). Barcode numbers of the lectotype and isolectotypes are given following the herbarium acronyms. The bibliographical citations in the original publications and databases such as IPNI (The International Plant Names Index; <http://ipni.org/>), TROPICOS (<http://www.tropicos.org/>), and The Plant List (<http://www.theplantlist.org/>) were also revised.

Light microscopy was used for plant description and trichome morphology that follows the classification of Leelavathi & Ramayya (1983). Scanning electron microscopy (SEM) images of the ovary from species collection (*L. Torres-Colin 1109*) were first rehydrated in distilled water, afterwards in graded ethanol and sputter-coated with gold. These samples were examined using a Hitachi S2460-N scanning electron microscope (Fig. 2).

Nomenclature and typification

It is important to first mention that in accordance to the Vienna Code (McNeill *et al.* 2006), the generic name *Desmodium* Desv. (1813) is conserved against the earlier names *Meibomia* Heister ex Fabricius (1759) and *Pleurolobus* J. Saint-Hilaire (1812) due to its very long usage in Botanical publications.

Anton Karl Schindler published *Meibomia karwinskii* Schindler (1924: 146) based on plants collected by W.F. Karwinski in Mexico, “Province of tropical Central America, Mexico: without location (by Karwinski!)” and characterized by “Legume (very immature) briefly stipitate, 6-articulated, folded, densely hairy uncinulate-enriched, mature unknown”. But he did not specify the type, precise locality, date and where the collection was deposited. However, according to “The Vascular Plant Collection at the Botanische Staatssammlung München”, published by SNSB—Botanische Staatssammlung München (2010–2020), Karwinski’s complete set of Mexican plants is currently deposited at M, while collecting for this Institution (McVaugh, 1980). These specimens were often labeled with very scanty annotations (read below), reason why the original description lacks such information. In addition, Schindler’s types are mainly at M (JSTOR Global Plants), and list of his main publications can be consulted in Schubert (1964).

To clarify the origin of the locality, we reviewed the history of Karwinski’s two field trips in Mexico (McVaugh, 1980, Rzedowski *et al.* 2009). In the first expedition (1827–1832) he collected in the state of Oaxaca, where most of his specimens include labels with imprecise information of locality and date. In the second expedition (1841–1843) most of his specimens were collected in the north of Veracruz and the state of Tamaulipas that carry herbarium labels generally associated with the name of the locality. Based on this information, and consulting Karwinski’s collections we found and identified two specimens of this species in the Botanische Staatssammlung München Herbarium (M). These specimens were compared with recent ones collected on the state of Oaxaca and were similar. Thus, we concluded that the type locality of *Desmodium karwinskii* corresponds to his first exploration in Mexico, and presumably from the same region in Oaxaca since it has a narrow distributional occurrence as mention below.

One of the specimens at M (M0233895) has an original label of the “Herbarium Regium Monacense” with original handwriting “Herb. in Mexico” “*Communic. de Karwinski*”, and in other ink and handwriting, “*Desmodium psilophyllum?* Schl.”, and the second one, with same annotation label by A.K. Schindler, “determinavit” as *Desmodium karwinskii* (28.4.1924).

The second Karwinski’s specimen at M (barcode 0233894) was acquired by M from the herbarium of Joseph Gerhard Zuccarini (in 1849), that contains duplicates of many important collectors. This sheet at M (of the *Herbarium Zuccarinii*) bears three labels: the original label has a glued label, in hand, “*in imperis mexicano*”, C. de Karwinski; another with different ink and handwriting notes “*Desmodium: nova species unifoliolata Mexicana. Desmodio psylophylo Schltdl. proxima videtur; sed rei edit. Foliolis, ramis pedunculis pubescentibus, racemis axillaribus simplicibus*”; and the annotation label by A.K. Schindler (dated 28.4.1924) as *Desmodium karwinskii* Schindl. This specimen is the only one out of three that has inflorescence with an immature folded loment, as Schindler described it.

The third specimen, here designated as isolectotype, is deposited at The Herbarium of the Natural History Museum in Vienna (W 0067922; photograph at F) and has five labels: 1) Typus (red label); 2) an original in handwriting *Hb. Endl.* [Endlicher] *Desmodium Mexico* Karwinsky; 3) the annotation label by A.K. Schindler (dated 28.4.1924) as *Desmodium Karwinskii* Schindl.; 4) the metric one, *Desmodium karwinskii* Schindl. (Karwinsky 32124), which corresponds to the negative number in the Field Museum’s collection of photo negatives, and 5) a label where the *Meibomia karwinskii* Schindl. lectotype is designated by J. Walter, 2016–07. This designation is not valid since no publication was found in which this taxon has been lectotypified. In addition, it has two stamps, 1) HERBARIUM MUSEICAESAREOPALATINIVINDOBONENSIS(#142), and 2) NATURHISTORISCHES MUSEUM WIEN W. This specimen does not carry the identification name of *Desmodium psilophyllum* Schltdl. (1838: 310) as the two other sheets at M.

Schindler labeled all three specimens as *Desmodium karwinskii* (in April 28, 1924), the same year of his publication “*Desmodium und Meibomia*, in *Repertorium Specierum Novarum Regni Vegetabilis* 20: 136–155. 1924”. This make us wonder if first decision was to publish this species as *Desmodium* Desv. and later, as was adopted in the introduction of his article, he changed his mind and published it as pertaining to the genus *Meibomia* Heist. ex Fabr.

These three specimens seem to be part of the same gathering, and consequently, following the International Code of Nomenclature for Algae, Fungi and Plants (Article 9.3 and 9.12, Turland *et al.* 2018) are syntypes, so we here designated the specimen with the barcode M0233895 (Fig. 1) as the lectotype, since it is the most complete, carrying lignescent stems and an immature folded loment which precisely corresponds to the information consulted in the protologue.

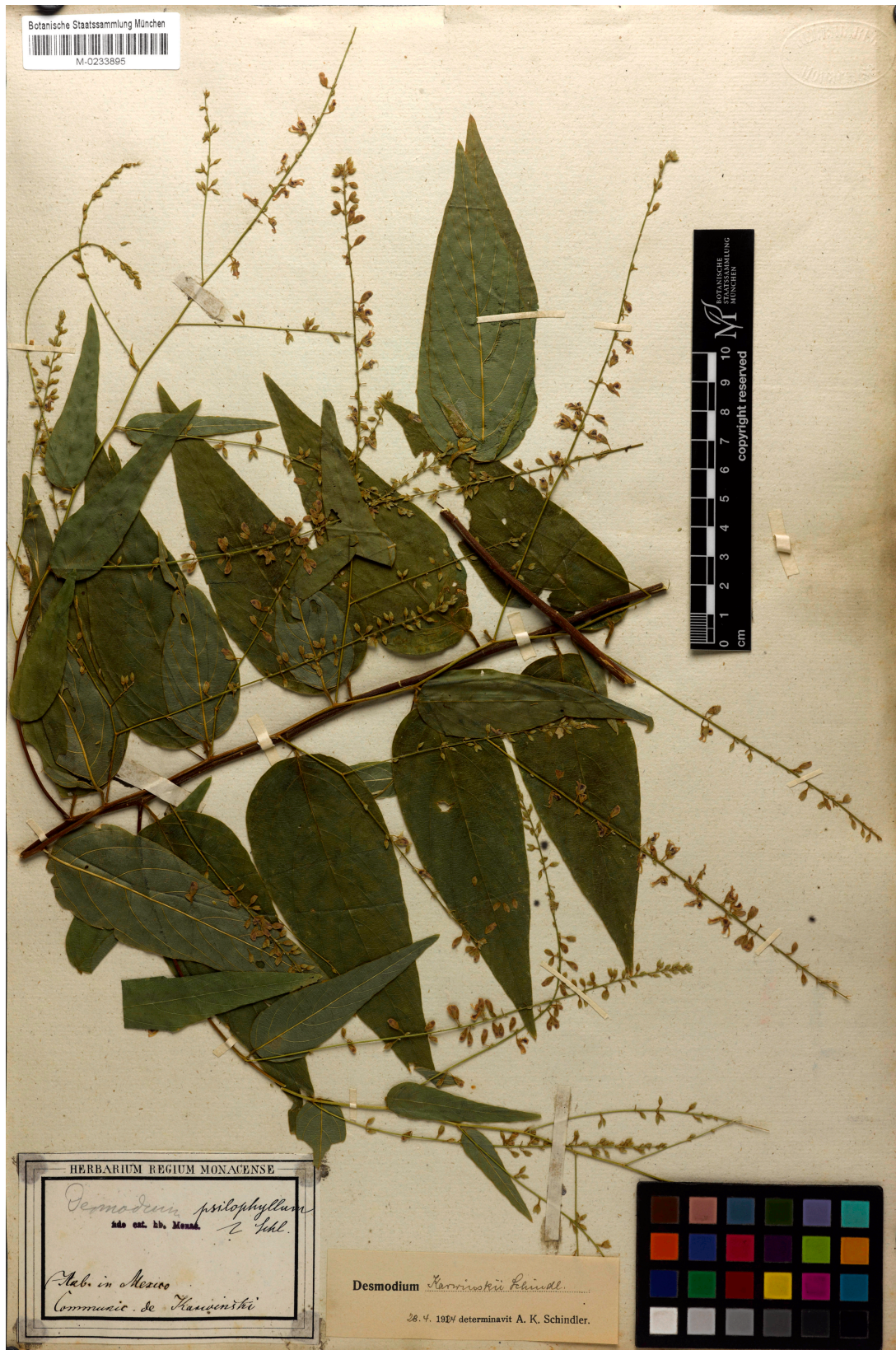


FIGURE 1. Digital image of the lectotype of *Meibomia karwinskii* Schindl., (M0233895). Reproduced by permission of the Botanische Staatssammlung Muenchen Herbarium (M).

Also, important to explained is that recently the name “*Desmodium karwinskii* Schindl.” was cited in a list of plants from Oaxaca state by García-Mendoza *et al.* (2004) and García-Mendoza & Meave (2011), and correspondingly attached an illustration that does not agree with this species name. Later “*Desmodium karwinskii* L. Torres” was listed as *ined.* in TROPICOS and unresolved by IPNI, demonstrating that this name was not validly published in accordance with the rules of the *Code* (Turland *et al.* 2018), since no lectotype designation was done, and the correct combination was wrongly named.

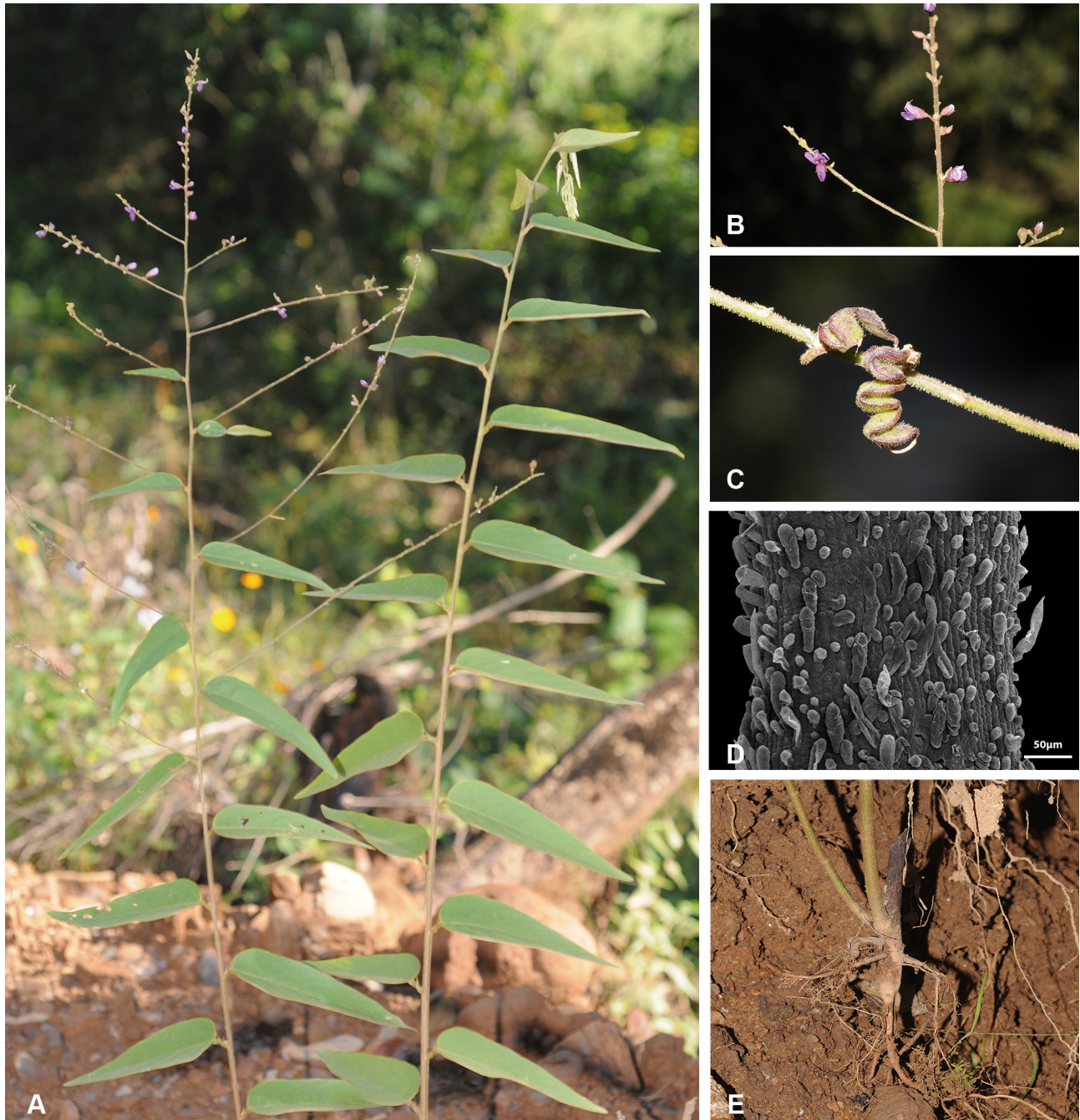


FIGURE 2. *Desmodium karwinskii*. A: Habit. B: Detail of the inflorescence and flowers. C: Articles of the folded loment. D: SEM image of the ovary surface covered by uniseriate filiform trichomes and uniseriate macroform trichomes. E: Fibrous, branched root. Field photographs taken by Carlos Gómez-Hinostrosa. Voucher: L. Torres-Colín *et al.* 1109 (MEXU).

New combination and lectotypification

Desmodium karwinskii (Schindl.) L. Torres-Colín & A. Delgado, *comb. nov.*

= *Desmodium karwinskii* Schindl. (2004: 266) *nom. ined.*

= *Desmodium karwinskii* L. Torres (TROPICOS) *nom. ined.*

= *Meibomia karwinskii* Schindler (1924: 146). Lectotype (designed here, Fig. 1):—MEXICO. “Hab. in Mexico”, [Oaxaca], *W.F. Karwinski s.n.* [s.d.] (lectotype at M, M0233895; isolectotypes, M, M0233894; W 0067922. Photograph of W specimen at F. (Negative n. 32124).

Description:—*Shrub*, 1.3–2.5 m tall, with conspicuous purple colorations in stems, leaves, and inflorescences parts, and fibrous, branched root (Fig. 2A,E). Stems long and cylindrical, striate, appressed hairy or glabrescent, with abundant lenticels and purple pigmentations. *Leaves* unifoliolate, alternate; stipules linear triangular, 4–6 × 0.4–0.8 mm, free, antrorse, early deciduous, usually with purple pigmentations, margin ciliate, the abaxial surface hirtellous, the adaxial surface glabrescent; short petioles 2.5–5.5 mm long, sulcate, densely hirsutellous with yellowish trichomes; stipels linear triangular, 3.5–7 × 0.2–0.5 mm, antrorse, persistent, usually with purple pigmentations, margin ciliate, abaxial surface glabrous and adaxial surface glabrescent. *Leaflets* 5.5–13.5 × 1–5.5 cm, chartaceous, ovate, base obtuse, apex acuminate, the abaxial surface hirsutellous, the adaxial surface hirsute or glabrescent, with yellowish trichomes on the midrib and primary veins, secondary venation marginal actinodromous, shortly hirsute margin. *Inflorescences* axillary or terminal simple raceme, 6–25 cm long, peduncles 0.5–3.5 cm long, hirsutellous and uncinata (Fig. 2B). *Primary bracts* linear triangular, 2–3 × 0.2–0.4 mm, usually with purple pigmentations, margin ciliate, the abaxial surface glabrous, the adaxial surface glabrescent, deciduous. *Secondary bracts* linear, 1–1.5 × 0.1 mm, usually with purple pigmentations, margin ciliate, glabrous on both surfaces, deciduous. *Flowers* 5–6.5 mm long, usually 2 per node; pedicels divaricate 1.5–2.5 mm long, with purple pigmentations, uncinata and hirtellous. *Calyx* bilabiate, tube ca. 1.5 mm long, with purple pigmentations, the abaxial surface hirtellous, the adaxial surface glabrous, upper lip bifid, ca. 2.5 mm long, lower lip with teeth 2.5–2.8 mm long. *Corolla* light purple; standard obovate, ca. 6.5 × 5 mm long, apex retuse, with yellow-spotted maculae in the center of the inner surface; wings oblong, 6 × 3 mm, unguiculate; keel petals narrowly obovate, 6.5 mm, apex obtuse, unguiculate. *Androecium* monadelphous, vexillary stamen attached above the middle of the tube, anthers basifixed. *Gynoecium* with sessile ovary, pubescent, covered by uniseriate filiform trichomes and uniseriate macroform trichomes (Fig. 2D), 6-ovulate; style thin and thickened in its apical part; stigma globose. Fruit loment, folded, sessile, indehiscent, 6 articles, isthmus central, both margins crenate-lobate; articles transversely elliptic, 2.8–3 × 2–3 mm, membranous, usually with purple pigmentations, slightly hirsutellous and uncinata (Fig. 2C). *Seeds* transversely elliptic, 1.5–1.8 × 1–1.4 mm.

Taxonomical Notes:—The specimen designated here as Lectotype was originally labeled as *Desmodium psilophyllum*; however, it is important to comment that, although both species develop single-leaflet leaves, contrasting differences in morphological characteristics such as leaves with short petioles and acuminate apex at leaflets, flowers on divaricate pedicels, and fruits sessile and folded in *Desmodium karwinskii* versus stipitate and flattened in *D. psilophyllum*, may be used to distinguish these two species. Also, *D. psilophyllum* is far more widely distributed, occurring throughout montane vegetation in the Southwestern United States, Mexico (states of Chihuahua, Chiapas, Coahuila, Guanajuato, Hidalgo, Nuevo León, Oaxaca, Puebla, Querétaro, San Luis Potosí, Tamaulipas, Veracruz), and Guatemala, while *D. karwinskii* is endemic of Oaxaca.

Additional specimens examined:—MEXICO. Oaxaca. Mpio. Putla Villa de Guerrero. Km 587, 4 km al SE de San Pedro Siniyuvi, de Putla hacia Yosotato, 800 m, 3 December 1985, *A. Bonet & A. Delgado 20* (MEXU); 1 km al SE de Concepción del Progreso, 17°1'51''N, 97°51'47''W, 786 m, 25 November 2013, *L. Torres-Colín et al. 1109* (MEXU); 10 km al NE de Putla de Guerrero, 900 m, 23 October 1977, *M. Sousa et al. 8512* (MEXU); San Pedro, a 3 km al NE de Putla de Guerrero, 850 m, 6 December 1978, *M. Sousa & S. Zárate 9873* (MEXU); 4 km al SE de San Pedro Siniyuvi, hacia Yosotato, 880 m, 31 October 1985, *R. Torres et al. 7616* (MEXU); 880 m, 16 December 1985, *R. Torres & C. Martínez 8041* (MEXU). Mpio. San Pedro El Alto. 4 km (en línea recta) al ENE de Rancho Copalita, camino a San Mateo Piñas, 15°58'33.7'' N, 96°25'19.7'' W, 948 m, 5 November 2019, *E. Martínez et al. 45655* (MEXU).

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