

A revision of neotropical *Diospyros* (Ebenaceae): part 3

B. Wallnöfer*

Abstract

In the course of a revision of New World Ebenaceae for "Flora Neotropica" and other regional floras, specimens from ca. 75 herbaria have been studied. The three Central American species *Diospyros anisandra* BLAKE, *D. bumelioides* STANDL. and *D. palmeri* EASTW. are here described in detail. A neotype is designated here for *D. texana* SCHEELE. Figures, distribution maps, lists of specimens and keys for identification are also presented.

Key words: Ebenaceae, *Diospyros anisandra*, *D. bumelioides*, *D. palmeri*, *D. texana*, revision, taxonomy, flora of Central America.

Zusammenfassung

Im Rahmen einer Revision der neuweltlichen Ebenaceae für "Flora Neotropica" und andere Regionalfloren, konnten Herbarbelege aus ca. 75 Herbarien studiert werden. Die drei mittelamerikanischen Arten *Diospyros anisandra* BLAKE, *D. bumelioides* STANDL. und *D. palmeri* EASTW. werden hier in Detail beschrieben. Ein Neotypus wird für *D. texana* SCHEELE ausgewählt. Abbildungen, Verbreitungskarten, Listen der gesehenen Herbarbelege und Bestimmungsschlüssel werden ebenfalls präsentiert.

Introduction

In the Americas, the Ebenaceae are represented by the genera *Diospyros*, with about 100–130 species, and *Lissocarpa* with 8 species. In the course of an ongoing revision of Ebenaceae (WALLNÖFER 2001a, 2001b, 2003b, 2004a, 2004b, 2004c, 2006, 2007, 2008a, 2008b, 2009, WALLNÖFER & MORI 2002, ESTRADA & WALLNÖFER 2007; see also DUANGJAI et al. 2006, 2009) for "Flora Neotropica", "Flora of Ecuador", "Flora of the Guianas", "Flora de Paraguay" and "Flora ilustrada de la Península de Yucatán" several new species have already been described (WALLNÖFER 1999, 2000, 2003a, 2005).

Note: Additions are given in brackets; coordinates given in brackets have been determined during this revision; acronyms of herbaria according to HOLMGREN & HOLMGREN (1998–2009); herbarium specimens are arranged according to ZANELLA et al. (2000); data from herbarium labels are cited here in a standardized way; – abbreviations: defl = deflorate; fl = flowering; flbuds = with flower buds; fr = fruiting; st = sterile; yfr = with young fruits; carp = fruit in the carpological collection; n.s. = not seen; 2× = 2 sheets.

Diospyros anisandra BLAKE, Proc. Biol. Soc. Wash. 34: 44–45 (1921); [fig. 1–3].

Typus: Mexico, Yucatán, forests of Suitun, [20°51' N, 88°56' W], fl (male), May 1916, **G.F. Gaumer & sons 23307** [holotype: F (photo F 59337; photo NY: N.S. 6891 at FHO), isotypes: BR, FHO, GH, K, LE n.s., US]; "a shrub 10 ft. high; blooms in May; flowers long, yellow and hanging; leaves a bright glossy green"; (on label at F: "at same time and place the next number [23308, see list of specimens below] was taken").

Shrub or small tree up to 10 (–12) m tall (already flowering when 1 m tall), dbh up to 4 (–17) cm, evergreen (according to ZAMORA CRESCENCIO 2003) or (?) semideciduous, with branches and twigs often spreading an angle of 60–90 (–110)° (obviously a facultative spreading climber and resembling certain species of *Randia* [e.g., *R. aculeata*, Rubiaceae] especially when young), developing long- and short-shoots; leading shoots remarkably thin and long; new, lateral shoots are either short-shoots from the beginning or more often they are several cm long (with well spaced, leaf-bearing nodes) and elongate during the following years only with short segments (internodes very contracted; proximal leaves scale-like, the distal ones fully developed and arranged whorl-like); short segments ± bent into the vertical position and ± densely covered with thickened and raised leaf scars and thus appearing thicker (± clavate) than the long segment of the first year (fig. 2a); only on rare occasions when the twig is subsequently transformed into a new leading shoot, long segments follow after the short ones; sometimes on long-shoot segments some perpendicularly orientated, conical, 0.5 cm long short-shoots with a remarkably wide basis are present resembling thorns; scales of **buds** ± ovate, obtuse or acute, often keeled on the back, densely hairy on the margins, glabrous or scattered hairy on abaxial side; young twigs subterete, with longitudinal ridges, gray to brown, with or without longitudinal lenticels, scattered to medium densely covered with appressed or ± spreading, straight or slightly flexuose, light, short hairs and at least partially (and especially on young plants) also with minute, patent, whitish-translucent, stiff hairs, but soon glabrescent; bark of older twigs ± smooth, later on with shallow fissures; **leaves** alternate, with brochidodrome venation, often partially covered with a dense layer of fine crystal needles (probably consisting of naphthoquinones); petioles 1–2 mm long, 0.5–1 mm thick, on adaxial side with a wide longitudinal groove and medium densely covered with short, patent hairs, on abaxial side usually glabrous, rarely with some scattered, appressed hairs; leaf scars light brown (strongly differing in color with respect to the bark of the twigs) or less frequently blackish, markedly thickened, protruding and ± decurrent on twigs; leaf lamina narrowly to broadly obovate, tapering into the petiole, (0.5–) 1.5–6.6 cm long, (0.3–) 1–3.9 cm wide, (1.1–) 1.5–2.5 (–3, on young plants up to 4.5) times longer than wide, chartaceous, shiny and darker green when alive adaxially, gray, dark brown or blackish and dull or sometimes slightly shiny when dry on both sides, glabrous (but frequently diseased, concave areas with a dense persisting indumentum can be seen on abaxial sides) and often minutely granulate (especially when young) on both sides; leaf apex usually emarginate, rarely broadly rounded; base of the lamina cuneate, decurrent along the petiole; leaf margin entire, with some scattered hairs when young, flat or ± revolute especially near base when dry; flachnectaria usually present only on abaxial leaf surfaces, a few ones rarely also on the adaxial side (e.g., on Cabrera & Cabrera 9350), dark when dry, markedly differing in size, often up to 100 on some leaves, the larger ones up to 10 per leaf, round or less frequently elongated, usually



FIELD MUSEUM OF NATURAL HISTORY
 NEGATIVE NO. 59337
 inches 1 2 3 4 5
 centimeters 1 2 3 4 5

HOLO TYPE OF:
Diospyros anisandra Blake
 Proc. Bio. Soc. Wash. 34:44. 1921.
 Ver. Laura Torres

25507
 A shrub 10 ft. high, blooms in May, flowers long, yellow and hanging; leaves a bright glossy green, taken in Suintun in May, at same time and place and place the next number was taken. Forests of Suintun, May 1916

TYPE PHOTOGRAPH COLLECTION
 of the New York Botanical Garden
 Negative: N. S. - 6891
Diospyros anisandra Blake
 Photographed at New York.



446760

446760
 HERBARIUM
 FIELD COLUMBIAN
 MUSEUM

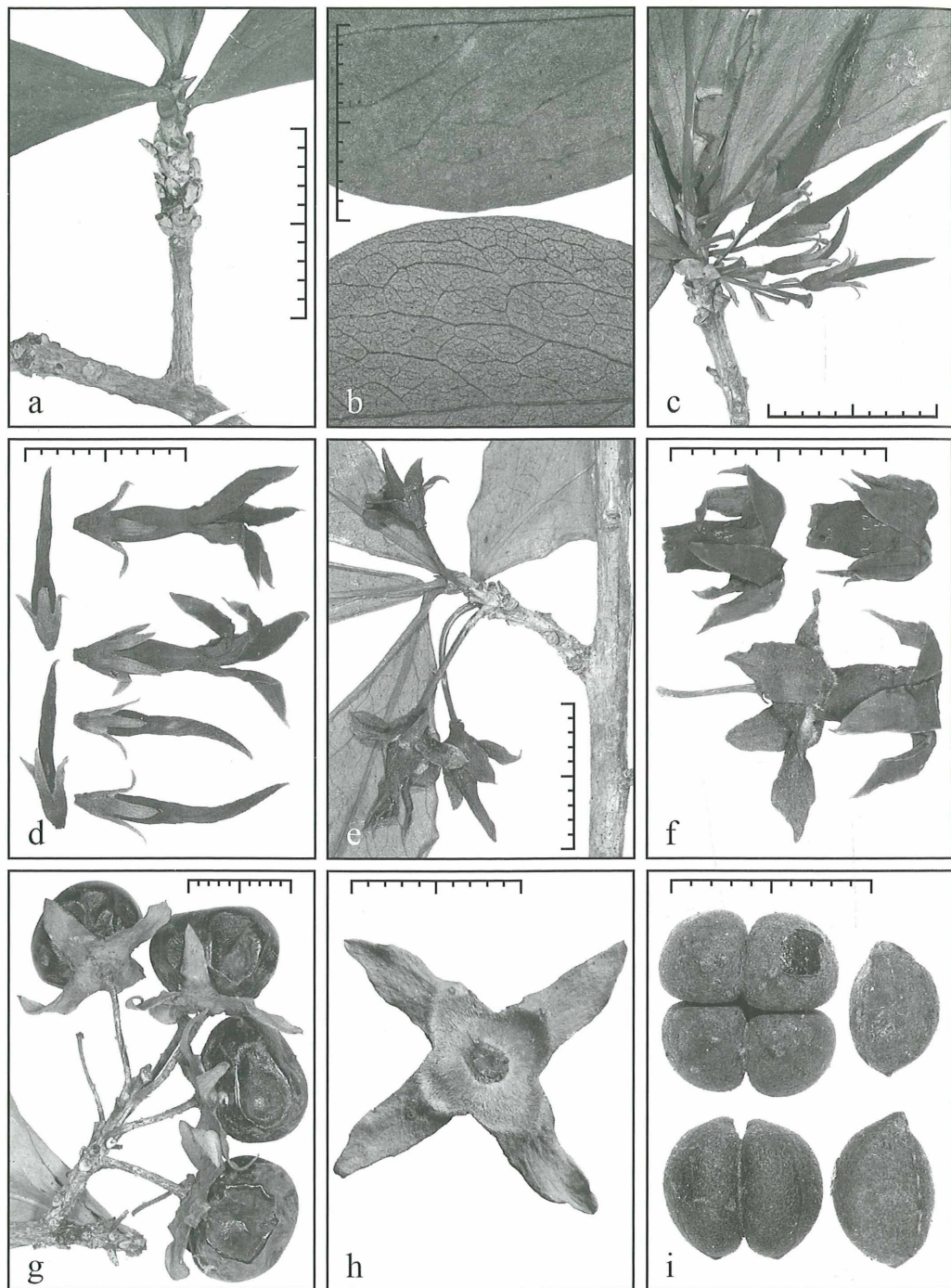
90/37
 NATURHISTORISCHES MUSEUM WIEN BOTANISCHE ABTEILUNG
 Holotype of:
Diospyros anisandra Blake
 Proc. Biol. Soc. Wash. 34:44-45 (1921)
 25. 9. 2009 det. rev. B. WALLNÖFER (W)
 Flora Mesoamericana

Field Museum of Natural History
 PLANTAE YUCATANAE
 No. 23307
Diospyros anisandra Blake.
 May 1916 Forests of
 Coll. GEO. F. GAUMER & sons Suintun

TYPE!

Diospyros anisandra Blake
 Det. C. Whitefoord & S. Knapp (BM) 4/1996

Fig. 1: Holotype of *Diospyros anisandra* BLAKE



present only in the proximal third of the leaves, the smaller ones wart-like or punctiform (and then hard to distinguish from injuries), distributed all over the leaf surface; midvein on the adaxial side slightly prominent, often \pm flat in proximal third, medium densely covered with minute, patent, whitish-translucent, stiff hairs especially proximally, on the abaxial side markedly prominent and usually glabrous, rarely with some scattered, appressed hairs; secondary veins ca. 5 per side, slightly raised adaxially, prominent abaxially, glabrous on both sides; intersecondary veins not conspicuous; tertiary and quaternary veins \pm flat on both sides, only hardly visible on old leaves; **inflorescences**: cymes of both sexes solitary in the axil of bracts or less frequently of \pm fully developed leaves, usually arranged on the proximal part of new, short shoots, rarely also near the base of new, long shoots; male cymes 1–2 (–3)-flowered, 1–8 (–17) together (fig. 2c); female cymes 1-flowered, 1–7 together (fig. 2e); **flowers** (3–) 4–5-merous; male flowers 8–10 mm long (without pedicel) at anthesis (fig. 2d); stalk (peduncle and pedicel) 2.5–7 mm long and 0.2–0.3 mm thick (pedicels of the lateral flowers 2 mm long), glabrous or especially distally with \pm scattered, patent hairs; bracts similar to the bud scales, ca. 1 mm long and 1.5 mm wide; bracteoles 1.2–4 mm long and 0.3–0.6 mm wide, usually linear (very rarely lanceolate and then up to 7 mm long and 2.7 mm wide), scattered hairy along the margins, glabrous or less frequently with some scattered hairs abaxially; calyx obconical, 3.5–5 mm long, undivided in the proximal 2–2.5 mm, glabrous and rarely also minutely granulate on the abaxial surface; calyx lobes triangular, (1.5–) 2–3 mm long, 0.8–1.5 mm wide, erect, acute and flexed outwards distally, usually glabrous abaxially, medium densely covered with spreading, slightly flexuose hairs abaxially and along the margins; corolla white, yellow or yellow-green when alive, black when dry; tube 5–7 mm long, narrowly urceolate or less frequently \pm cylindrical, widest in or below the middle and there 1.5–2 mm wide, glabrous on both sides; aperture of the corolla ca. 1 mm or less wide; corolla lobes narrowly triangular, (5.5–) 6–7.5 mm long and (1.3–) 1.5–2 mm wide, glabrous on both sides, reflexed, acute distally; stamina 4 or 5 (only one flower each of Lundell & Lundell 7530 and 7563 dissected), of different lengths, 3.5–6.5 mm long, glabrous; filaments 1.5–4.5 mm long, adnate to the base of the corolla tube for 0.8–1 mm; anthers 2 mm long and ca. 0.8 mm wide, widest in or below the middle, pointed distally, opening by two lateral slits in the distal half; rudiment of the ovary subglobose, ca. 1 mm long, densely hairy, distally pointed; **female flowers** slightly scented, ca. 5 mm long (without pedicel) at anthesis (fig. 2f); stalk (peduncle and pedicel) 5–13 mm long and 1 mm thick, glabrous or with very scattered, appressed hairs (but Acuña & Zayas 19923 from Cuba shows scattered, patent hairs on the stalks); bracts similar to the bud scales, 1.5–2 mm long and ca. 1.5 mm wide; bracteoles 2 (–10) mm long and 0.5–1 (–5.5) mm wide, broadly lanceolate to obovate, \pm hairy along the margins, scattered hairy on surfaces, mostly attached near the middle of the stalks, soon caducous, leaving thickened, strongly prominent, light brown scars (color

Fig. 2: *Diospyros anisandra*: **a**: shoot with thickened and raised leaf scars (from Leal & Rico-Gray 10 [CICY]); **b**: adaxial (on top) and abaxial (bottom) leaf surface (from Miranda 8067 [US]); **c**: male inflorescence (from Lundell & Lundell 7530 [LL]); **d**: male flowers (from Lundell & Lundell 7530 [LL + MICH]); **e**: female inflorescence (from Lundell & Lundell 7496 [F]); **f**: female flowers (from Lundell & Lundell 7568 [DS + US]); **g**: fruits (from Contreras 10393 [CAS]); **h**: calyx of a fruit, seen from adaxial side (from Contreras 10385 [US]); **i**: seeds (from Frisch N12 [W]); scale = 1 cm.

markedly contrasting with respect to the black pedicels); calyx 3–5 mm long, undivided in the proximal 1.5–2 mm, glabrous and lacking longitudinal ridges running down from the sinuses abaxially; sinuses between the calyx lobes flat, not enlarged; undivided (basal) part of the calyx on its inside (adaxial side) densely covered with light brown or sometimes ferruginous to dark brown, appressed, centrifugally (\pm parallel) orientated, \pm straight, long hairs, but \pm glabrous in some specimens; calyx lobes narrowly triangular, 5–10 mm long, (2–) 3–3.5 mm wide, acute distally, glabrous on both sides, but sometimes at the apex with scattered hairs when very young (Acuña & Zayas 19923 from Cuba shows, however, on the abaxial side at least on some places scattered and patent hairs), adaxially at the base with a markedly developed triangular, densely hairy step (compare also the description of fruits); corolla creamy-white, light yellow or yellow-green when alive (pale green when young), black when dry; tube urceolate, 3.5–4 mm long and 2.5 mm wide, widest near or below the middle, glabrous on both sides, or rarely (e.g., on Cabrera & Cabrera 13905) on the adaxial side slightly below the base of the lobes with some appressed, flexuose hairs; aperture of the corolla ca. 1 mm wide; corolla lobes narrowly triangular, 4.5–5.5 mm long and (1.3–) 1.5–1.8 mm wide, acute distally, reflexed, glabrous on both sides; staminodia missing (only one flower each of Lundell & Lundell 7496 and Gaumer & sons 23308 dissected); ovary 2 mm long and ca. 1.8 mm in diameter, glabrous, but at its base surrounded by a dense ring of straight hairs, 4-locular (but 3- and 5-merous flowers have not been analyzed in this respect); stylodia 4, ca. 1.5 mm long, fused together up to the apex, glabrous; stalk of the **fruits** of the same length like in flowers but slightly thicker; fruits oblate-globose (somewhat depressed near apex), up to 1.5 cm in diameter and up to 1 cm high when dry (fig. 2g), sweet and shiny when alive, changing colour from green to yellowish, reddish-orange, reddish-brown, red, dark red and finally to black when ripe, black (but often \pm pruinose, probably due to naphthoquinon-efflorescences), \pm shiny, smooth, wrinkled or with large folds when dry, usually glabrous (except around its attachment), rarely scattered hairy proximally, (1–) 4-seeded; fruit wall ca. 0.25 mm thick, with the epidermis adhering when dry; fruit pulp exiguous; calyx light green when alive, including the spreading lobes up to 2.5 cm wide; undivided (basal) part of the calyx \pm widely cup-shaped and often \pm funnel-shaped near the insertion of the stalk (as seen from the outside), adaxially densely hairy or rarely \pm glabrous on some specimens (e.g., Lundell 1154), adhering to the fruit and forming a cup or plate with 4 or 5 corners (fig. 2h) which protrude as triangles into the proximal part of the 4 or 5 calyx lobes and end there in a step (the calyx lobes are usually bent downwards after this step) which is densely covered with short and \pm spreading, rarely only with minute, stiff hairs; lobes (6–) 9–10 mm long and 2.5–3 (–4.5) mm wide, spreading or \pm flexed downwards, flat when dry, triangular to narrowly triangular, \pm acute distally, glabrous on both sides, without conspicuous, longitudinal venation; sinuses between the lobes broadly rounded and inconspicuous; seeds like the segments of an orange or \pm ellipsoidal-fusiform when only 1–2 per fruit (fig. 2i), 8 mm long, 5–5.5 mm wide, 5–6 mm thick, grayish-brown, with a finely texture on the surface.

Vernacular names: in Mexico (Yucatán) it is called by the Mayas: k'a kálche' (Simá 128), ka'ak'l'che' (Flores & Ludlow 10003), kakal ché (Medina 915), kakal che' (SOSA et al. 1985), kakalche' (ANKLI et al. 1999), kakalché (Estrada E-182, Ortega Torres & Mena 789), ka-kal-che (Leal & Rico-Gray 10), kakal-che (May 77), kakalche (Vargas 235,

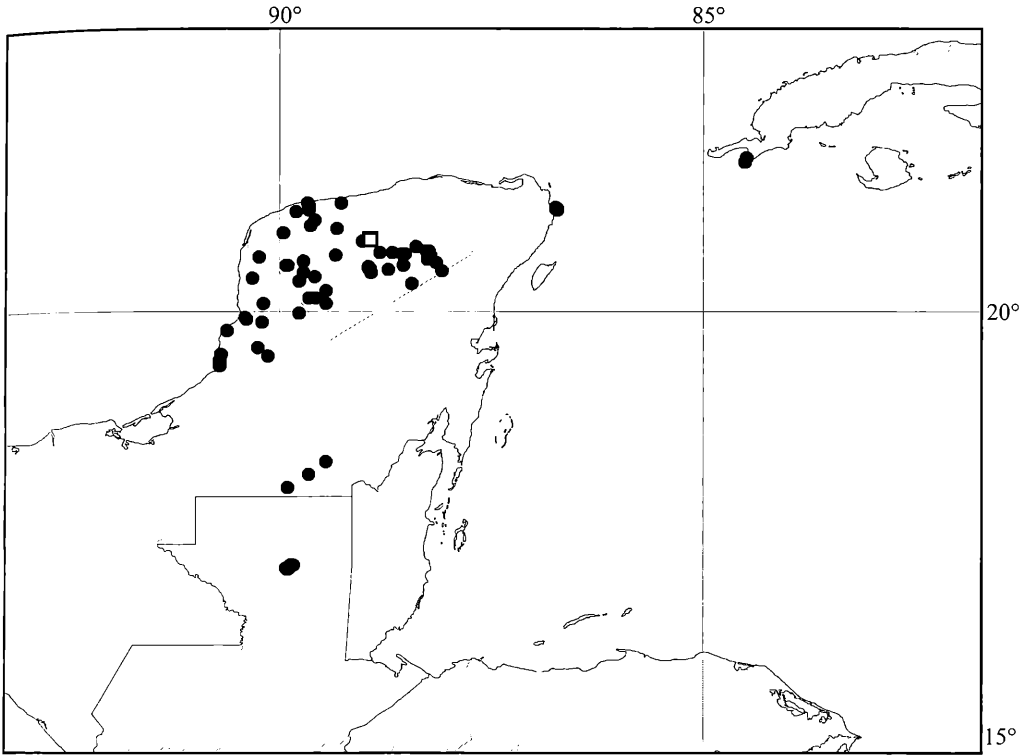


Fig. 3: Distribution of *Diospyros anisandra* BLAKE (●; type locality: □).

WHITEFOORD & KNAPP 1999–2009), kanan (ANKLI et al. 1999), kka ché (ZAMORA CRESCENCIO 2003), xkache' (BARRERA et al. 1976), xkachee (Flores s.n., WHITEFOORD & KNAPP 1999–2009), xk'akalche' (Simá 865, Ucán 4217), xnob che' (SOSA et al. 1985), xnobche' (BARRERA et al. 1976), xnob-che (Chan 3446), x-nob-ché (MARTÍNEZ 1978), xnobche (STANDLEY 1930), xnobché (Gaumer 688, indicating also the variants: xanobché, xonobche). – In Guatemala (Petén) it is called by the Itzá Mayas: ché kuuk hembra (Frisch N12), ebano (Wallnöfer & Tut-Tesucun 6003), kruskiis, crus de espina macho (Wallnöfer & Tut-Tesucun 6012) and palo santa maria (Wallnöfer 9499). The Maya word ché (che') indicates a tree which is usually taller than 3 meters.

Use: The wood is used for various utensils (Medina 915, Simá 128, Vargas 235), as timber (Chan 3446, Vargas 235) or firewood (Medina 915, Ucán 4217, Wallnöfer 9499). It is furthermore used as follows: "barzón para carga de caballo" (Ucán 4217), "el corazón se usa para sabukan (hilar)" (Medina 915), "capar ganado" (Vargas 235), "medicinal para castrar caballos" (May 77). The fruits are eaten (Flores & Ludlow 10003, Leal & Rico-Gray 10). The leaves of *D. anisandra* are used for curing dermatological problems (pimples, scabies, and inflammation) (ANKLI et al. 1999, 2002).

Distribution, habitat, ecology, and phenology: This species is known from the Yucatán peninsula (Campeche, Yucatán and Quintana Roo in Mexico, as well as from the central

part of Petén in Guatemala), and from the westernmost part of Cuba (Península de Guahacabibes in the state of Pinar del Río), (fig. 3). Concerning this remarkable disjunction see also CHIAPPY-JHONES et al. (2001). It grows from sea level up to an elevation of ca. 250 meter and occurs in low to medium tall, deciduous or semideciduous, primary or frequently also in secondary ("acahuales") forests and in thickets, on red or black, sometimes wet or shallow, usually calcareous soils, or on stony or sandy places on limestone. The soils are said to be of the following types: "suelo jo aktun puuk" (Simá 865), "suelo chac-kan-kab" (May 77) and "suelo tzekeel con abundante mat. orgánica" (Dorantes & Ek 38). *D. anisandra* was also collected in a "campo henequenero" (Cabrera & de Cabrera 9068), as well as in an "ecotono entre manglar - selva baja - duna costera" (Cabrera & de Cabrera 13396, 15448). In the southern part of its distribution range it is reported to grow in zapotales (climax forest dominated by *Manilkara zapota*) and ramonales (climax forest dominated by *Brosimum alicastrum*), (LUNDELL 1937). ZAMORA CRESCENCIO (2003) indicates it from the "selva baja caducifolia" (low, deciduous forest) in Campeche and states: "Por otro lado, en la estación seca del año, que generalmente ocurre a finales de enero y principios de junio, se observó que hay algunas plantas que mantienen sus hojas, tales como: *D. anisandra* " – It has been collected in flower from May to July (rarely also in August and September), and in fruit from January to March and from July to December.

Specimens examined: **Mexico, Campeche**, Mun. Calkini, 5,5 km E [W!] de Tancuche [= Tankuché], sobre el camino Calkini - Punta Arenas, [20°24' N, 90°19' W], acahual de selva baja con *Piscidia*, (fl female), 26 Jul. 1987, **E. Cabrera & H. de Cabrera 13905** [F], "arbusto 3 m; botones florales"; – Mun. Tenabo, Pomuch micro-ondas (microwave) station, 8,5 km SW of Hecelchakán, ca. 125 m, 20°06.12' N, 90°11.02' W, short dry forest on top of limestone hills, (yfr), 29 Aug. 1997, **M. Nee & D. Atha 47177** [NY n.s., W], "slender shrub 2.5 m tall; fruit green"; – 3 km S de Bolonchen de Rejón, en los alrededores de las Grutas de Xtacumbilxunán, [ca. 19°59' N, 89°46' W], selva mediana, con *Talisia*, (fl male), 21 May 1985, **E. Cabrera C., H. de Cabrera & O. Canul 8531** [CAS, MO], "arbusto 6 m; flores amarilla"; – en los alrededores de las Grutas de Xtacumbilxunán, a 3 km O de Bolonchen de Rejón, [ca. 19°59' N, 89°46' W], acahual maduro de selva mediana, (fr), 29 Sep. 1985, **E. Cabrera & H. de Cabrera 9512** [MO], "arbusto 4 m; fruto verde"; – Mun. Campeche, a 15 km NE de Campeche, camino a Mérida, 25 m, [19°56' N, 90°24' W], selva baja caducifolia, (fr), 6 Feb. 1983, **E.M. Martínez S. & O. Téllez 2989** [MEXU n.s., W], "arbusto 3 m"; – Mun. Campeche, km 16 carretera Campeche - Pomuch, entronque con Hampolol, 4 m, 19°50' N, 90°25' W [corrected in CICY: 19°55'30" N, 90°23'20" W], selva baja caducifolia, secundaria; suelo rojo, pedregoso, (yfr), 12 Oct. 1984, **C. Chan 4217** [CICY], "árbol 6 m; abund. escaso; fruto verde"; – Municipio Tenabo, entre San Pedro y Santa Rita, carretera Tinun - Emiliano Zapata, 19°53'12" N, 90°11'35" W, vegetación secundaria, dentro de la selva, (yfr), 28 Oct. 1997, **P. Zamora C. & H. Uc Cach 5888** [CICY], "arbusto 2,5 m; [abundancia] regular; fruto verde"; – Campeche - Champotón road, km 9, [19°47' N, 90°37' W], (fr), 27 Feb. 1958, **B.G. Schubert & A. Gomez Pompa 1660** [A], "slender shrub with deep red fruit the size of a cherry"; – 19 km S de Cayal, km 44 de la carr. 180, cerca de la Zona Arqueológica de Edzna, [19°35' N, 90°15' W], acahual de selva mediana, (defl male), 21 May 1985, **E. Cabrera, H. de Cabrera & O. Canul 8518** [MO], "arbusto 3 m; flor amarilla"; – a 15 km N de Champotón, sobre la carretera Campeche - Champotón, [19°30' N, 90°41' W], manglar-selva baja, (defl female, yfr), 3 May 1987, **E. Cabrera & H. de Cabrera 13396** [MEXU n.s., W], "arbusto 6 m; fruto verde"; – (Mun.) Campeche, 1 km antes de llegar al poblado de Pich, 19°31' N, 90°14' W [corrected in CICY: 19°29'00" N, 90°07'45" W], selva mediana subperennifolia, secundaria; suelo negro somero con regular mat. orgánica, (yfr), 11 Aug. 1983, **A. Puch 1266** [CICY], "arbusto 2,5 m; abund. escaso; fruto verde"; – 8 km N de Champotón, sobre la carretera Cd. del

Carmen Campeche, [19°26' N, 90°42' W], acahual de selva mediana; suelo arenoso, (fl male), 26 Jul. 1986, **E. Cabrera & H. de Cabrera 11788** [MO], "arbusto 4 m"; – Mun. Champotón, 6 km N de Champotón, sobre la carr. 180 tramo Ciudad del Carmen - Campeche, [19°25' N, 90°42' W], selva baja, con *Caparis*, *Pithecellobium*, *Vitex*; suelo arenoso, (yfr), 22 Nov. 1986, **E. Cabrera & H. de Cabrera 12734** [MO], "arbusto 3 m; fruto verde"; – 6 km NE de Champotón, sobre la carretera Ciudad del Carmen - Campeche, [19°25' N, 90°42' W], veg. secundaria; suelo arenoso, (fr), 30 Nov. 1987, **E. Cabrera & H. de Cabrera 15180** [F], "arbusto 3 m; fruto verde"; – Mun. Champotón, Champotón, Río Champotón, 1 m, 19°20' N, 90°45' W [19°22' N, 90°42' W], selva baja caducifolia, primaria; suelo negro semi-pedregoso, (fr), 19 Oct. 1981, **C. Chan & E. Ucan 947** [CICY], "arbusto 3 m; abund. regular; fruto verde claro"; – Mpio. Calakmul, loc. Ejido Narciso Mendoza, a 1 km del poblado, carr. Xpujil - Narciso, 250 m, 18°14'20" N, 89°27'10" W, secundaria de selva baja subcaducifolia, (fr), 25 Aug. 1997, **D. Alvarez M. 288** [CICY, MO n.s.], "arbusto de 2 m con fruto verde inmaduro"; – Calakmul, [18°5' N, 89°39' W], (fr), 31 Dec. 1931, **C.L. Lundell 1154** [DS, F, GH, MICH (photo at LL), MO, NY, US], "small tree"; – a 65 km S de Conhuas, en el Centro Regional de Calakmul, limite norte del Petén Guatemalteco, [ca. 17°56' N, 89°54' W], selva mediana con *Brosimum*, *Bursera*, etc., (fr), 17 Mar. 1983, **E. Cabrera, T.P. Rammamoorthy, J.L. Godínéz & H. de Cabrera 4460** [MO], "arbusto 3 m; fruto amarillo"; – Yucatán, Municipio Progreso, Carretera Mérida - Sierra Papacal - Chuburná Puerto, ca. 11 km al norte de Sierra Papacal, 3–10 m, 21°11'00" N, 89°47'50" W, selva baja caducifolia bastante alterada mezclada con elementos de selva baja caducifolia con cactáceas columnares y abundantes Convolvulaceae como *Jacquemontia pentantha* (JACQ.) G.DON y *Merremia cissoides* (LAM.) HALLIER f. y sobre los afloramientos de roca caliza plantas como *Cienfuegosia yucatanensis* MILLSP. y *Senna polyphylla* (JACQ.) H.S.IRWIN & BARN., (fr), 21 Jan. 2000, **G. Carnevali, J.L. Tapia & F. May-Pat 5971** [CICY], "arbusto hasta 2,5 m; frutos verdes"; – Progreso, [21°17' N, 89°40' W], (flbuds male), 1932, **R.S. Flores s.n.** [F], "flores blancas, estambres 5"; – 5 km al S de Puerto Progreso, sobre la carretera Mérida/Puerto Progreso, [21°15' N, 89°39' W], selva baja con *Thouinia*, *Bursera*, etc., (fr), 24 Nov. 1986, **E. Cabrera & H. de Cabrera 12846** [MO, TEX], "arbusto 5 m; fruto verde"; – a 7 km S de la desviación a Yucalpeten, sobre la carretera Mérida - Pto. Progreso, [21°12' N, 89°39' W], selva baja con *Thouinia*, (fr), 25 Sep. 1985, **E. Cabrera & H. de Cabrera 9350** [MO, RSA], "arbusto 4 m; fruto verde"; – Progreso, km 23, Merida road, [21°12' N, 89°39' W], thicket, (fl male), Jul. 1938, **C.L. Lundell & A.A. Lundell 7981*** [MICH], "shrub 8 ft."; – ["Quintana Roo"], a 10 km al N de Telchac [= Telchac] Pueblo, sobre la carretera Motul - Telchac [= Telchac] Puerto, [21°17' N, 89°16' W], selva baja con *Thouinia*, *Randia* etc., (fr), 1 Oct. 1985, **E. Cabrera & H. de Cabrera 9636** [RSA], "arbusto 3 m; fruto verde"; – a 12 km al O [SW!] de Humucma [= Hunucmá], sobre la carretera Mérida - Celestun, [20°56' N, 89°57' W], veg. secundaria, en campo henequenero, (fr), 20 Jul. 1985, **E. Cabrera & H. de Cabrera 9068** [MO], "arbusto 1 m; fruto verde"; – Mun. Mérida, Jardín Botánico CICY, arboretum, 21°01'30" N, 89°38'30" W, veg. secundaria; selva baja caducifolia, rejolla, (yfr), 9 Oct. 1987, **S. Escalante 291** [CICY], "árbol 6 m; fruto verde inmaduro"; – same locality: colección de selva con cactáceas, 21°01'42" N, 89°38'17" W, selva baja caducifolia, (fl male), 24 Jul. 1995, **J.C. Trejo, P. Simá & R. Durán 351** [CICY], "árbol 1,8 m"; – Mun. Mérida, borde del cenote Xlakah en Dzibilchaltún, 5 m, 21°05' N, 89°26' W [corrected in CICY: 21°05'25" N, 89°35'52" W], borde de selva, primaria; suelo pedregoso, (fr), 5 Nov. 1982, **J. Leal & V. Rico-Gray 10** [CICY], "árbol 2 m; abund. escasa; fruto verde y rojizo al madurar"; – a 8 km al O [= W] de Cacalchen, sobre la carretera Tixkokob - Tekanto, [20°59' N, 89°19' W], acahual de selva mediana con abundante *Gymnopodium*, (yfr), 27 Sep. 1985, **E. Cabrera & H. de Cabrera 9470** [MEXU n.s., W], "arbusto 3 m; fruto verde"; – Xanaba [UPS-label: "at Xkanaba"], [20°50' N, 89°1' W], (fl male or fl female, fr), s.d., **G.F. Gaumer 688** [A, F 2×, K, UPS]; – Suitun, [20°51' N, 88°56' W], forests, (fl male or fl female), May 1916, **G.F. Gaumer & sons 23308** [paratypes: CAS, DS, E, F, GH, US, W], "a shrub 10 ft.; blooms in May; flowers short, erect and of a maroon color; the leaves were not so glossy as the preceding number"; – Mun. Sudzal, 9 km N de Holcá [= Holcá] hacia Tzalam, [20°51' N, 88°55' W], selva baja

subcaducifolia, primaria; suelo somero, con abundante materia orgánica; asoc.: *Bursera*, *Bunchosia*, Euphorbiaceae, (fl female), 14 May 1985, **E. Estrada E-182** [CICY n.s. (photocopy)], "árbol 3,5 m; abund. regular; flores viejas"; – (Halacho), Rancho el Naranjo 2 km W of Chunchucmil, 12 m, ca. 20°41' N, 90°13' W [20°39' N, 90°14' W], in a pasture; regional veg.: tropical deciduous forest; soil black and wet, (yfr), 8 Sep. 1988, **L.M. Ortega Torres & E. Mena P. 789** [RSA], "tree ca. 3 m; fruits green with red"; – (Mun. Opichén), hills above Calcehtok, [added in CICY: 20°33'00" N, 89°54'45" W], trailside, (fr), 26 Sep. 1982, **S.P. Darwin 2285** [BM, CICY, F, MO], "tree 12 ft. tall; fruits becoming orange when mature"; – Mun. Opichén, carretera Calcehtok - Grutas de Oxkintok, unos 1–2 km al S del pueblo de Calcehtok, 30–100 m, ca. 20°33'00" N, 89°54'27" W, selva baja caducifolia sobre suelo superficial muy pedregoso y con abundantes afloramientos de rocas calcáreas; vegetación dominada por árboles y arbustos de las Fabaceae, Rhamnaceae, Malvaceae, *Plumeria* sp. y *Diospyros* sp.; lugares abiertos con abundantes rosetas de *Hechtia schottii* BAKER; trepadoras abundantes; epifitas muy escasas, (fr), 6 Nov. 1996, **G. Carnevali, I.M. Ramirez, F. May Pat & C. Espadas 4324** [CICY n.s., UPRRP n.s., W], "arbusto o árbol 2,5–4 m, localmente escaso y disperso; frutos maduros rojo-naranja"; – Municipio Abalá, 15 km al S del poblado de Yaxcopoil, a lo largo de la carretera Mérida - Muna, 20–50 m, ca. 20°36'30" N, 89°42'50" W, aguada o cenote de unos 200 metros de diámetro en esta época del año, con vegetación acuática en las orillas con *Cyperus* sp., *Bacopa* sp. y *Pluchea* sp., rodeada de una matriz de selva baja caducifolia bastante alterada con especies arbóreas como *Bursera simaruba* (L.) SARG., *Gynopodium floribundum* ROLFE y *Cnidocolus aconitifolius* (MILL.) I.M.JOHNST. y epifitas como *Tillandsia brachycaulos* SCHLECHT.; los márgenes rocosos del cenote con *Hechtia schottii* BAKER, (fr), 7 Nov. 2001, **G. Carnevali, J.L. Tapia-Muñoz, F. May-Pat & M. Gómez-Juárez 6446** [CICY n.s., W], "árbol 3–4 m alto; frutos verdes"; – 2 km S de Muna, sobre la carretera Uman - Holpelchen, [20°28' N, 89°43' W], selva baja con *Agave*, (fr), 23 Jan. 1986, **E. Cabrera & H. de Cabrera 10809** [MEXU n.s., W], "arbusto 3 m; fruto verde"; – Ticul y al O. (hacia la Sierrita), [20°25' N, 89°35' W], (fl female, fr), 16 Sep. 1954, **F. Miranda 8067** [US]; – Uxmal, [20°22' N, 89°46' W], in thicket covering ruins, (fr), May - Aug. 1938, **C.L. Lundell & A.A. Lundell 8165** [A, DS, F, LL, MICH, US], "shrub 8 ft. high"; – Mun. Oxkutzcab, 6 km rumbo a Cooperativa, 150 m lado izquierdo del camino, 20°15'35" N, 89°27'00" W, veg. secundaria, conuco de 9 años de abandono; suelo jo aktun puuk; asociada a cruz k'iix, (fr), 25 Aug. 1988, **P. Simá 865** [CICY], "árbol 3 m; abund. regular; frutos verdes"; – en los alrededores de la Zona Arqueológica de Sayil por la carretera Uxmal - Oxkutzcab, [20°10' N, 89°39' W], selva mediana con *Karwinskia*, (fr), 25 Dec. 1985, **E. Cabrera & H. de Cabrera 10352** [MO], "arbusto 4 m"; – Mun. Oxkutzcab, en los alrededores de la zona arqueológica de Labná, a 28 km SE de Oxkutzcab, [added in CICY: 20°10'15" N, 89°34'42" W], acahual de selva mediana, (fr), 22 Jul. 1985, **E. Cabrera & H. de Cabrera 9179** [CICY, MO], "arbusto 8 m; fruto verde"; – Mun. Oxkutzcab, Xul, antigua carretera Xul - Tekax km 4.5, 120 m, 20°10' N, 89°32' W [corrected in CICY: 20°06'08" N, 89°27'36" W], selva mediana decidua, secundaria; suelo chac-kan-kab, ruderal; asociada: tsi tsilche, (yfr), 16 Aug. 1983, **F. May 77** [CICY], "arbusto 2,5 m; abund. regular; fruto verde"; – Cuzamá, 4 km al S de Chunkanán, en un cenote, 20°40'05" N, 89°20'00" W, selva baja subcaducifolia; suelo tzekel con abundante mat. orgánica; asoc. *Agave*, *Parmentiera*; crece sobre laja, (fr), 19 Nov. 1995, **A. Dorantes & B. Ek 38** [CICY], "arbusto 1 m; abund. escaso; frutos verdes y rojos"; – Mun. Sotuta, Ejido Sip, en Tixcaltuyub, 22 m, 20°27' N, 88°54' W [corrected in CICY: 20°31'50" N, 88°57'20" W], selva baja caducifolia, primaria; estrato arbustivo; suelo pedregoso de color rojo; con *Lysiloma latisiliqua*, (fr), 12 Oct. 1983, **J.S. Flores & B. Ludlow W. 10003** [CICY], "arbusto 2 m; abund. regular; fruto redondo de 1 cm diam."; – Mun. Sotuta, km 6 camino Tixcaltuyub Sotuta a 200 m del camino lado sur, 20 m, 20°35' N, 80°00' W [corrected in CICY: 20°31'35" N, 88°57'00" W], selva mediana decidua, secundaria; monte de 50 años; suelo negro pedregoso, (yfr), 1 Aug. 1983, **P. Simá 128** [CICY], "árbol 4 m; abund. escaso; fruto verde"; – Mun. Yaxcabá, Tixcaltuyub (Rancho Sta. Maria-Norte), 24 m, 20°27' N, 88°54' W [corrected in CICY: 20°30'50" N, 88°56'35" W], selva baja-mediana, secundaria; suelo rojo pedregoso, (fr), 29 Nov. 1980, **C. Vargas 235** [CICY], "árbol 10 m;

abund. regular; fruto amarillo-moreno"; – [Mun.] Yaxcabá, 3 km al S de Tixcacaltuyub [= Tixcacaltuyú], sobre la carretera a Peto, 20 m, 20°28'00" N, 88°55'05" W, selva baja caducifolia, secundaria; milpa roza; suelo rojizo negro, textura granular-arcilloso, caliza, (st), 10 Aug. 1988, **M.E. Medina 915** [CICY], "árbol abundante, retoño"; – near Libre Union, [20°42' N, 88°49' W], in advanced deciduous forest; abundant in undergrowth, (fl male), May - Aug. 1938, **C.L. Lundell & A.A. Lundell 7563** [BRIT, DS, DUKE, LL, MICH, MO, NY, US, WIS n.s.], "arborescent shrub 6–10 ft. high"; – SE Kancabonot [= Kancabzonot or Kancabzonot], [20°30' N, 88°43' W], (fl male or fl female), May 1917, **G.F. Gaumer & sons 23863** [A, BM, C, F 2×, G, GH n.s., MA, MO, NY, UPS, US]; – same data and collectors **23863 bis** [F], fl (female)"; – off Piste - Libre Union road, [20°42' N, 88°40' W], in advanced deciduous forest, (fl female), May - Aug. 1938, **C.L. Lundell & A.A. Lundell 7568** [A, DS, F, LL, MICH, NY, US], "shrub 8 ft. high; corolla creamy-white or pale green"; – en los alrededores de las Grutas de Balancanche a 36 km W de Valladolid, [20°41' N, 88°33' W], acahual de selva mediana, (fr), 2 Oct. 1985, **E. Cabrera & H. de Cabrera 9712** [MEXU n.s., W], "arbusto 6 m; fruto verde"; – en los alrededores de las Grutas de Balancanche a 32 km W de Valladolid, [20°41' N, 88°31' W], acahual de selva mediana con abundante *Randia*, (fr), 29 Jun. 1985, **E. Cabrera & H. de Cabrera 8759** [MEXU n.s., W], "arbusto 3 m; fruto verde"; – same locality: acahual de selva mediana, (fr), 23 Jul. 1986, **E. Cabrera C. & H. de Cabrera 11612** [MEXU n.s., W], "arbusto 6 m; fruto verde"; – Chichen Itzá, off Kaua road, [20°40' N, 88°32' W], in advanced deciduous forest, (fl male), Jun. - Jul. 1938, **C.L. Lundell & A.A. Lundell 7530** [BRIT, DS, F, LL, MICH, MO, NY 2×, P, US], "shrub or treelet 8–12 ft. high; corolla yellow-green"; – 11 km S Xcalacoop, [20°33' N, 88°32' W], (yfr), 14 Aug. 1979, **J. Utley & K. Utley 6496** [MO], "low tree to 3 m; immature fruits green"; – Tinum, Xnakal Lu'um, ejido de Tinum, 22 m, ca. 20°45'59" N, 88°23'30" W, selva baja caducifolia, secundaria, en la orilla del cenote; suelo moreno lajoso; asociada a *Clusia* y *Ficus*, (fr), 24 Oct. 1985, **E. Ucan & B. Poot 4312** [CICY n.s., SEL, W], "árbol 12 m; abundancia regular; fruto verde"; – Mun. de Valladolid, Pixoy, 22 m, 20°42' N, 88°14' W [corrected in CICY: 20°42'53" N, 88°15'45" W], orilla de una milpa; selva baja caducifolia; veg. secundaria; suelo rojo pedregoso; asoc. *Mimosa*, (fl male), 15 May 1985, **E. Ucan et al. 3904** [CICY], "árbol 4 m; abund. regular; flor blanca"; – near Yokdzonot [= Yokdzonot], [20°43' N, 88°14' W], advanced deciduous forest, (fl female), May - Aug. 1938, **C.L. Lundell & A.A. Lundell 7496** [A n.s., BRIT, DS, DUKE, F, LL, MICH, NY], "tree 25 ft., 2 in. diam.; corolla yellow-green"; – same locality: in advanced, deciduous forest; abundant in undergrowth, (yfr), May - Aug. 1938, **C.L. Lundell & A.A. Lundell 7925** [A, DS, F, LL, MICH, US], "shrub or treelet 6–15 ft. high"; – Mun. Valladolid, en la orilla del camino hacia Dzitnup, km 3 de Valladolid, 22 m, 20°42' N, 88°12' W [20°40' N, 88°13' W], selva mediana subcaducifolia, secundaria; suelo negro y pedregoso, (yfr), 20 Aug. 1980, **E. Ucan 323** [UC], "arbusto 2 m, escaso; fruto verde y redondo"; – 1 mi SW of Chichimilá, ca. 25 m, 20°37' N, 88°15' W, woods on limestone, (fr), 4 Aug. 1972, **G.L. Webster & S. Lynch 17689** [DAV, GH, MO], "common shrub 2–3 m tall; fruits becoming black"; – Xocén, Valladolid, 20°35'56" N, 88°09'45" W, veg. secundaria; selva baja caducifolia, en la orilla de una milpa; suelo rojo, pedregoso; asociada a *Lonchocarpus rugosus*, (fr), 17 Oct. 1985, **E. Ucán 4217** [CICY], "árbol 7 m; abund. escaso; fruto verde"; – Mun. de Valladolid, Xuilub, 8 km from Xuilub on the road to Xocén, 25 m, 20°29' N, 88°05' W, forest more than 20 years (Nukuch k'aax); semideciduous tropical forest, (yfr), 24 Oct. 1989, **B. Mogensen 1169** [CICY], "tree 10 m; fruits green"; – camino Xcocmil a Pop, Chikindzonot, 10 m, 20°20'15" N, 88°26'30" W, veg. secundaria; selva baja caducifolia; suelo moreno pedregoso, (yfr), 26 Jul. 1984, **C. Chan 3446** [CICY], "árbol 8 m; abund. escaso; fruto verde"; – Merida, Xcanxunup, [not located], (fl male), Aug. 1865, **A. Schott 922** [BM]; – without further data, (fl female), 1917–1921, **G.F. Gaumer 24030** [BM, C, F, G, GH, MA, MO, NY, UC, UPS, US 2×]; – Quintana Roo, 3 km al S de la zona urbana, sobre el camino a La Hacienda Mundaca, Isla Mujeres, [21°14' N, 86°44' W], selva baja con *Acacia pringlei*, (fr), 5 Mar. 1986, **E. Cabrera C. & H. de Cabrera 11032** [MO, TEX, WIS n.s.], "arbusto 4 m; fruto verde"; – same area: veget. secundaria, (fl buds female), 25 Jun. 1987, **E. Cabrera & H. de Cabrera 13645** [BM, MO n.s.], "arbusto de 4 m; flor crema"; – cerca de la Hacienda Mundaca, ca.

3,5 km al SE de la zona urbana de Isla Mujeres, [21°14' N, 86°44' W], selva baja, con *Euphorbia*, (fr), 25 Jan. 1987, **E. Cabrera & H. de Cabrera 13050** [MO], "arbusto 4 m; fruto verde"; – a 3 km al N del Parque Natural El Garrafón, en Isla Mujeres, [21°13' N, 86°43' W], selva baja con *Esenbeckia* y *Pithecellobium*, (fr), 8 Jan. 1986, **E. Cabrera & H. de Cabrera 10480** [MO, RSA], "arbusto 3 m"; – Isla Mujeres, camino al Puerto de Abrigo, [added in CICY: ca. 21°13'30" N, 86°44'00" W], selva baja, (fr), 1 Nov. 1990, **E. Cabrera, S. Torres & H. de Cabrera 17212** [CICY], "arbusto 4 m, abundante; fruto maduro, negro"; – 500 m al N de Playa Lancheros, sobre el camino al Restaurant Hacienda Gomar, Isla Mujeres, [21°13' N, 86°43' W], ecotono entre manglar - selva baja - duna costera, (fr), 6 Jan. 1988, **E. Cabrera & H. de Cabrera 15448** [MO], "arbusto 3 m; fruto verde"; – frente al Parque Natural El Garrafón, a ca. 7 km al SE de la zona urbana de Isla Mujeres, [21°12' N, 86°43' W], selva baja con *Guaiacum*, *Adelia*, etc., (fr), 13 Sep. 1987, **E. Cabrera & H. de Cabrera 14221** [MO], "arbusto 4 m; fruto verde"; – Mexico, without further data, (st, fr), s.d. (1968), **F. White 9079** [FHO 4×], "sparsely-branched straggling tree up to 3 m tall; leaves dark green and glossy above"

Guatemala, Petén, Lake Petén Itzá, bordering lake between San José and Chachaclun, [ca. 17°1' N, 89°52' W], in low forest, (fr), 24 Jan. 1971, **E. Contreras 10382** [LL, MO, S], "shrub 12 ft. high, 1 in. diam.; fruits bright red"; – same locality and data: **E. Contreras 10385** [LL, MO, S, US], "shrub 15 ft high, 2 in. diam.; fruit sweet"; – same locality: in low forest, (fr), 25 Jan. 1971, **E. Contreras 10393** [CAS, LL, MO, S, US], "shrub 10 ft. tall"; – Lake Petén Itzá, 3 km E [NE!] of San José, [ca. 17°1' N, 89°52' W], bordering lake, (fr), 2 Aug. 1966, **E. Contreras 5893** [DS, G, LL, NY], "shrub 25 ft. high, 4 in. diam."; – E [NE!] of San José, along N shore of lake, [ca. 17°1' N, 89°50' W], in forest on gypsum cliffs, (fr), 22 Jan. 1962, **C.L. Lundell 17227** [DUKE, LL, S, WIS n.s.], "slender shrub; fruits black and shiny"; – same locality: abundant in forest on gypsum cliffs along shore of lake, (fr), 22 Jan. 1962, **C.L. Lundell 17232** [LL, MICH, MO, S, US], "slender shrub 10 ft. high; fruits shiny and black"; – NW-Ufer des Lago Petén Itzá: Sekundär-Vegetation am Fuße des kleinen Hügels direkt N des Chakmamantok-Felsens (in Seeufer-Nähe), im Anwesen von R.O. Frisch, das ist 0,5 km NNE Zentrum von San José, ca. 150 m, 16°59'12" N, 89°53–54' W, (st), 14 Dec. 2006, **R.O. Frisch 2006-1** [W], "Lebendmaterial: Blätter adaxial glänzend, dunkler grün als abaxial; Mittelnerv heller grün, ganz leicht erhaben; Seitennerven leicht erhaben; kleinere Nervatur ganz leicht erhaben, kaum erkennbar; - Blätter abaxial viel schwächer glänzend, heller grün als abaxial; mäßig dicht mit kleinen, hellen Punkten bedeckt (wohl Atemhöhlen unter den Stomata); Mittelnerv heller grün, erhaben; Seitennerven nur leicht erhaben; kleinere Nervatur nahezu flach, besser erkennbar; Flachnektarien: entweder gleichfarbig wie umgebende Fläche und nur schlecht sichtbar, auch kaum eingesenkt, oder alt und schwärzlich; Blattstiele grün"; – am Gipfel des Chakmamantok-Felsens, das ist 0,5 km NE Zentrum von San José, 150 m, 16°59'9" N, 89°53–54' W, (st), 22 Aug. 1993, **B. Wallnöfer & F.M. Tut-Tesucun 6003** [USCG, W], "steriles, sparriges Sträuchlein 0,3–0,5 m"; – an der Straße San José - Nuevo San José, das ist W des Chakmamantok-Felsen bzw. 0,5 km NE Zentrum von San José, ca. 140 m, 16°59'8" N, 89°53–54' W, Gebüschaum und Böschung ober der Straße, (fl female, yfr), 24 Aug. 1993, **B. Wallnöfer & F.M. Tut-Tesucun 6012** [M (MSB), MO, NY, U, USCG, W], "sparriger Strauch bis Baum 3 (–8) m; DBH 3–4 (–17) cm; Kelch grün, mit (3–) 4 (–5) Zipfeln; Krone hell gelblich; Blüten etwas duftend; Früchte grün, mit (2–) 3 (–4) Samen; Fruchtsaft sich schnell schmutzig orange verfärbend"; – same locality: ca. 180 m, 16°59'11" N, 89°53–54' W, Sekundärvegetation an der Böschung der Straße, (fr), 24 Nov. 1994, **B. Wallnöfer 9499** [M (MSB), MO, NY, U, USCG, W], "geneigtes Bäumchen 2 m hoch; Früchte grün, später einseitig bräunlichrot, dann vollständig rot; Kelchzipfel an den Früchten spreizend, hellgrün"; – between San Andres - San José, bordering Lake Petén Itzá, [ca. 16°58' N, 89°54' W], in zapotal, (fr), 19 Sep. 1976, **C.L. Lundell & E. Contreras 20381** [LL, MO, NY], "shrub 15 ft., 3 in. diam.; fruit reddish-green"; – Umgebung von San José und San Andrés, 115–250 m, [ca. 16°58' N, 89°54' W], (fr), 20 Feb. 1993, **R.O. Frisch N12** [W].

Cuba, Pinar del Rio, Península de Guanahacabibes, Tetas de María la Gorda, [21°49' N, 84°29' W], (yfr), 25 Jul. 1955, **J. Acuña & F. Zayas 19923** [GH]; – Guanahacabibes, María la Gorda, I. Reserv., [ca. 21°49' N, 84°29' W], in silvis litoralibus calcareis, (fr), 14 Jan. 1970, **A. Borhidi, O. Muniz & S. Vazquez s.n.** [BP n.s. (dig. photo)]; – Guanahacabibes, prope Cabo Corrientes, [21°45' N, 84°31' W], in silvis siccis calcareis carsticis, (fr), 15 Jan. 1970, **A. Borhidi, O. Muniz & S. Vazquez s.n.** [BP n.s. (dig. photo)].

Diospyros bumelioides STANDL., Trop. Woods 18: 31–32 (1929); [fig. 4–6].

Typus: Belize, Orange Walk, Honey Camp, [18°2' N, 88°26' W], (fr), Sep. - Dec. 1928, **C.L. Lundell 137** [holotype: F (photo F 52490; photo NY: N.S. 6892 at FHO), isotypes: G ex F, K, NY (without number!), US], "tree"

Small tree up to 12 m tall (already flowering when 2 m tall), evergreen (according to White 9083), but at least some branches seem to lose all their leaves; trunk diameter up to 7 (–25) cm; bark smooth, pale brown, mottled with whitish grey (White 9083); slash 1.5 mm thick, green outside, pale yellow inside, soon becoming deep orange-yellow (White 9083); branches and twigs consisting of long- and short-shoots, sometimes spreading at an angle of up to 90° (a facultative spreading climber?); growth of twigs similar to that of *D. anisandra*, but short-shoots with a greater tendency to branch (thus branches appearing often gnarled); thorn-like short shoots missing; scales of **buds** ± ovate, obtuse or ± acute, densely covered with appressed, straight or slightly flexuose, gray to light brown hairs; young twigs subterete, with longitudinal ridges running down from the leaf insertions or ± irregularly flattened especially when very young, gray to dark brown, with or without lenticels, scattered to medium densely covered with appressed to slightly spreading, straight or slightly flexuose, light hairs of different lengths and at least partially (and especially on young plants) also with minute, patent, whitish-translucent, stiff hairs, but soon glabrescent; bark of older twigs ± smooth, later on with shallow fissures; **leaves** alternate, with brochidodrome venation, often covered with a dense layer of fine crystal needles (probably consisting of naphthoquinones); petioles 1.5–2 mm long, 0.8–1 mm thick, on adaxial side ± flat and densely covered with short, patent hairs, on abaxial side usually covered with appressed, long hairs; leaf scars dark, thickened and protruding; leaf lamina obovate, gradually tapering into the petiole, (0.4–) 1.5–3.5 (–5) cm long, (0.3–) 0.7–2 (–2.3) cm wide, 1.6–3.5 times longer than wide, chartaceous to slightly coriaceous, dark green when alive, brownish and dull or sometimes ± shiny on both sides when dry, on the abaxial side with scattered, appressed, ± straight, light hairs of different lengths and on the adaxial side with shorter and thinner, patent hairs when young, soon glabrescent on both sides (except on diseased, concave areas on abaxial sides where a dense indumentum persists); leaf apex usually emarginate; base of the lamina narrowly cuneate, decurrent along the petiole; leaf margin entire, slightly revolute especially near the base when dry; flachnectaria usually only on abaxial leaf surfaces (very rarely also on adaxial sides, e.g., on Contreras 8643), 0–5, dark, round, usually only present in the proximal half of the lamina (but many, wart-like or ± punctiform structures, hardly distinguishable from injuries, are located especially distally and may also represent flachnectaria); venation sometimes light brown and differing in color with respect to the lamina and then ± well visible; midvein on the adaxial side slightly prominent, rarely ± flat, scattered to medium densely covered with spreading

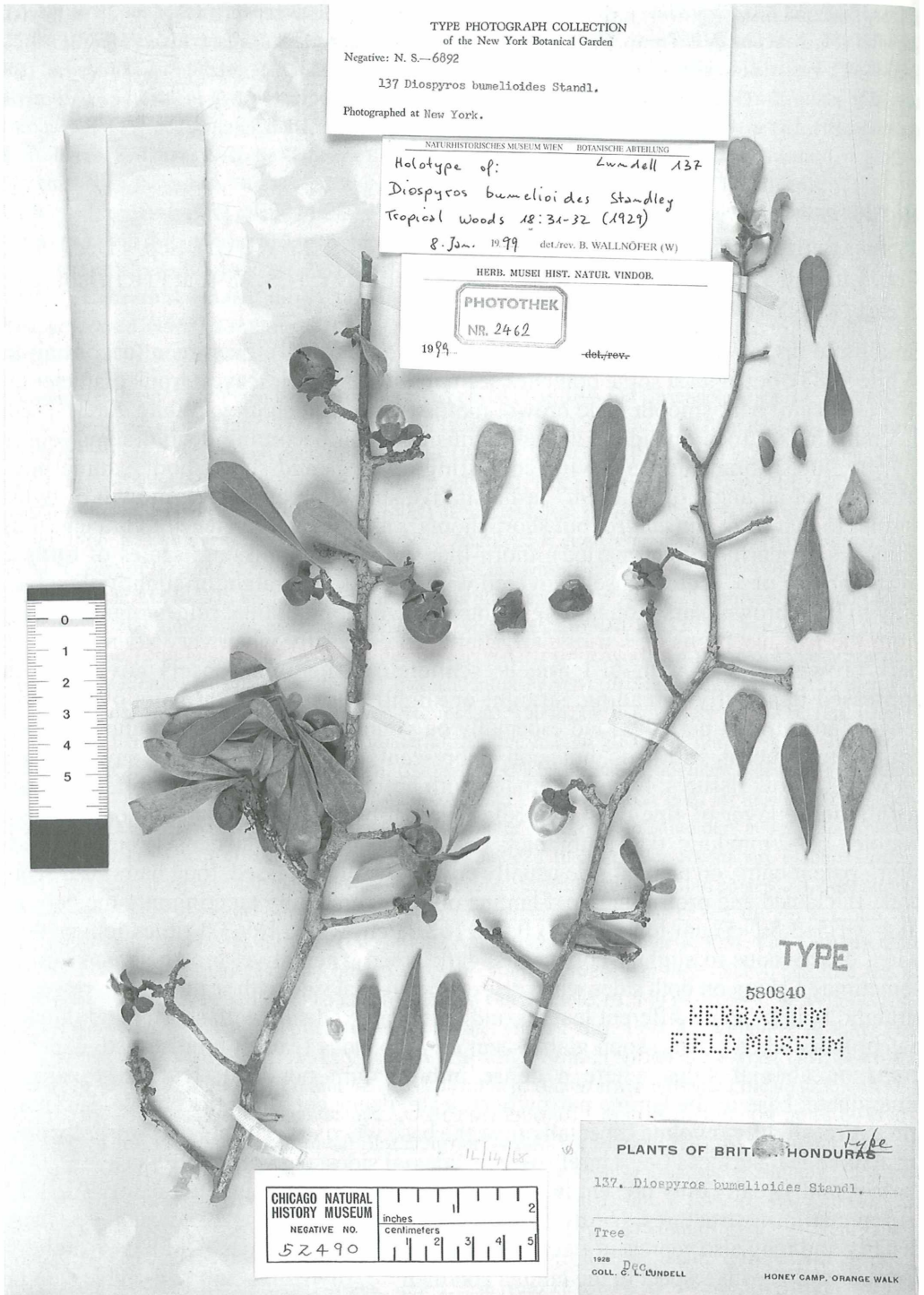


Fig. 4: Holotype of *Diospyros bumelioides* STANDL.

or patent, slightly flexuose hairs, especially distally glabrescent with age, on the abaxial side markedly prominent and with scattered, appressed, long hairs, \pm glabrescent with age; secondary veins ca. 3–4 per side, slightly prominent adaxially, \pm flat abaxially, often scarcely visible, glabrous on both sides; intersecondary veins not conspicuous; tertiary and quaternary veins \pm flat on both sides, not or only visible when differing in color; **inflorescences**: cymes of both sexes solitary in the axil of bracts or less frequently in that of \pm fully developed leaves, usually arranged on the proximal part of new, short shoots, rarely also near the base of new, long shoots; male cymes 1 (–2)-flowered, 1–2 (–3) together (fig. 5b); female cymes 1-flowered, 1–2 (–4) together; **flowers** (3–) 4 (–5)-merous; male flowers 7–9 mm long (without pedicel) at anthesis (fig. 5c), said to be pendulous (WHITEFOORD & KNAPP 1999–2009); stalk (peduncle and pedicel) 1.5–6 mm long and 0.5–0.8 mm thick, scattered to medium densely covered with straight to flexuose, \pm spreading, long hairs and with minute, patent, whitish-translucent, stiff hairs; bracts similar to the bud scales, 0.5–1.5 mm long and ca. 0.8 mm wide, abaxially densely hairy; bracteoles (0.5–) 1.5–6 mm long and (0.3–) 0.8–2 mm wide, usually \pm linear, the larger ones obovate, scattered hairy, often already shed at anthesis; calyx obconical, 4–5 mm long, undivided in the proximal 1.5–2.5 mm, with scattered, appressed, \pm straight, light hairs of different lengths abaxially; calyx lobes \pm ovate (widest shortly above the base), 2.5–3 mm long, 1–1.5 mm wide, erect, obtuse (rarely \pm rounded) and slightly flexed outwards distally, scattered hairy abaxially, \pm densely covered with patent hairs of different lengths adaxially, at the apex with a dense tuft of light hairs; corolla white, cream or yellow when alive, black when dry; tube 6.5 mm long, narrowly urceolate, widest below the middle and there 2 mm wide, covered abaxially by a dense, appressed, light indumentum composed of straight, long and quite thick, as well as of short hairs, glabrous on the inside and near base on the outside; aperture of the corolla ca. 1 mm wide; corolla lobes triangular, ca. 4 mm long and ca. 1 mm wide, abaxially covered with the same sort of indumentum as on the tube, but \pm glabrous towards the margins and apex, glabrous adaxially, acute and with a dense tuft of light hairs distally; stamina 8–9 (only two flowers of Martinez et al. 27584 dissected), of different lengths (5 are long, 3 are short), 4.5–5.5 mm long, usually glabrous (but one stamen with a few appressed hairs on the abaxial side of the connective); filaments 2–3 mm long and ca. 0.2 mm wide, adnate to the base of the corolla tube for ca. 0.8 mm; anthers 2–2.5 mm long and ca. 0.3 mm wide, widest in the lower half, tapering into a long tip distally, opening by two lateral slits; rudiment of the ovary \pm globose, ca. 1 mm long, densely hairy; **female flowers** 7 mm long (without pedicel) at anthesis (fig. 5d); stalk (peduncle and pedicel) (1–) 2–4 mm long and 0.5–0.8 mm thick, medium densely covered with light, straight or slightly flexuose, \pm appressed to spreading hairs of different lengths; bracts similar to the bud scales, 1–1.8 mm long and ca. 0.8 mm wide; bracteoles 1.5–4.5 mm long and 0.6–1.8 mm wide, linear (the larger ones obovate), densely hairy on the apex and margins, but scattered hairy on the lamina, slightly revolute, leaving thickened and prominent, brown scars; calyx 5–6.5 mm long, undivided in the proximal 2–3 mm, covered with the same kind of indumentum as on the male calyx, lacking longitudinal ridges running down from the sinuses abaxially; undivided (basal) part of the calyx on its inside (adaxial side) densely covered with appressed, centrifugally (parallel) orientated, \pm straight, long hairs, but glabrous in the lower half; calyx lobes \pm semicircular or broadly ovate, (2–) 3.5–4 mm long and 2.5–3.5 mm wide, slightly involute, broadly rounded or obtuse, rarely slightly

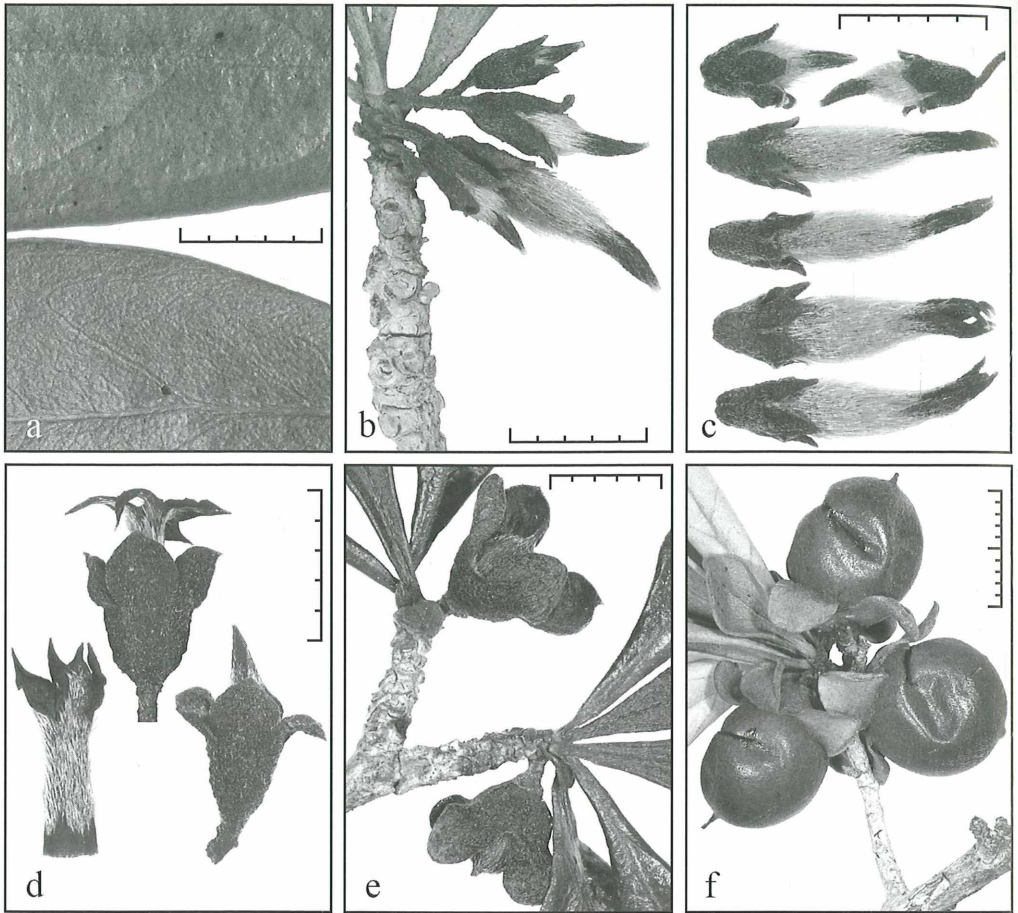


Fig. 5: *Diospyros bumelioides*: **a**: adaxial (on top) and abaxial (bottom) leaf surface (from Lundell s.n. = 137 [NY]); **b**: male inflorescence and **c**: male flowers (both from Martínez S. et al. 27584 [CICY]); **d**: female flowers (from Contreras 8482 [LL]); **e**: young fruits (from Contreras 8643 [TEX]); **f**: fruits (from Contreras 195 [LL]); scale = 5 mm, except f = 1 cm.

emarginate distally, spreading or \pm flexed downwards, on abaxial side scattered hairy, on adaxial side medium densely (near base densely) covered with spreading, straight or slightly flexuose, light hairs of different lengths; corolla white or yellow when alive, black when dry; tube narrowly urceolate, 4–5 mm long and 1.8–2 mm wide, widest in the lower half, on the outside covered by a dense, appressed, light indumentum composed of straight hairs of different length and thickness, glabrous on the inside and near base on the outside; aperture of the corolla ca. 1 mm wide; corolla lobes triangular, ca. 3 mm long and 2 mm wide, abaxially on the back covered with the same sort of indumentum as on the tube, but \pm glabrous towards the margins and apex, glabrous adaxially, acute and with a dense tuft of thin, light hairs distally; staminodia missing (only one flower of Contreras 8482 dissected); ovary ovoid (gradually tapering into the stylodia), 2.5 mm

long (without stylochia) and 1.8 mm in diameter, densely covered with appressed, straight hairs, 4-locular (but 3- and 5-merous flowers have not been analyzed in this respect); stylochia 4, 1.5 mm long, fused together nearly up to the apex, densely hairy except on the apex; stalk of the **fruits** 2–5 mm long and 1–1.5 mm thick (strongly enlarged distally), covered with weathered remnants of the indumentum; fruits globose or slightly \pm ovoid (fig. 5e, 5f), up to 1.3 (–1.5) cm high and in diameter when dry, distally with the mucro-like remnant of the stylochia, green (also when ripe?) when alive, brown to dark brown or rarely blackish, slightly shiny and smooth when dry, scattered to medium densely covered with, appressed to slightly spreading, straight or slightly flexuose, light hairs of different lengths, often only 2-seeded; fruit wall ca. 0.25 mm thick, with the epidermis adhering when dry, firm, rarely appearing to have become soft (mature?) and consequently wrinkled; fruit pulp exiguous; calyx including the spreading lobes up to ca. 2 cm wide; undivided (basal) part of the calyx \pm widely cup-shaped (as seen from the outside), on its inside (adaxial side) densely hairy distally and \pm glabrous proximally, adhering to the fruit and forming a cup or plate with 4 (rarely 5) corners (similar to fig. 2h) which protrude as triangles into the proximal part of the 4 (or 5) calyx lobes and end there in a densely hairy step (the calyx lobes are usually bent downwards after this step); lobes 6–8 mm long and 5–7 mm wide, not adhering to the fruit, \pm flat when dry, \pm semicircular or broadly ovate, covered with the same indumentum as on the flowers, without conspicuous, longitudinal venation; sinuses between the lobes broadly rounded and inconspicuous; seeds like the segments of an orange or \pm ellipsoidal, 9–11 mm long, 4 mm wide, 5 mm thick, dark brown, with a finely texture on the surface.

Vernacular names and use: not known. Probably it has not been distinguished from *D. anisandra* (see there) by the natives.

Distribution, habitat, ecology, and phenology: This species is only known from the central and southern part of the Yucatán peninsula and occurs in Mexico (Campeche, Quintana Roo and Tabasco), in Guatemala (Petén), and in Belize (Belize, Orange Walk, and most probably also in Cayo), where it grows from sea level up to an elevation of ca. 300 meter, (fig. 6). It occurs in seasonally inundated, swampy areas covered by low to medium tall, semideciduous, primary (sometimes also secondary) forests and thickets. These wooded swamps are called "bajos", "tintales" (when dominated by *Haematoxylum campechianum*) or "akalches" (LUNDELL 1937). *D. bumelioides* has been reported to be abundant or co-dominant in some localities but to be scarce in others. According to Jan C. Meerman (Belmopan, email communication July 2009), "in Belize it is found in low, scrubby forests including savanna hammocks, typically where moisture availability fluctuates between extremes, from inundated during rainy periods to bone dry in the dry season" He reported it from the following localities (MEERMAN 2003–2009): Aguas Turbias NP (Orange Walk, UTM: 16Q 274415 1979115, 19.11.2003), Northern Highway (Belize, UTM: 16Q 342200 1968350, 21.12.1991), near Spanish Lookout (Cayo, UTM: 16Q 276700 1918500, and 16Q 275575 1921600, both: 100 m, 7.1.2000); Western Highway: Cheers (Cayo, UTM: 16Q 333800 1958500, 20.12.1999); Western Highway: JB's (Cayo, UTM: 16Q 331870 1914350, 20.12.1999).

D. bumelioides has been collected in flower from May to July, and in fruit from January to March, from August to October and in December (in May and July it has been found with very young fruits).

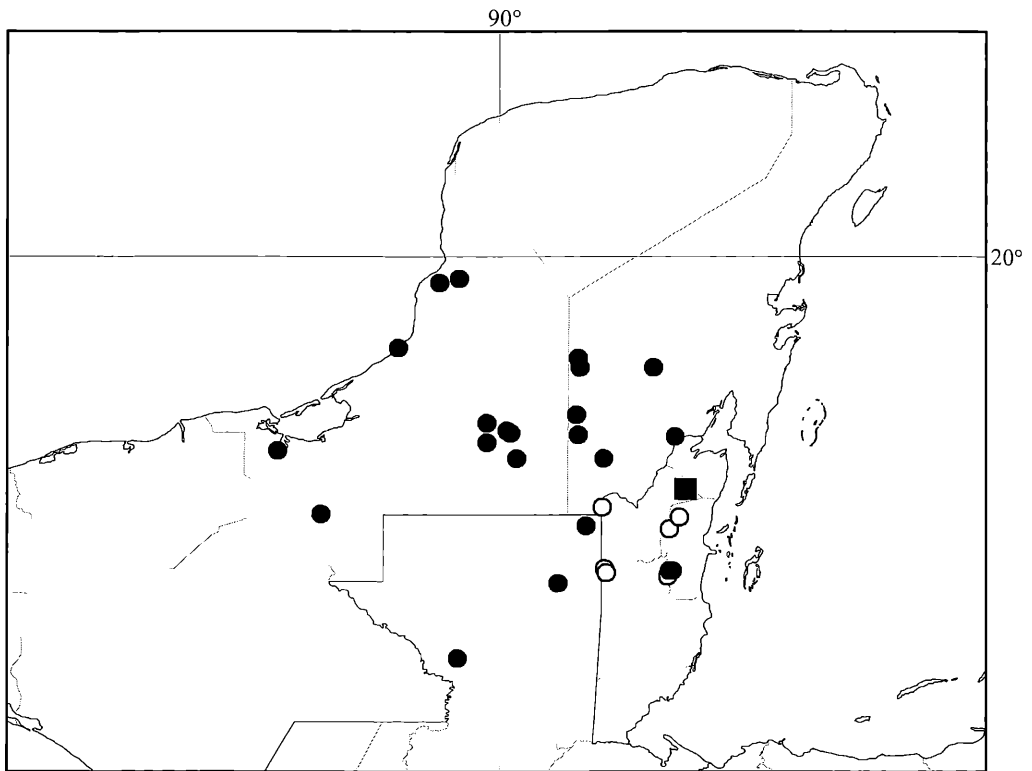


Fig. 6: Distribution of *Diospyros bumelioides* STANDL. (●; type locality: ■; records from MEERMAN [2003–2009]: ○).

Specimens examined: **Mexico, Tabasco**, a 2 km de la N-25 sobre la W-O rumbo a la N-20 cerca de un drene (localidad 6), Balancan, 30 m, [ca. 17°50' N, 91°30' W], selva baja mediana, primaria, asoc. *Lonchocarpus*, (fr), 13 Oct. 1975, **F. Menendez et al. 290** [BM, DAV, K, MEXU n.s., MO 2×], "árbol 8 m, abundante, codominante; fruto verde; semilla roja"; – **Campeche**, Municipio Campeche, 2 km al norte de Chiná, 8 m, 19°47'30" N, 90°30'25" W, ecol.: hidrófitas emergentes, secundaria, inundable; suelo negro, (fr), 11 Jan. 1998, **C. Gutiérrez B. 5613** [CICY, UCAM n.s.], "arbusto 5 m; [abundancia] regular; fruto verde"; – cerca Xtun, [19°49' N, 90°20' W], (fr), 12 Sep. 1954, **F. Miranda 8020** [US]; – Mun. Champoton, a 20 km al SW de Champoton, camino Champoton, Cd. del Carmen, 2 m, [19°14' N, 90°51' W], tinal con zona inundada permanente, (fr), 9 Feb. 1983, **E. Martínez S., O. Téllez & F. Martínez 3066** [CAS, MEXU n.s., MO 2×], "arbusto 3 m; fruto inmaduro"; – Mun. Hopolchén, loc. a 10 km al S de X-maben, camino a Xpujil, 120 m, 19°8'52" N, 89°19'44" W [these coordinates are near the western border but still within Quintana Roo!], selva mediana subperennifolia, inundada, (fr), 10 Oct. 1997, **E. Martínez S., D. Alvarez & S. Ramirez 28635** [CICY, MEXU n.s.], "arbusto 3 m; con fruto"; – Mun. Hopolchén, loc. a 3 km S de Xcan-ha [= X-Kanhá], camino a Xpujil, 80 m, 19°4'24" N, 89°19'18" W [these coordinates are near the western border but still within Quintana Roo!], selva baja subcaducifolia, (fl male), 29 Jun. 1997, **E. Martínez S. & D. Alvarez M. 27442** [CICY, MEXU n.s., MO], "arbusto 2 m; flor amarilla"; – Municipio Calakmul, loc. a 16 km al NE de Zoh-Laguna, 262 m, 18°40'32" N, 89°21'16" W [these coordinates are near the western border but still within Quintana Roo!], selva baja subperennifolia, (fr), 4 Aug. 1997, **E. Martínez S., D. Alva-**

rez, **S. Ramírez & G. Bacab 28029** [IEB n.s. (dig. photo), MEXU n.s.], "arbusto de 4 m"; – [Laguna de] Vapor, [Río] Palizada, [ca. 18°22' N, 91°52' W], swamp side, (yfr), 25–28 Jul. 1939, **E. Matuda 3889** [A n.s., F, MEXU n.s., MICH 2×, NA n.s.], "frutex"; – Mun. Champotón, camino a Conhuas a 2 km de Constitución, [ca. 18°36' N, 90°6' W], selva mediana subcaducifolia, secundaria, (fr), 22 Oct. 1996, **P. Zamora C. & D. Méndez D. 5504** [CICY, UCAM n.s.], "arbusto 2,5 m; [abundancia] escasa; fruto verde"; – Mun. Champotón, en la entrada a Calakmul, sobre el km 98 de la carretera Escárcega - Chetumal, [ca. 18°32' N, 89°56' W], selva baja caducifolia, con *Cameraria*, *Coccoloba*, *Manilkara*, etc.; suelo negro, chicloso, (fr), 30 Jul. 1987, **E. Cabrera & H. de Cabrera 14169** [MO], "arbusto 4 m; fruto verde"; – Municipio Champotón, 1 km de la desviación a Calakmul, 18°32'30" N, 89°56'00" W, selva baja inundable, (fr), 2 Dec. 1996, **R. Durán, P. Simá & C. Espadas 2822** [MO], "arbusto 2 m; abundancia regular; fruto verde"; – a 3 km al sureste de Conhuas, a 98 km al este de Escárcega, [18°31' N, 89°54' W], selva baja con *Manilkara*, *Metopium*, *Cameraria*, etc., (fl), 11 Jul. 1983, **E. Cabrera & H. de Cabrera 5079** [MO], "arbusto 6 m; fruto inmaduro [?];" – Tuxpeña [= La Tuxpeña], [according to CAMPOS-RÍOS & CHIANG CABRERA 2006: 18°25'60" N, 90°5'60" W], in bajos; common in Campeche, (fr), 25 Oct. 1931, **C.L. Lundell 864** [DS, F, GH, MICH 2×, MO, NY, PH, UC, US, WIS n.s.], "bushy tree 5 m high"; – Mpio. Calakmul, loc. a 30 km al S de la entrada a Calakmul, 294 m, 18°18'7" N, 89°50'50" W, selva baja subcaducifolia espinosa ("tintal"), (fl male), 11 Jul. 1997, **E. Martínez S., D. Alvarez & S. Ramírez 27584** [BM, CICY, MEXU n.s., MO], "arbusto 4 m; flor blanca"; – same locality and collectors: (fl female), 11 Jul. 1997, **27613** [BM, MO], "arbusto 2 m; flor amarilla"; – same locality: 121 m, selva baja subcaducifolia espinosa, (yfr), 9 Aug. 1997, **E. Martínez S., D. Alvarez, S. Ramírez & G. Bacab 28328** [COL n.s. (dig. photo)], "arbusto de 2 m"; – Mpio. Calakmul, a 5 km al E de Xpujil, camino a Chetumal, 250 m, 18°29'53" N, 89°20'16" W [these coordinates are near the western border but still within Quintana Roo!], veg. tular [vegetation dominated by *Schoenoplectus acutus*], (fr), 21 Feb. 2002, **E. Martínez S., J. Calónico & D. Álvarez 35021** [CICY, MEXU n.s.], "arbusto 4 m; con fruto"; – Quintana Roo, Municipio Othón P. Blanco, 3–4 km al oeste de Margarita Maza, unos 11 km al oeste de Graciano Sánchez (La Pantera), ca. 19°04'30" N, 88°42'10" W, selva baja inundable (tintales) con alta biomasa y diversidad de epífitas como *Tillandsia dasyliriifolia* HOOK., *Tillandsia brachycaulos* SCHLECHT., *Notylia orbicularis* A.RICH. & GAL., *Encyclia guatemalensis* (KL.) DRESSLER & POLLARD y *Campylocentrum poeppigii* (RCHB.f.) ROLFE, (fr), 25 Aug. 1999, **G. Carnevali, F. May-Pat, G. Gerlach, N. Piven & D. Mondragón 5602** [CICY, F n.s. (dig. photo), MO n.s.], "arbusto 2–3 m alto; [abundancia] localmente común; frutos verdes"; – Municipio Othón P. Blanco, ejido Caobas, Sabana del Jaguactal, un desvío de 9,5 km por carretera de terracería al oeste de la carretera hacia Tres Garantías, unos 21 km al sur de la carretera principal desde Xpujil - Chetumal, ca. 18°18' N, 89°07' W, sabana con suelos ácidos, arcillosos, parcialmente inundados, con arbustos dispersos, esclerófilos, de 1,5–3 m alto y árboles dispersos de *Pinus caribaea* MORELET de hasta 6–15 m alto; otras plantas presentes incluyen *Byrsonima bucidifolia* STANDL., *B. crassifolia* H.B.K., *Chrysobalanus icaco* L., *Rapanea guianensis* AUBL., *Plumeria* sp., *Oncidium ensatum* LINDLEY, *Coutoubea* sp. y varias especies de Melastomataceae, (fr), 28 Jan. 1999, **G. Carnevali, J.L. Tapia, F. May, M. Gómez & J. Hernández 5301** [CICY, GH n.s.], "arbusto hasta 4 m; [abundancia] localmente común; frutos verdes"; – en la brecha a el ingenio Alvaro Obregon, a 5 km al W de Ucum, [18°29' N, 88°31' W], selva mediana, (fr), 17 Jan. 1981, **E. Cabrera & R. Torres 1009** [CAS], "árbol 6 m; frutos verdes"; – Mexico, without further locality data, in secondary thicket with *Bursera simaruba*, *Pithecellobium*, *Haematoxylon*, *Acacia*, Polygonaceae, *Mimosa*, *Caesalpinia gaumeri* (25'); evergreen understory: *Diospyros anisandra*, *Jacquinia*, *Randia*, *Croton*, no grass, (fr), s.d. (1968), **F. White 9083** [FHO 3×], "small evergreen tree 15' with 4 ascending stems from base; bark smooth, pale brown, mottled with whitish grey; slash 1.5 mm thick, green outside, pale yellow inside, soon becoming deep orange-yellow; leaves dark green; stems spinous because of persistent short shoots; seeds removed from fruit while still on the tree"

Belize, Orange Walk, Coastal region, Honey camp, [18°2' N, 88°26' W], "acaches" [= akalche] (swamps), (fr and st), Sept. and Nov. 1929 [obviously a mixed collection], **C.L. Lundell 342** [BM, GH, K, MO 2×, NY, UC, US]; – **Belize**, western highway, mile 31, Colonel English Creek, upstream of highway, [17°21' N, 88°34' W], (fl male), 31 May 1981, **C. Whiteford 3087** [BM], "erect shrub 10 ft.; flowers cream"; – Mile 28 on the Western Highway between Belize City and Belmopan, Tropical Education Center of the Belize Zoo, along Savanna Nature Trail, 30 m, GPS coordinates: 17°21'26" N, 88°32'21" W, *Pinus caribea* savanna with *Quercus oleoides* and *Byrsonima crassifolia*, grading into deciduous forest, (fl), 8 Jun. 1997, **G. Davidse & D.L. Holland 37026** [MO], "slender shrub 2.5 m; flowers white"

Guatemala, Petén, Dos Lagunas, Ixcanrio, Bajo Ixcanrio, [17°44' N, 89°16' W], in tinal, (fl female), 8 May 1969, **E. Contreras 8482** [LL, MO], "shrub 18 ft., 2 in. diam.; flowers white"; – same locality: (defl female, yfr), 24 May 1969, **E. Contreras 8643** [DS, NY, RSA, S, TEX, US], "shrub 12 ft. high, 1 in. diam."; – Tikal National Park, Bajo de Santa Fe, salida de Arroyo Corriental, in tinal on Aguada Terminos road, [ca. 17°15' N, 89°30' W], (fr), 26 Sep. 1959, **E. Contreras 195** [G, LL, MICH, MO], "tree 40 ft. high; 10 in. diam."; – same locality: (fr), 17 Jan. 1964, **E. Contreras 3868** [DS, G 2×, LL], "shrub 30 ft. high; 3 in. diam."; – same area: in tinal on pinal trail, [ca. 17°15' N, 89°30' W], (fr), 2 Feb. 1960, **E. Contreras 589** [DUKE, LL, MO, S], "tree 25 ft. high, 7 in. diam.; fruit green"; – same area: in chololal [correct is probably "cholobal", a vegetation around aguadas dominated by *Coccoloba* which is called "cholob" by the Maya] bordering pinal [?], (st), 7 Mar. 1960, **C.L. Lundell 16710** [LL, MO], "arborescent shrub 12 ft."; – same area: near Aguada Pucte off Aguada Terminos Road, [ca. 17°15' N, 89°30' W], in tinal, (fr), 13 Jan. 1962, **C.L. Lundell 17077** [LL, MO], "tree 20 ft., 4 in. diam."; – Rio Pasion, on Rio El Pucte tributary below Sayaxche, [16°37' N, 90°21' W], in tinal, (fr), 6 Mar. 1964, **C.L. Lundell 18219** [DAV, DS, F n.s. (dig. photo), LL, US], "shrub 25 ft. high"

Key for *D. anisandra* and *D. bumelioides*

- 1 Leaves usually broadly obovate, less frequently narrowly obovate or ± spatulate; corolla tube of male and female flowers glabrous abaxially (on female flowers rarely with few hairs); calyx lobes of the female flowers narrowly triangular, usually much longer than wide, ± glabrous (except near the base) adaxially; ovary glabrous (except around the base); fruit usually slightly wider than long, glabrous (except around the extreme base) and drying black; occurring in deciduous or semideciduous, primary or frequently also in secondary forests *D. anisandra*
- 1* Leaves usually spatulate or sometimes narrowly obovate; corolla tube of male and female flowers densely covered with appressed hairs abaxially; calyx lobes of the female flowers ± semicircular, nearly as long as wide, covered with a medium dense indumentum over the whole length adaxially; ovary densely hairy; fruit globose or slightly longer than wide, covered with scattered hairs, usually drying brown to dark brown, rarely black; occurring in seasonally inundated, wooded swamps *D. bumelioides*

***Diospyros palmeri* EASTW.**, Proc. Amer. Acad. Arts 44: 604–605 (1909); [fig. 7–9].

Typus: Mexico, San Luis Potosí, vicinity of San Dieguito, [22°1' N, 99°14' W], (fr), 7–10 Jun. 1905, **E. Palmer 631** [holotype: GH, isotypes: A, F (photo F 59335), MO, NY, US], "large shrub or small tree 2–4 m"; protologue: "leaves dark green; fruits light green but with a patch of red and brown at the exposed or lower end"

Shrub or small tree up to 8 m tall (already flowering when 2.5 m tall; according to TREVIÑO GARZA et al. [2001] reaching a maximal height of 11 m), deciduous (?) or semideciduous; scales of **buds** ovate, densely covered with appressed or slightly spreading, straight or slightly flexuose, light hairs; young twigs \pm terete, scattered to medium densely covered with the same sort of \pm spreading hairs as the buds and at least partially \pm densely covered with minute, patent, whitish-translucent, stiff hairs; bark of older twigs glabrous, gray to brown, \pm smooth, with scattered lenticels, later on shallowly fissured; **leaves** alternate, with brochidodrome venation; petioles 1–2 (–3) mm long, ca. 0.8 mm thick, on adaxial side flat or with a longitudinal groove, medium densely covered with short, \pm straight, spreading hairs, on abaxial side with scattered, straight or slightly flexuose, \pm appressed, longer hairs, glabrescent with age; leaf scars markedly thickened and protruding (thus short twigs often with a gnarled appearance); leaf lamina obovate, gradually tapering into the petiole, (1–) 2–6 (–7.3) cm long, (0.7–) 1–3 cm wide, 1.5–2.8 (–3.3) times longer than wide, chartaceous, dark green when alive, brown or brownish-green and slightly shiny adaxially, lighter brown and dull abaxially when dry, often verrucose especially adaxially, glabrous on both sides when mature (except on the midvein, and on diseased, concave areas on abaxial sides where a dense, brown indumentum persists), sometimes with very scattered, \pm appressed, long hairs abaxially when very young; leaf apex retuse to emarginate or \pm rounded, rarely truncate; base of the lamina narrowly cuneate, decurrent along the petiole; leaf margin entire, \pm flat (except sometimes near the base) when dry; flachnectaria 10–20 (–50), scattered all over the abaxial leaf surfaces, round, small and inconspicuous; venation on both sides of the mature leaves light brown (dark when very young) and frequently differing in color with respect to the lamina; midvein flat or slightly raised, rarely \pm sunken adaxially, markedly prominent abaxially, covered on proximal parts with the same indumentum as the respective side of the petiole, glabrous on both sides distally, often becoming completely glabrous when old; secondary veins 5–7 per side, prominent and glabrous on both sides; intersecondary veins not conspicuous; tertiary and quaternary veins slightly prominent and glabrous on both sides; **inflorescences**: cymes of both sexes solitary in the axil of bracts, arranged near the base of new, long or short shoots (the latter are often very short and leafless; sometimes their axes do not exceed even the bud-scales); male cymes 1-flowered, up to 5 together (fig. 8c); female cymes 1-flowered, 1 (–2) together; **flowers** (4–) 5–6 (–7)-merous; male flowers 4–5 mm long (without pedicel), sweet smelling at anthesis (Hinton & al. 17738) (fig. 8b - 8d); stalk (peduncle and pedicel) 1.5–3 (–5) mm long and ca. 0.5 mm thick, medium densely to densely covered with spreading hairs of different lengths (same sort of indumentum as on young twigs); bracts 1–1.5 mm long and wide, ovate, \pm acute distally, covered with a dense indumentum (appressed on the back, spreading on the margins) abaxially, glabrous adaxially, usually soon caducous; bracteoles 1 (–1.8) mm long and up to 0.8 mm wide, ovate or \pm lanceolate, usually attached towards the base, rarely near the middle of the stalk, covered with the same indumentum as the bracts, soon caducous; calyx obconical, 3–3.5 mm long, undivided in the proximal 1–1.3 mm, with scattered, appressed or spreading, straight or \pm flexuose, short, light hairs abaxially; calyx lobes \pm triangular, 1.5–2 (–2.5) mm long and 1–1.8 (–2) mm wide, erect, glabrous adaxially, covered on abaxial side with the same indumentum as the base of the calyx, \pm acute and with a dense tuft of light or sometimes slightly reddish hairs distally; corolla white or yellowish-white at anthesis when alive

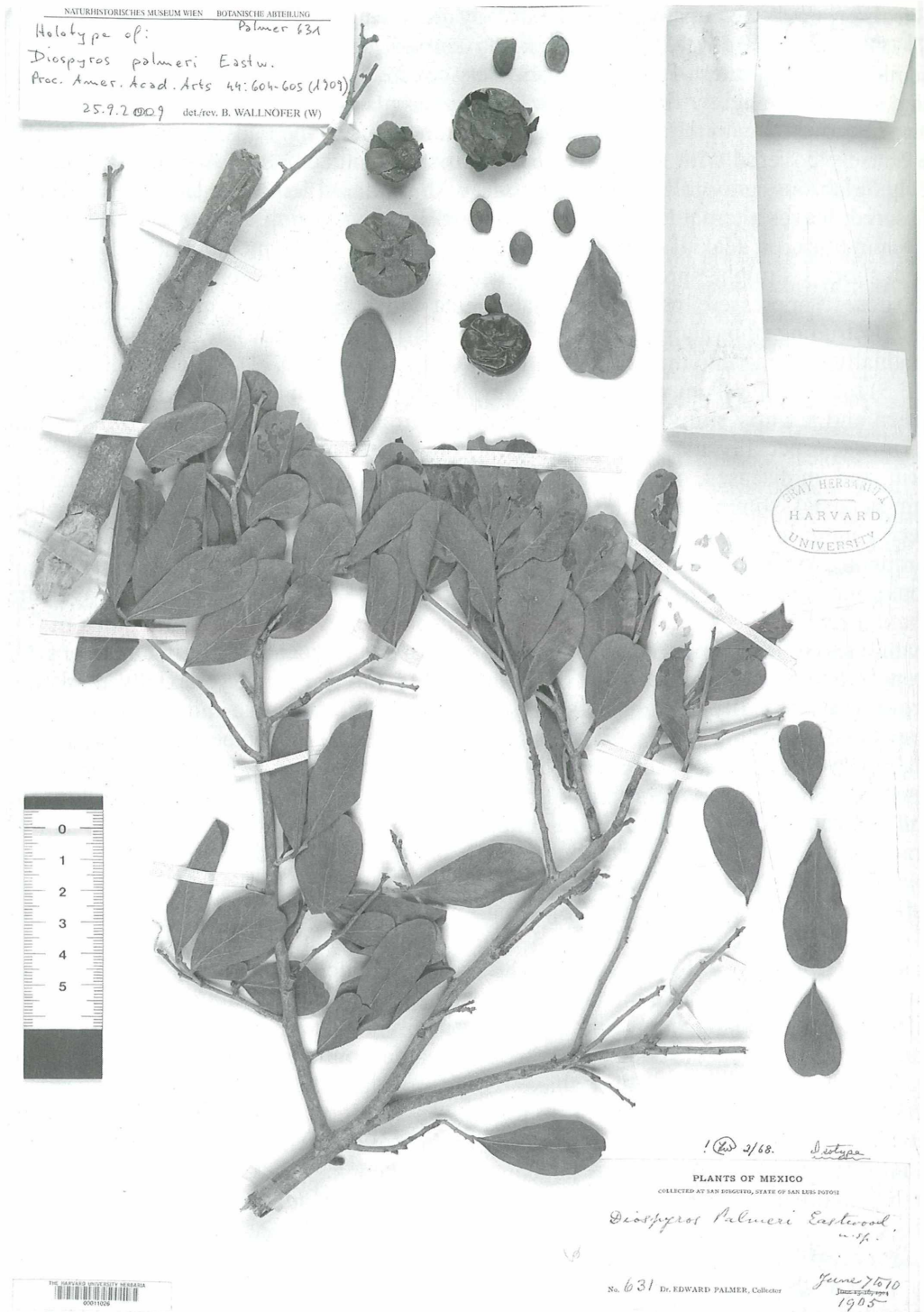


Fig. 7: Holotype of *Diospyros palmeri* EASTW.

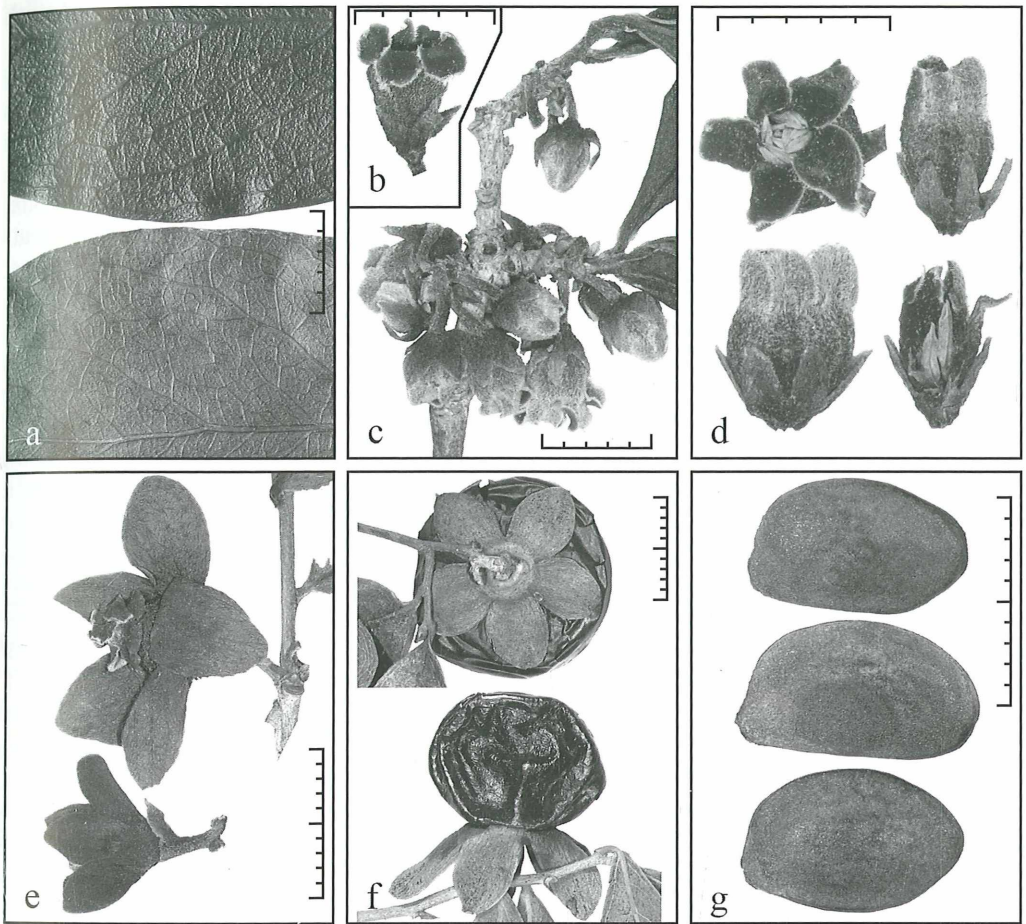


Fig. 8: *Diospyros palmeri*: a: adaxial (on top) and abaxial (bottom) leaf surface (from González Medrano & Hiriart 12513 [TEX]); b: male flower (from Crutchfield & Johnston 5184 [TEX]); c: male inflorescence (from Martínez & Martínez 2191 [TEX]); d: male flowers (from González Medrano et al. 2855 [MEXU]); e: deflorate female flower (on top) and female flower bud (bottom) (from Palmer 116 [UC]); f: fruits (on top: from Fernández 4779 [MEXU], bottom: from González Medrano et al. 1804 [MEXU]); g: seeds (from Palmer 631 [GH]); scale a - d = 5 mm, e - g = 1 cm.

(greenish when immature), black when dry; tube 3–4 mm long, broadly barrel-shaped, widest in or shortly above the middle and there 3–4.5 mm wide, on the outside medium to densely covered with \pm spreading, \pm straight, light hairs of different lengths, on the inside with scattered, patent, minute hairs, but glabrous distally; aperture of the corolla 2.5–3 mm wide; corolla lobes 2–2.8 mm long and 2–3 mm wide, nearly orbicular but retuse or \pm emarginate distally, very densely covered with the same sort of indumentum as on the tube abaxially (but hairs somewhat longer; spreading on the margins), glabrous adaxially; stamina 14–17 (only two 5-merous flowers dissected: Crutchfield & Johnston 5184 and Martínez & Martínez 2191), 2.8–4.5 mm long; filaments 0.8–2 mm long and

ca. 0.2 mm wide, adnate to the corolla tube 0.5–1.5 mm above its base, covered with minute, patent hairs; anthers 2–2.8 mm long and ca. 0.8 mm wide, widest near the base, opening by two lateral slits and tapering into a tip distally; rudiment of the ovary flattened and nearly glabrous, ca. 1 mm wide and less than 0.5 mm high; **female flowers** ca. 7 mm long (without pedicel) (fig. 8e); stalk (peduncle and pedicel) 2–4 (–13?) mm long and 1–1.5 mm thick, covered with the same indumentum as the young twigs; bracts similar to the bud scales, ca. 1.5 mm long and ca. 1 mm wide, ovate, soon caducous; bracteoles 2–6 mm long and 1.5–3 mm wide, ovate or lanceolate, acute distally, scattered hairy and with some glands on both sides or ± glabrous, usually soon caducous; calyx ca. 7 mm long, undivided in the proximal 2 mm and here abaxially with scattered, appressed, short hairs, lacking longitudinal ridges running down from the sinuses abaxially; undivided (basal) part of the calyx on its inside (adaxial side) glabrous; calyx lobes ± broadly elliptic or obovate, 6–7 mm long and 5 mm wide, ± spreading, ± flat, broadly rounded or obtuse distally, glabrous or rarely abaxially with some scattered hairs; corolla white at anthesis when alive, black when dry; tube broadly barrel-shaped, 4 mm long and 5 mm wide, widest in the middle, on the outside medium densely covered with ± straight, ± spreading hairs, glabrous adaxially and in the basal part abaxially; aperture of the corolla ca. 2 mm wide; corolla lobes 4 mm long and 3 mm wide, ovate, obtuse distally, densely covered with ± straight, ± appressed hairs abaxially, glabrous adaxially; staminodia missing (only one 5-merous flower of Yanez 83 was analyzed); ovary ± globose (abruptly tapering into the stylodia), 3 mm long (without stylodia) and 4 mm in diameter, glabrous, 10-locular (as seen in a fruit of González Medrano & Hiriart 12513); stylodia 5, 3 mm long, fused together nearly up to the apex, glabrous; stalk of the **fruits** (3–) 5–13 mm long and (1–) 1.5–2 mm thick (strongly enlarged distally); fruits ± globose (fig. 8f), up to ca. 2.5 cm in diameter when dry, green, greenish-yellow, becoming tinged with red (and brown) when alive, black, smooth and slightly shiny and sometimes covered with a gray layer of crystals when dry, glabrous, with the mucro-like remnant of the stylodia distally, 8 (–10?)-seeded, apparently becoming soft when mature; fruit wall ca. 0.25 mm thick, with the epidermis often detaching when dry; fruit pulp exiguous; calyx including the spreading lobes up to 3 cm wide; undivided (basal) part of the calyx ± widely cup-shaped (as seen from the outside), up to 8 mm wide, on its inside (adaxial side) glabrous or with some scattered, appressed hairs; lobes (6–) 7–13 mm long and (3–) 5–8 mm wide, oblong, broadly lanceolate or obovate, rarely ± narrowly triangular, spreading and obtuse or rounded, less frequently acute distally, ± flat when dry, with a ± raised longitudinal venation, usually glabrous on both sides, but sometimes with scattered hairs or a tuft of hairs near the apex, rarely with minute, scattered, patent hairs on the lamina adaxially; sinuses between the lobes inconspicuous; seeds flattened, ± elliptic in outline, 9–12 mm long, 7–8 mm wide, 3–5 mm thick (fig. 8g), dark brown, with a finely texture on the surface.

Vernacular names and use: chapota (MARTÍNEZ 1978), chapote (González-Medrano 888, 1041, Rodríguez 103, Uvalle s.n., Wooton s.n.; STANDLEY 1924, CARRANZA GONZÁLEZ 2000), manzanillo (CARRANZA GONZÁLEZ 2000), zapote negro (STANDLEY 1924, MARTÍNEZ 1978, CARRANZA GONZÁLEZ 2000), zapotillo (González-Medrano 9960; CARRANZA GONZÁLEZ 2000). According to Martínez 1333, the fruits are eaten.

Distribution, habitat, ecology, and phenology: This species is only known from the states Nuevo León, Tamaulipas, San Luis Potosí and Queretaro in northeastern Mexico,

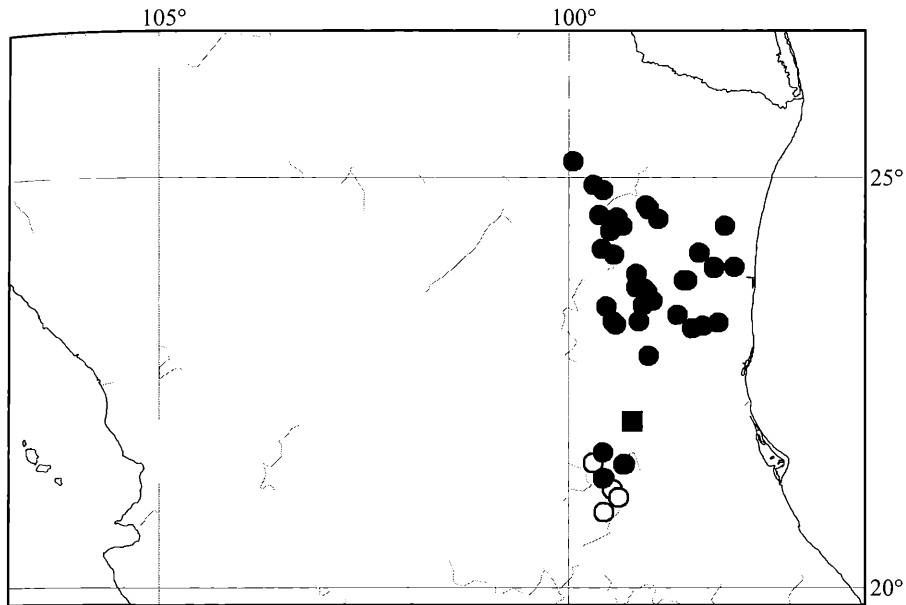


Fig. 9: Distribution of *Diospyros palmeri* EASTW. (●; type locality: ■; records from CARRANZA GONZÁLEZ [2000]: ○).

where it grows at elevations between 60 and 1800 meters (fig. 9). A distribution map with 6 localities for Queretaro is given in CARRANZA GONZÁLEZ (2000). It occurs in tropical, deciduous or semideciduous, sometimes even in evergreen forests, in brush vegetation, in thickets and in scrubs (matorrales, chaparrales) on slopes of canyons, along streams (arroyos) and rivers. Frequently it has been observed in oak-forests, but it has also been reported from pine-oak woods and from grassy pastures. It grows on calcareous clay and loamy soil (with or without organic material) or on sandy, stony or rocky ground and is often said to be locally common. TREVIÑO GARZA et al. (2001) reported a population density of 200 individuals per hectare from the gallery forests along the Rio Cabezones in Nuevo León. *D. palmeri* has been collected in flower in March and November, and in fruit from April to October and in December.

Specimens examined: **Mexico**, **Nuevo León**, Mun. Montemorelos, Los Lirios, 325 m, [25°12' N, 99°56' W], chaparral, (fr), 19 May 1934 [as "94/05/19"], **G.B. Hinton & al. 24207** [MEXU, NY, TEX], "tree 3 m, common"; – Mun. Hualahuises, a lo largo del "Arroyo de la Laja" hasta el "Pinto" (3 km), la entrada está a 4 km al N de Hualahuises, carr. Linares - Monterrey, [24°55' N, 99°41' W], veg. primaria es matorral bajo espinoso; suelo areno-pedregoso, (fr), 6 Aug. 1982, **R. Torres C., J. López, O. Oropeza & R. Sánchez 962** [MO], "arbolito 5 m, abundante; fruto maduro"; – Mun. Linares, below Ebanito, 720 m, [ca. 24°51' N, 99°34' W], chaparral, (fl male), 8 Mar. 1932 [? - as "12-03-80"], **G.B. Hinton & al. 17738** [GH, MEXU], "tree 5 m; flowers yellowish white, sweet smelling" – **Tamaulipas**, Mun. San Carlos, 5 km al NW del Ejido Marmolejo, 700 m, [24°40' N, 99°3' W], bosque de *Quercus*, (fl male), 22 Mar. 1986, **M. Martínez 975** [MEXU, MO], "árbol de 3 m; flor blanca"; – Mun. San Carlos, Sierra de San Carlos, 2 km al E de Marmolejo en el camino al Rosario, 700 m, 24°37' N, 99°01' W, bosque encino; encinar con *Carya*, *Diospyros* y *Platanus*, en cañada, (fl male), 18 Mar. 1994, **M. Martínez & J. Martínez 2191** [TEX], "árbol 5 m; flor

blanca"; – same area: vicinity of Marmolejo, La Morita, 1700 ft., [ca. 24°38' N, 99°1' W], (fr), 1 Aug. 1930, **H.H. Bartlett 10756** [DS, F, GH, MICH], "small tree"; – San Ignacio de Zaragoza, Villa Mainero, 530 m, [ca. 24°33' N, 99°37' W], dry streambed, (fr), 11 May 1935 [as "1995/05/11"], **G.B. Hinton & al. 25319** [TEX], "tree 4 m; a few trees"; – Río Pilón, ca. 3 km al E de la Estación Garza Valdés, Villagrán, 60 m, [24°31' N, 99°24' W], veg. riparia de *Taxodium* y *Esenbeckia*, (fl male), 20 Nov. 1983, **A. Rodríguez & M.A. Carranza 813** [MEXU], "árbol o arbusto muy ramificado"; – Mun. San Carlos, 9–10 km al S de San Carlos, camino a El Diente, 900 m, [24°30' N, 98°54' W], matorral alto subinerm, (fl male), 30 Mar. 1970, **F. González Medrano, V.M. Toledo & E. Martínez 2855** [MEXU], "arbusto de 5–6 m"; – on Highway 85 between Linares and Ciudad Victoria, 111 km NW of Ciudad Victoria, 415 m, [ca. 24°25' N, 99°20' W], roadside scrub forest to 4 m tall, (fr), 24 Jun. 1977, **T.B. Croat 39187** [FHO, MO, W], "tree 4 m; fruits green, globose, becoming tinged with red"; – 18 miles E of the San Fernando - Santander Jimenez highway on the road to Loreto, [24°25' N, 98°5' W], local *Prosopis* brush on deep calcareous clay soil along an arroyo, (fr), 15 Sep. 1960, **J. Crutchfield & M.C. Johnston 5526** [MICH, TEX]; – 8 miles S of Villagrán, Caliche mesa, 1600 ft., [24°21' N, 99°29' W], (fl male), 12 Mar. 1960, **J. Crutchfield & M.C. Johnston 5243** [MEXU, MICH, TEX], "common"; – Mun. Hidalgo, Presa Valles, cañones a lo largo del Río Blanco, 650 m, [ca. 24°8' N, 99°35' W], matorral alto subinerm, (fr), May 1970, **F. González-Medrano, V. Toledo & E. Martínez 2975** [MEXU], "árbol 5 m"; – same locality: 450 m, (fr), 26 May 1970, **E. Martínez, V.M. Toledo & F.G. Medrano 2975** [MEXU], "árbol 5 m"; – Mun. Hidalgo, 31 km al W de El Carmen, [24°4' N, 99°26' W], selva baja caducifolia con elementos de encinar; suelos derivados de lutita y caliza, (fr), May 1984, **F. González Medrano, P. Hiriart, L. Gonzalez, V. Juárez, D. Baro & L. Hernandez 13853** [MEXU], "arbolito de 6 m"; – Mun. Matamoros, camino Jimenez - Soto La Marina, antes de Abasolo, 100 m, [24°5' N, 98°24' W], asoc. de halofitas, (fr), Aug. 1963, **F. González Medrano 124** [MEXU], "árbol"; – at Peñita [= La Peñita] beside Soto la Marina river, [23°55' N, 98°13' W], (fr), 23 Jun. 1919, **E.O. Wootton s.n.** [US]; – 18 kms al N de Soto La Marina, [23°54' N, 98°13' W], selva baja perennifolia, (fr), Dec. 1964, **F. González Medrano 1041** [MEXU], "árbol"; – 30 kms al NE de Soto La Marina, [23°55' N, 97°58' W], selva baja perennifolia, (st), Dec. 1964, **F. González Medrano 888** [MEXU], "árbol de 8 m de alto"; – N of Ciudad Victoria, 1000 ft., [ca. 23°50' N, 99°10' W], scrub, (fr), 7 Jul. 1945, **A.J. Sharp 45650** [GH, NY], "small tree"; – Soto La Marina - Casas, 450 m, [23°45' N, 98°35' W], encinar, (st), 8 Aug. 1963, **A. Gómez-Pompa & F. González Medrano 1041** [MEXU], "planta 5 m de alto"; – 11 miles E of Casas on the road to Soto la Marina, [23°45' N, 98°35' W], brush on clay loam (calcareous); lowlands, (fr), 27 Sep. 1959, **J. Graham & M.C. Johnston 4098** [MEXU, MICH, TEX]; – Mun. Casas, Rancho Los Alacranes, 20 km al E de Casas, camino a Soto La Marina, 200 m, [23°45' N, 98°33' W], selva baja subcaducifolia, (fr), Sep. 1968, **F. González Medrano, C. Delgadillo & M. Hernández 1804** [MEXU 2×], "arbusto de 4–5 m"; – vicinity of Victoria, ca. 320 m, [ca. 23°40' N, 99°10' W], (defl female, yfr), 1 Feb. - 9 Apr. 1907, **E. Palmer 116** [F, GH n.s., K, MO, NY, UC]; – same locality: (fr), 1 May - 13 Jun. 1907, **E. Palmer 369** [F, GH, K, MO, NY, UC, US]; – riverbank at bridge of hwy. Mex. 85, 11 km S of outskirts of Ciudad Victoria, ca. 350 m, [23°39' N, 99°4' W], matorral submontano; brushy vegetation along banks of stream with rocky-filled bed and now dry and with no sign of water, (fr), 21 Jun. 1980, **B.F. Hansen & M. Nee 7338** [F, MO, RSA, SEL], "small tree 5 m"; – km 17 de la Carr. Cd. Victoria - Cd. Mante, [23°36' N, 99°2' W], (fr), 10 Sep. 1979, **A. Uvalle B. s.n.** [MEXU], "arbusto"; – km 179 Carretera Victoria - Llera, 520 m, [ca. 23°30' N, 98°58' W], matorral alto subinerm, (fr), 29 Apr. 1985, **M. Martínez & M. Martínez 488** [MEXU], "árbol de 6 m; fruto verde"; – S slope of Mesa de Llera near the top, 4 miles N of the Río Guayalejo crossing, 1700 ft, [ca. 23°27' N, 99°5' W], brush on basalt over shale, (fl male), 5 Mar. 1960, **J. Crutchfield & M.C. Johnston 5184** [MEXU, MICH, TEX], "frequent low trees among the basalt boulders"; – Mun. Jaumave, 3 km al sureste de Magdaleno Aguilar, 1170 m, [23°26' N, 99°32' W], matorral subinerm, (fr), 24 Sep. 1984, **P. Hiriart, F. González Medrano, V. Juárez & R. Molczadzki 487** [CICY, MEXU], "arbusto de 2.5 m"; – Soledad Nogales, 24 km al S de Jaumave, 1550 m, [23°15' N, 99°27' W], matorral alto subinerm;

lomeríos de suelos derivados de calizas; suelos someros negros o pardos con abundante materia orgánica; asoc. con *Pithecellobium*, *Flourensia*, *Helietta* y *Acacia*, (fr), 22 Sep. 1976, **F. González Medrano 9960** [CAS, MEXU], "árbol 4 m, escasa"; – 15 km al S de Padron y Juarez, 1800 m, [23°13' N, 99°25' W], matorral alto subinermé, (fl female), 23 Mar. 1985, **M. Yanez 83** [MEXU], "árbol de 3 m; flor blanca"; – 33 miles S of Victoria, Cuesta de Herradura, [23°15' N, 99°8' W], (fr), 18 Aug. 1950, **A.J. Sharp 5013** [GH, MEXU]; – Mun. Llera de Canales, 5 km E de Congregación Garza en el camino al Picacho, 400 m, [ca. 23°20' N, 98°40' W], bosque tropical caducifolio, (fr), 12 Oct. 1986, **M. Martínez 1333** [MO], "árbol 7 m; fruto verde"; – Mun. Gonzalez, Sierra de Tam., Ejido El Cabrito 45 km E cruce brecha que viene de Xicotencatl, carr. Zaragoza - Gonzalez, [23°10' N, 98°29' W], bosque tropical subcaducifolio, (fr), 28 Sep. 1984, **S. Rodríguez 103** [MO], "árbol 5 m; fruto verde-amarillento"; – western slopes of the Sierra de Tamaulipas, at Santa Maria de los Nogales, 800 m, [23°12' N, 98°21' W], grassy pastures and pine-oak woods, and walnuts at the edge of the streams, (fr), 23 Sep. 1956, **F. Martínez Martínez & G. Borja Luyando F-2098** [TEX]; – Mun. de Aldama, Sierra de Tamaulipas, region of Rancho Las Yucas, ca. 40 km NNW of Aldama, Las Yucas, ca. 23°14' N, 98°10' W, rocky arroyo in tropical deciduous forest, (fr), 28 Jul. 1957, **R.L. Dressler 2061** [GH, MO], "3 m tall"; – ca. 61.2 mi. N of Ciudad de Valles, [ca. 22°50' N, 99°1' W], *Asclepias*, *Euphorbia*, *Bauhinia*, and *Karwinskia* were present at the site, (fr), 26 Jul. 1967, **O.F. Clarke, B.T. Gittens, H. Haid & E. Lathrop s.n.** [CAS]; – 45 kms al O de Soto La Marina y 10 kms de Abasolo, [not located], selva baja perennifolia, (fr), Dec. 1964, **F. González Medrano 1094** [MEXU], "árbol"; – Mun. Aldama, 50 km al N de Manuel, [not located], 650 m, selva baja caducifolia, (fr), 13 May 1982, **F. González Medrano & P. Hiriart V. 12513** [MEXU, TEX], "árbol de 8 m"; – 84 kms al E del Rivereño a 42 kms al S de S. Fernando, [not located], selva baja perennifolia, (st), Dec. 1964, **F. González Medrano 884** [MEXU], "árbol de 8 m de alto"; – San Jose, [not located], (st), 17 Feb. 1939, **H. LeSueur 342** [pro parte: F]. – San Luis Potosí, Mun. Lagunillas, 7 km N de Lagunillas, 1000 m, [21°39' N, 99°34' W], matorral submontano, (fr), 27 Jun. 1979, **H. Puig 6808** [MEXU], "arbusto de 5 m"; – N of Valles at km 517.5, [not located], in thicket, (fr), Jul. 1937, **C.L. Lundell & A.A. Lundell 7282** [A, MICH 2×, MO, NY, WIS n.s.], "shrub or small tree 5–8 m" – Querétaro, Mun. de Jalpan, El Pozo de la Peña, 4 km al W de San Antonio Tancoyol, 880 m, [21°30' N, 99°19' W], terreno plano con vegetación de pastizal, (fr), 5 Sep. 1991, **R. Fernández N. 4779** [ENCB n.s., IEB n.s., MEXU], "árbol de 8 m de alto; abundancia regular; frutos verdes"; – Mun. de Arroyo Seco, Rio Jalpan, cerca de Panales, 700 m, [21°20' N, 99°34' W], bosque tropical caducifolio; laderas del cañón, (fl male), 15 Mar. 1999, **E. Pérez & E. Carranza 3923** [IEB n.s. (dig. photo)], "árbol de 4–5 m de alto; escaso; flores masculinas verdosas"

Key for *D. palmeri* and *D. texana*

- 1 Mature leaves glabrous (very young leaves sometimes with scattered, appressed hairs on the abaxial side); leaf margins ± flat (except near the base); fruits and ovaries glabrous *D. palmeri*
- 1* Mature leaves usually covered with patent hairs on both sides (sometimes ± glabrescent abaxially, but always, at least partially with patent, stiff, short hairs adaxially); leaf margins revolute; fruits and ovaries hairy *D. texana*

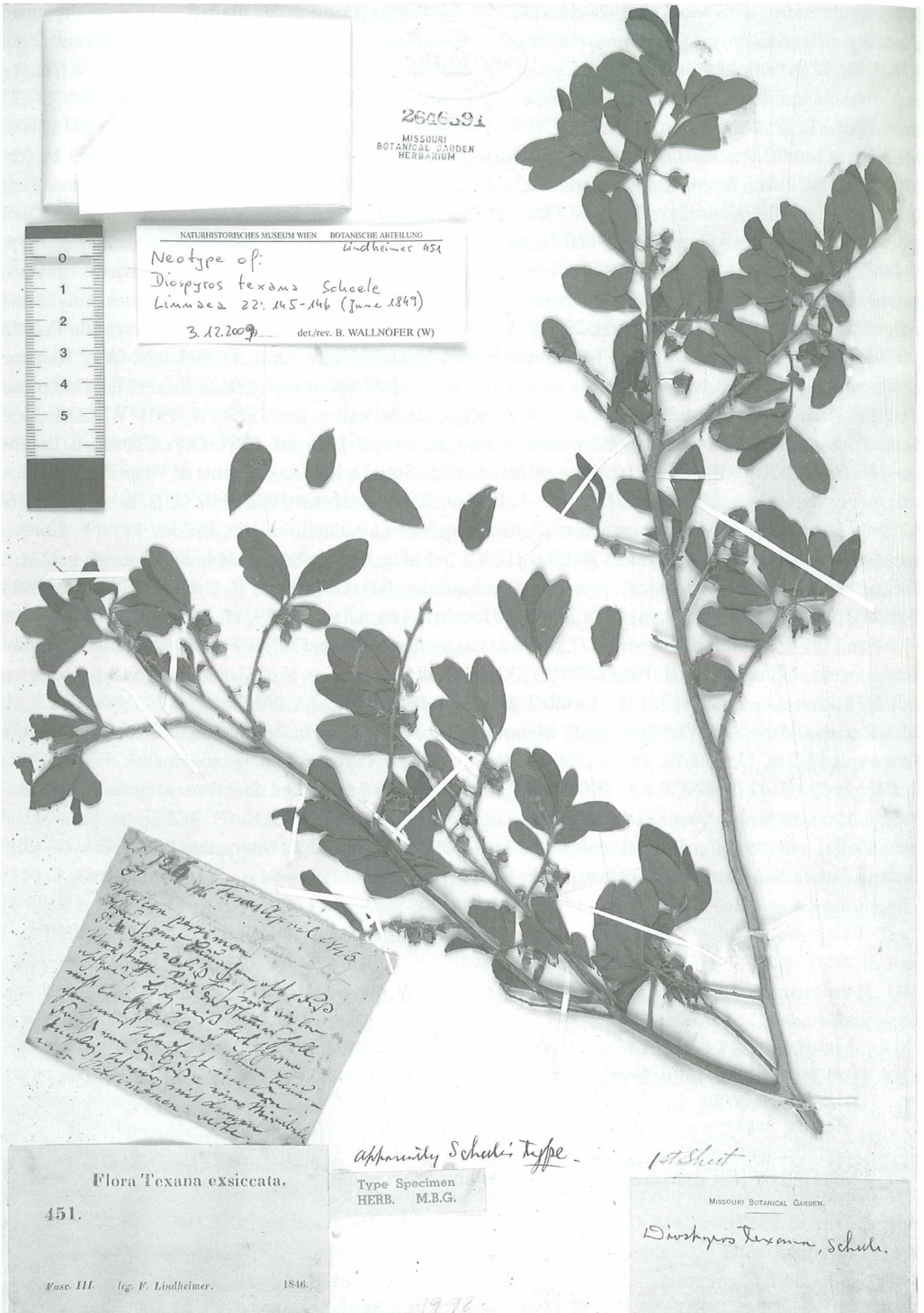


Fig. 10: Neotype of *Diospyros texana* SCHEELÉ.

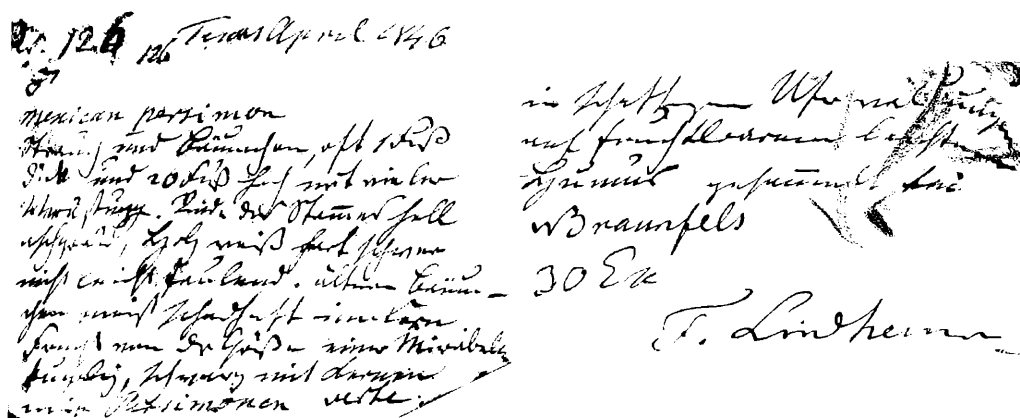


Fig. 11: Neotype of *Diospyros texana* SCHEELE: both sides of Lindheimer's label.

Diospyros texana SCHEELE, *Linnaea* 22: 145–146 (June 1849); [fig. 10–11].

≡ *Brayodendron texanum* (SCHEELE) SMALL, *Bull. Torrey Bot. Club* 28 (6): 356 (1901).

Typus: U.S.A., Texas, gesammelt bei [collected near] Braunfels [= Neubraunfels, now: New Braunfels], [29°42' N, 98°7' W], in schattigen Uferwäldungen auf fruchtbarem, leichtem Humus [in shadowy riparian forests on fertile, light (= not heavy; but "with a little" could also be meant here) humus], (fl male), Apr. 1846, **F.J. Lindheimer 451** [neotype: MO (here designated), isoneotypes: BM, CAN n.s., G, K 3×, NA n.s., P, US n.s., W 2×], "Strauch und Bäumchen, oft 1 Fuß dick und 20 Fuß hoch mit vieler Verästelung; Rinde des Stammes hell aschgrau; Holz weiß, hart, schwer, nicht leicht faulend; ältere Bäumchen meist schadhafte im Kern; Frucht von der Größe einer Mirabelle, kugelig, schwarz mit Kernen wie Persimmonen" [shrub and treelet, often 1 foot thick and 20 feet high, richly branched; bark of the trunk pale ash-gray; wood white, hard, heavy, not easily rotting; older treelets usually with damaged heart wood; fruit of the size of a mirabelle, globose, black and with seeds like those of persimmons]; vernacular name: Mexican persimmon; "30 Ex." = 30 Exemplare (specimens). – The neotype (fig. 10–11) bears the embossed stamp "The George Engelmann Herbarium", a printed label ("Flora Texana exsiccata. Fasc. III") with the number 451, and the original label (with the number 126 and the data given above) of Lindheimer written by hand in the barely legible former German writing-style ("Kurrentschrift"). All the duplicates of number 451 will be treated here formally as isoneotypes, although it cannot be proven with certainty that they belong all to the same gathering (see the note below).

Note: Georg Heinrich Adolf Scheele (1808–1864) described this species based on specimens collected by Ferdinand Jacob Lindheimer (1801–1879) near New Braunfels in Texas. He had received them from Karl Ferdinand Roemer (1818–1891) who had just returned from a long journey through Texas carrying rich paleontological and botanical collections with him. In Texas the latter had met his compatriot Lindheimer who had handed over to him some of his herbarium collections. Lindheimer had started to collect

large sets of plants in Texas and to ship them to George Engelmann (1809–1884) and Asa Gray (1810–1888) who distributed them as "Plantae Lindheimerianae" to subscribers (ENGELMANN & GRAY 1845, GRAY 1850, BLANKINSHIP 1907, GILLETT & SHCHEPANEK 1977). According to SCHEELE (1848–1853: 454) Lindheimer's specimens at his disposal had been collected in 1846. Unfortunately, SCHEELE (1848–1853, 1849) did not cite any collecting numbers. As he described the male ("flores steriles") and the female ("flos fertilis") flowers, as well as the fruits in detail, it can not be doubted that he had at least three different collections at his disposal which thus represent syntypes and are most likely lost (see the next paragraph). It is not known whether Lindheimer had handed over to Roemer complete gatherings of his collections or if he may have retained some duplicates. Lindheimer was used to mix up under one number collections of the same species which he had gathered during different days and thus probably also on different places (for further details see BLANKINSHIP 1907 and GILLETT & SHCHEPANEK 1977). It is therefore, probably impossible to identify the single original gatherings. The collections Lindheimer 451, 452 and parts of 453 (numbers allocated by the distributors, see above) have been also collected in 1846 but they are not part of the type collections. BLANKINSHIP (1907) indicated the one numbered 451 as the type collection but this is not correct. In the protologue the habitat is indicated as "auf felsigem Boden" (on rocky ground), what is clearly in contrast to the habitat given on the handwritten label of the number 451 (at MO; fig. 10–11): "in schattigen Uferwäldungen auf fruchtbarem, leichtem Humus" (in shadowy riparian forests on fertile, light humus). No original label of Lindheimer 452 could be found in MO. Lindheimer 453 at MO has, on the other hand, such a label which informs us that the plants have been collected west of the Colorado [river] "in Gebüsch der Flußwäldungen" (in bushes of riparian forests).

Unfortunately nothing is known about the fate of Adolf Scheele's important herbarium (WAGENITZ 1982, STAFLEU & COWAN 1985) which contained more than 100 types of Texan plants (see SCHEELE 1848–1853) and was announced for sale by WILLKOMM (1864). SEELAND (1927, 1936) first affirmed, but nine years later revoked that it had been sold to the "Roemer- und Pelizaeus-Museum Hildesheim" (Germany). Unfortunately, due to the following reasons, this can now not be verified any more. The herbarium of the Roemer-Museum apparently outlasted the World War II and was allegedly transferred in 1956 to GOET (H. Stein in a letter dated 19th Aug. 1999 and J. Vespermann in an email dated 2nd Dec. 2009). This transfer can, however, not be confirmed by G. Wagenitz (email dated 20th Sept. 1999) who was for many years in charge of the latter herbarium. The truth may have not been (or could not be) told and putatively could be somewhat different: the herbarium of the Roemer-Museum may not had been adequately curated for decades reaching subsequently a very deteriorated condition, and thus, may have been most likely discarded by the art historians who dominated from the beginning the course of that museum. – As can be deduced from a note in SEELAND (1936: 20, 5th paragraph), at least one set of duplicates of F. Roemer's own plant collections (according to SCHEELE rich in duplicates and containing also many of his types) is said to have been incorporated into the herbarium of the Roemer-Museum (co-founded by Hermann, the brother of F. Roemer). Another note (ANONYMUS 1932: 438) informs us that 4 fragments of Scheele's types had been sent on exchange from the "Provinzial-Museum zu Hannover" to the Berlin herbarium (B). Unfortunately, the sort of plants in question is not stated. Lamentably both herbaria have been destroyed during World War

II, so it can also in this case not be checked any more if Scheele's herbarium may had been sold to Hannover!

Acknowledgements

I wish to thank Walter Till (WU) for critically reading the manuscript, Heimo Rainer (Vienna) for allowing me to use his ArcView GIS application for creating the distribution maps, Jan Meerman (Belmopan) for information on the ecology of *D. bumelioides*, Wolfgang Reichmann (Vienna) for the advice concerning the program Photoshop, Anton Igersheim (Vienna) for taking digital images of some specimens kept in BP, and our librarian Andrea Kourgli (Vienna) for procuring rare literature. Stefan Meyer, Gerhard Wagenitz (both Göttingen), Günter Gottschlich (Tübingen), Hilde Stein, Jürgen Vespermann (both Roemer-Museum Hildesheim), and many others are acknowledged for their information concerning the fate of Scheele's herbarium. Last but not least, I am grateful to the directors and curators of 75 herbaria who kindly made their herbarium material available for study.

Literature

- ANKLI A., STICHER O. & HEINRICH M., 1999: Medical ethnobotany of the Yucatec Maya: healers' consensus as a quantitative criterion. – *Econ. Bot.* 53 (2): 144–160.
- ANKLI A., HEINRICH M., BORK P., WOLFRAM L., BAUERFEIND P., BRUN R., SCHMID C., WEISS C., BRUGGISSER R., GERTSCH J., WASESCHA M. & STICHER O., 2002: Yucatec Mayan medicinal plants: evaluation based on indigenous uses. – *Journal of Ethnopharmacology* 79: 43–52.
- ANONYMUS, 1932: Bericht über den Botanischen Garten und das Botanische Museum zu Berlin-Dahlem vom 1. April 1931 bis 31. März 1932. – *Notizbl. Bot. Gart. Berlin-Dahlem* 11: 425–449.
- BARRERA M., A., BARRERA V., A. & LOPEZ F., R.M., 1976: *Nomenclatura Etnobotanica Maya*. – México, D. F.: Instituto Nacional de Antropología e Historia.
- BLANKINSHIP J.W., 1907: *Plantae Lindheimerianae*. Part III. – *Annual Rep. Missouri Bot. Gard.* 18: 123–223.
- CAMPOS-RÍOS M.G. & CHIANG CABRERA F., 2006: Una revisión nomenclatural de los tipos de plantas de la península de Yucatán (México). – *Polibotánica* 22: 89–149.
- CARRANZA GONZÁLEZ E., 2000: Ebenaceae. – In: *Flora del Bajío y de regiones adyacentes*, 83: 1–9. – Pátzcuaro, Michoacán: Instituto de Ecología, A. C.
- CHIAPPY-JHONES C., RICO-GRAY V., GAMA L. & GIDDINGS L., 2001: Floristic affinities between the Yucatán Peninsula and some karstic areas of Cuba. – *J. Biogeogr.* 28: 535–542.
- DUANGJAI S., WALLNÖFER B., SAMUEL R., MUNZINGER J. & CHASE M.W., 2006: Generic delimitation and relationships in Ebenaceae sensu lato: evidence from six plastid DNA regions. – *Amer. J. Bot.* 93 (12): 1808–1827.
- DUANGJAI S., SAMUEL R., MUNZINGER J., FOREST F., WALLNÖFER B., BARFUSS M.J.H., FISCHER G. & CHASE M.W., 2009: A multi-locus plastid phylogenetic analysis of the pantropical genus *Diospyros* (Ebenaceae), with an emphasis on the radiation and biogeographic origins of the New Caledonian endemic species. – *Molec. Phylogen. Evol.* 52: 602–620.
- ENGELMANN G. & GRAY A., 1845: *Plantae Lindheimerianae*; an enumeration of the plants collected in Texas, and distributed to subscribers, by F. Lindheimer, with remarks, and descriptions of new species, &c. – *Boston J. Nat. Hist.* 5: 210–264.
- ESTRADA J. & WALLNÖFER B., 2007: Ebenaceae. – In: DUNO DE STEFANO R., AYMARD G. & HUBER O. (eds.): *Catálogo anotado e ilustrado de la flora vascular de los Llanos de Venezuela*, p. 460. – Caracas: FUDENA - Fundación Empresas Polar - FIBV

- GILLET J.M. & SHCHEPANAK M.J., 1977: Isotypes and syntypes in a Lindheimer Texas collection at the National Herbarium of Canada, Ottawa. – *Taxon* 26: 429–434.
- GRAY A., 1850: *Plantae Lindheimerianae*, part II. An account of a collection of plants made by F. Lindheimer in the Western part of Texas, in the years 1845–6, and 1847–8, with critical remarks, descriptions of new species, &c. – *Boston J. Nat. Hist.* 6: 141–240.
- HOLMGREN P.K. & HOLMGREN N.H., 1998–2009: *Index Herbariorum*. – New York Botanical Garden. – <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>
- LUNDELL C.L., 1937: The vegetation of Petén. – *Publ. Carnegie Inst. Wash.* 478.
- MARTÍNEZ M., 1978: *Catálogo de nombres vulgares y científicos de plantas mexicanas*. – México: Fondo de Cultura Económica.
- MEERMAN J.C., 2003–2009: Biodiversity & environmental resource data system of Belize: http://www.biodiversity.bz/find/species/profile/find_name_spp.phtml?genus=Diospyros.
- SCHEELE A., 1848–1853: *Beiträge zur Flora von Texas*. – *Linnaea* 21: 453–472 (1848), 576–602 (1849), 747–768 (1849), 22: 145–168 (1849), 339–352 (1849), 23: 139–146 (1850), 25: 254–256 (1852), 257–265 (1853).
- SCHEELE A., 1849: Verzeichnis der von Dr. Ferdinand Roemer aus Texas mitgebrachten Pflanzen. – In: ROEMER F.: *Texas. Mit besonderer Rücksicht auf deutsche Auswanderung und die physischen Verhältnisse des Landes nach eigener Beobachtung geschildert. Mit einem naturwissenschaftlichen Anhang und einer topographisch-geognostischen Karte von Texas*: 425–449. – Bonn: A. Marcus.
- SEELAND H., 1927: Zur Literatur über die Flora von Hildesheim. – *Mitteilungen aus dem Hermann Roemer-Museum Hildesheim* 27: 1–28 (Hildesheim: Gebr. Gerstenberg) [only pages 1 and 18 seen].
- SEELAND H., 1936: August Schlauter, ein Hildesheimer Botaniker (1803–1849) und zeitgenössische Botaniker der Heimat. Ein Beitrag zur Floristik und Flora von Hildesheim. – *Mitteilungen aus dem Hermann Roemer-Museum Hildesheim* 40: 1–49 [only a PDF of pages 20–22 seen].
- SOSA V., FLORES J.S., RICO-GRAY V., LIRA R. & ORTIZ J.J., 1985: *Lista florística y sinonimia Maya. Etnoflora Yucatanense, Fascículo 1*. – Xalapa: Instituto Nacional de Investigaciones sobre Recursos Bióticos.
- STAFLEU F.A. & COWAN R.S., 1985: *Taxonomic literature. Volume V: Sal-Ste*. – *Regnum Veg.* 112.
- STANDLEY P.C., 1924: *Diospyraceae*. – In: *Trees and shrubs of Mexico*. – *Contr. U. S. Natl. Herb.* 23 (4): 1126–1129.
- STANDLEY P.C., 1930: *Flora of Yucatan*. – *Publ. Field Mus. Nat. Hist., Bot. Ser.* 3 (3): 376–377.
- TREVIÑO GARZA E.J., CAVAZOS CAMACHO C. & AGUIRRE CALDERÓN O.A., 2001: *Distribución y estructura de los bosques de galería en dos ríos del centro sur de Nuevo León*. – *Madera y bosques* 7 (1): 13–25.
- WAGENITZ G., 1982: *Index collectorum principalium herbarii Gottingensis*. – Göttingen: Systematisch-Geobotanisches Institut der Georg-August-Universität.
- WALLNÖFER B., 1999: *Neue Diospyros-Arten (Ebenaceae) aus Südamerika*. – *Ann. Naturhist. Mus. Wien, B*, 101: 565–592.
- WALLNÖFER B., 2000: *Neue Diospyros-Arten (Ebenaceae) aus Südamerika - II*. – *Ann. Naturhist. Mus. Wien, B*, 102: 417–433.
- WALLNÖFER B., 2001a: *The Biology and Systematics of Ebenaceae: a Review*. – *Ann. Naturhist. Mus. Wien, B*, 103: 485–512.

- WALLNÖFER B., 2001b: Lectotypification of *Diospyros cayennensis* A. DC. (Ebenaceae). – Taxon 50: 887–889 [see Erratum in Taxon 50 (4): 1319].
- WALLNÖFER B., 2003a: A new species of *Diospyros* from southwestern Amazonia. – Ann. Naturhist. Mus. Wien, B, 104: 563–566.
- WALLNÖFER B., (2003b [submitted for publication]): Ebenaceae. – In: CARNEVALI FERNÁNDEZ-CONCHA G. et al. (eds.): Flora ilustrada de la Península de Yucatán. – Mérida (Yucatán).
- WALLNÖFER B., 2004a: A revision of *Lissocarpa* BENTH. (Ebenaceae subfam. Lissocarpoideae (GILG in ENGLER) B.WALLN.). – Ann. Naturhist. Mus. Wien, B, 105: 515–564.
- WALLNÖFER B., 2004b: Ebenaceae. – In: KUBITZKI K. (ed.): The families and genera of vascular plants, 6: 125–130. – Berlin, Heidelberg: Springer Verlag.
- WALLNÖFER B., 2004c: Lissocarpaceae. – In: KUBITZKI K. (ed.): The families and genera of vascular plants, 6: 236–238. – Berlin, Heidelberg: Springer Verlag.
- WALLNÖFER B., 2005: New species of *Diospyros* (Ebenaceae) from the Neotropics and additional information on *D. apeibacarpus*. – Ann. Naturhist. Mus. Wien, B, 106: 237–253.
- WALLNÖFER B., (2006 [submitted for publication]): Ebenaceae. – In: JÖRGENSEN P.M. et al. (eds.): Catalogue of vascular plants of Bolivia.
- WALLNÖFER B., 2007: A revision of neotropical *Diospyros* (Ebenaceae): part 1. – Ann. Naturhist. Mus. Wien, B, 108: 207–247.
- WALLNÖFER B., 2008a: Ebenaceae. – In: HOKCHE O., BERRY P.E. & HUBER O. (eds.): Nuevo Catálogo de la Flora Vascular de Venezuela, pp. 356–357. – Caracas: Fundación Instituto Botánico de Venezuela Dr. Tobías Lasser.
- WALLNÖFER B., 2008b: Ebenaceae. – In: ZULOAGA F.O., MORRONE O. & BELGRANO M.J. (eds.): Catálogo de las Plantas Vasculares del Cono Sur. – Monogr. Syst. Bot. Missouri Bot. Gard. 107: 1987.
- WALLNÖFER B., 2009: A revision of neotropical *Diospyros* (Ebenaceae): part 2. – Ann. Naturhist. Mus. Wien, B, 110: 173–211.
- WALLNÖFER B. & MORI S.A., 2002: Ebenaceae. In: MORI S.A., CREMERS G., GRACIE C.A., DE GRANVILLE J.-J., HEALD S.V., HOFF M. & MITCHELL J.D. (eds.): Guide to the vascular plants of central French Guiana. Part 2. Dicotyledons. – Mem. New York Bot. Gard. 76 (2): 254–257, pl. 50–51.
- WHITEFOORD C. & KNAPP S., 1999–2009: Ebenaceae. In: Flora Mesoamericana. – <http://www.mobot.org/mobot/fm/welcome.html>.
- WILLKOMM M., 1864: Personal-Nachrichten. – Bot. Zeitung (Berlin) 22 (45): 342–343.
- ZAMORA CRESCENCIO P., 2003: Contribución al estudio florístico y descripción de la vegetación del municipio de Tenabo, Campeche, México. – Polibotánica 15: 1–40.
- ZANELLA F.C.V., DE OLIVEIRA M.L. & GAGLIANONE M.C., 2000: Standardizing lists of locality data for examined specimens in systematics and biogeography studies of new world taxa. – Biogeographica 76 (4): 145–160.

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Annalen des Naturhistorischen Museums in Wien](#)

Jahr/Year: 2009

Band/Volume: [111B](#)

Autor(en)/Author(s): Wallnöfer Bruno

Artikel/Article: [A revision of neotropical Diospyros \(Ebenaceae\): part 3. 101-133](#)