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A revision of neotropical *Diospyros* (Ebenaceae): part 6

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Abstract

In the course of a revision of New World Ebenaceae for "Flora Neotropica" and some regional floras, specimens from ca. 75 herbaria have been studied. The Cuban endemic *Diospyros grisebachii* (HIERN) STANDL. is here described in detail. *D.* ×*leonis* (BRITTON & P.WILSON) STANDL., the putative hybrid *D. crassinervis* (s.lat.) × *D. grisebachii* or perhaps *D. caribaea* × *D. grisebachii*, is also presented. An identification key for the Cuban species, figures, distribution maps, and lists of specimens are included.

Key words: Ebenaceae, *Diospyros grisebachii*, *D.* ×*leonis*, revision, taxonomy, identification key, distribution maps, flora of Cuba.

Zusammenfassung

Im Rahmen einer Revision der neuweltlichen Ebenaceae für "Flora Neotropica" und einigen Regionalfloren konnten Herbarbelege aus ca. 75 Herbarien studiert werden. Der Kubanische Endemit *Diospyros grisebachii* (HIERN) STANDL. wird hier im Detail beschrieben. *D.* ×*leonis* (BRITTON & P.WILSON) STANDL., der vermutliche Hybrid *D. crassinervis* (s.lat.) × *D. grisebachii* oder eventuell *D. caribaea* × *D. grisebachii*, wird hier ebenso präsentiert. Ein Bestimmungsschlüssel für die Kubanischen Arten, Abbildungen, Verbreitungskarten und Listen der gesehenen Herbarbelege werden ebenfalls beigefügt.

Introduction

In the Americas, the Ebenaceae are represented by the genera *Diospyros*, with about 100–130 species, and *Lissocarpa* with eight species. In the course of an ongoing revision of Ebenaceae (WALLNÖFER 2001a, 2001b, 2004a, 2004b, 2004c, 2006, 2007, 2008a, 2008b, 2009a, 2009b, 2010a, 2010b, 2010c, 2010d, 2011, 2012, WALLNÖFER & MORI 2002, ESTRADA & WALLNÖFER 2007; see also DUANGJAI et al. 2006, 2009) for "Flora Neotropica", "Flora of Ecuador", "Flora of the Guianas", and "Flora de Paraguay" several new species have already been described (WALLNÖFER 1999, 2000, 2003, 2005).

Note: Additions are given in brackets; coordinates given in brackets were determined during this revision; acronyms of herbaria according to THIERS (2012); 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; s.n. = without number; s.d. = without date; s.coll. = without collector; s.lat. = sensu lato; 2× = 2 sheets.

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***Diospyros grisebachii* (HIERN) STANDL.**, Publ. Carnegie Inst. Wash. 461 (4): 80 (1935), – [fig. 1–3, 4a–f, 5, 6a].

≡ *Macreightia buxifolia* GRISEB., Cat. pl. Cub. 169 (1866), non *D. buxifolia* (BLUME) HIERN, Trans. Cambridge Philos. Soc. 12 (1): 218 (1873) [≡ *Leucoxylum buxifolium* BLUME, Bijdr. Fl. Ned. Ind. 17: 1169 (1827)].

≡ *Maba grisebachii* HIERN, Trans. Cambridge Philos. Soc. 12 (1): 125 (1873), non *M buxifolia* (ROTTB.) PERS., Syn. Pl. [Persoon] 2 (2): 606 (1807) [≡ *Pisonia buxifolia* ROTTB., Nye Saml. Kongel. Danske Vidensk. Selsk. Skr. 2: 536–537, tab. 4 (1783)].

≡ *Ebenus grisebachii* (HIERN) KUNTZE, Revis. gen. pl. 2: 408 (1891), nom. illeg.

Typus: Cuba, "in Cuba Orientali, prope San Antonio", [not located], (fl female), 4 Jul. 1860–1864, **C. Wright 2938** [holotype: GOET (fig. 1), possible isotypes (see note below): BM, BREM n.s. (dig. photo), G-DC, G, GH, K, LE n.s., MA n.s. (dig. photo), MO, P, S (photo NY: N.S. 6909 at FHO, NY), W].

Note concerning Wright's collections: HOWARD (1988) noted: "Although he collected 'species' rather than numbered specimens " and " reveals that many of Wright's 'numbers' are mixed collections" and " since the numbers on his various collections were arbitrarily assigned by Gray and Eaton after collections were identified and assembled into sets". According to HOWARD (1988), a second sheet (not seen during this study) of the collection numbered 2938 at GH bears the locality "Zapele [not located; Fapele?], jurisdicción Guanes [in Pinar del Río], 12/21 [= 21st December]"

Spiny shrub or tree up to 7 (–8) m tall (already flowering when ca. 0.9 m tall), with a trunk diameter up to at least 15 cm (as estimated from a fragment of a trunk cross-section of Rife s.n.), evergreen, usually developing long- and short-shoots; the former often ± spreading and sometimes also markedly thickened; branches and twigs (ramification) appearing often constricted, distorted and crooked (fig. 3); wood hard, heavy, light-colored in the outer and black (with irregular outline) in the inner parts (Rife s.n., fig. 4f); bark gray to brownish, with brown inner parts when dry (Rife s.n.); scales of buds and young twig apices covered with ± appressed, ± straight, light hairs of different length; young twigs subterete, ± smooth, gray or less frequently gray-brown, bearing patent, whitish-translucent, simple, stiff, minute hairs (see fig. 3c–d in WALLNÖFER 2012), but soon glabrescent; older twigs slightly fissured; **leaves** (fig. 4a) alternate or sometimes subopposite, with brochidodrome venation, with a spiny apex and often not exceeding 1 cm in length on the whole branch (fig. 3); petioles 1–2 mm long, up to 1.5 mm thick, gray-brown, dark above insertion, often slightly hairy; scars of petioles often thickened; leaf lamina ovate or less frequently elliptic, rarely ± obovate, orbicular or narrowly lanceolate, (0.3–) 1–1.8 (–3.4) cm long, (0.15–) 0.5–1 (–2.5) cm wide (some leaves quite large, e.g., up to 3.3 × 1.7 cm in Ekman 6526, or up to 3.3 × 2.5 cm in León 14320, see fig. 2), (1–) 1.5–2.6 (–5) times longer than wide, flat or longitudinally slightly v-like, coriaceous, usually glabrous on both sides (rarely with some scattered, appressed hairs on veins), dark green and glossy adaxially, light green and dull abaxially when alive; venation on both sides usually lighter than the lamina, especially when alive (fig. 5); leaf apex usually tapering into an up to 2 mm long, spiny, light or black mucro, rarely rounded or emarginate; base of lamina cuneate or sometimes rounded; leaf margins entire, flat, with a thickened marginal vein; flachnectaria minute, surrounded by a strong vein, 0–2 (–5) on the proximal ⅓–½ of the abaxial leaf surfaces; midvein slightly raised adaxially,

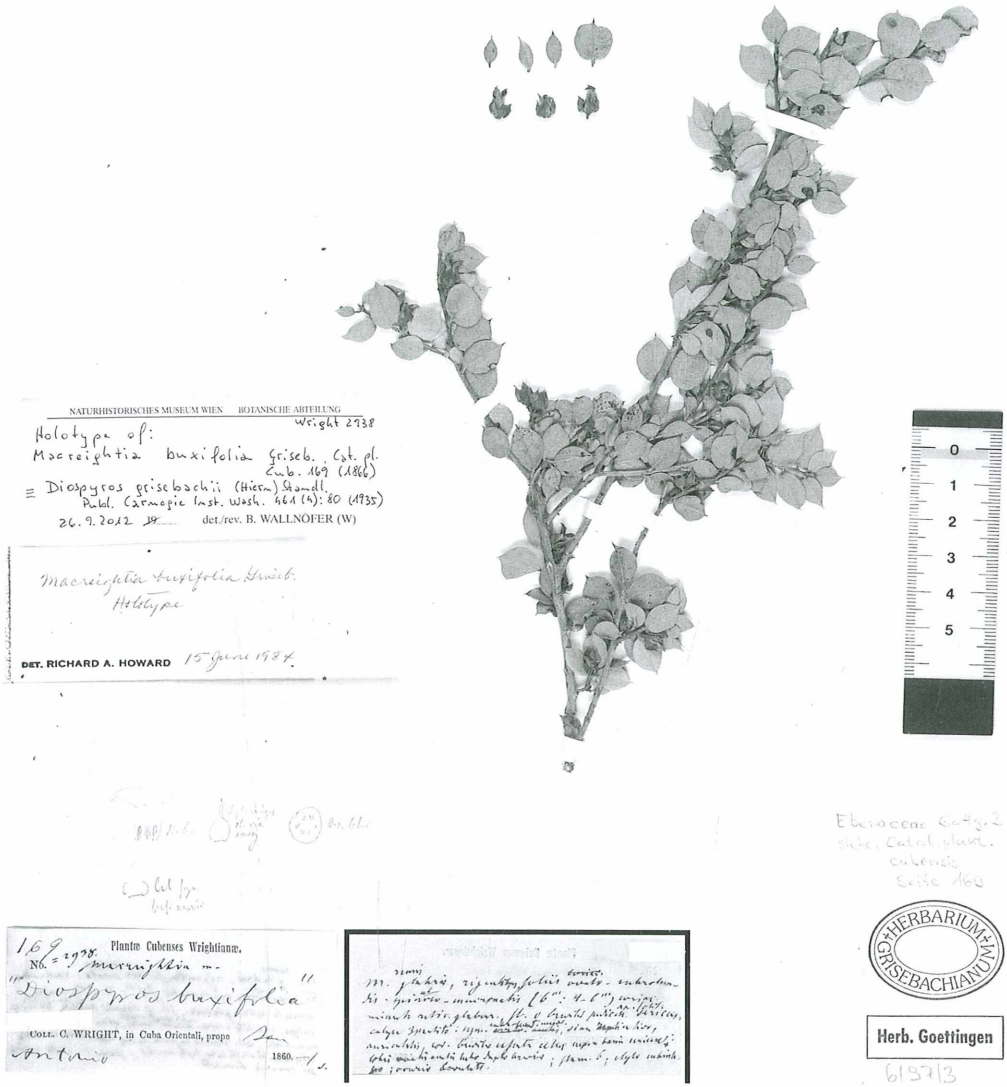

Fig. 1: Holotype of *Diospyros grisebachii* (HIERN) STANDL. [GOET].

markedly prominent abaxially; secondary veins 3–4 per side, slightly prominent on both sides; intersecondary veins not conspicuous; tertiary veins only slightly raised adaxially, hardly visible abaxially; area in-between the veinlets slightly sunken adaxially, ± flat abaxially; **inflorescences** arranged along the proximal part of new short-shoots in the axil of leaves (the lowermost ones often in the axil of caducous bracts or very small leaves), scattered to medium densely covered with appressed, short hairs; male inflorescence units up to 1.1 cm long, consisting of a simple, 1–3-flowered cyme; pedicels up to 3 mm long, 0.5–1 mm thick, ± longitudinally ridged, irregularly hairy, widened distally; female cymes 1-flowered (fig. 4c); stalk (peduncle and pedicel) up to 3 mm long and 0.8–1 mm thick (widened distally); bracts and bracteoles of both sexes similar in shape,

Fig. 2: *Diospyros grisebachii*: specimen with exceptionally large leaves [León 14320 in NY].

Fig. 3: *Diospyros grisebachii*: specimen with small leaves [Ekman ser. III 7662 in S].

1–1.5 mm long and 0.8–1 mm wide, caducous or persisting, broadly triangular or ± ovate, ± acute, scattered to densely hairy abaxially, glabrous adaxially; **flowers** 3 (–4)-merous; male flowers (fig. 4b) up to 8 mm long (pedicels excluded); calyx 3–4.5 mm long and ca. 2.5 mm wide, undivided in the proximal 1.5–3 mm, on the outside scattered to medium densely covered with ± appressed, ± straight hairs of different length, on the inside except on margins of lobes glabrous; calyx lobes ± triangular, ca. 1.5 mm long, ca. 2 mm wide, acute; sinuses between the lobes inconspicuous; corolla ca. 7 mm long, black when dry, on the outside densely covered with long, ± straight, ± appressed, light (sometimes slightly ferruginous) hairs, on the inside glabrous; tube 5 mm long, narrowly barrel-shaped, widest in the middle and there ca. 2 mm wide; corolla throat ca. 0.5 mm wide; corolla lobes ovate, ca. 3 mm long and ca. 1.8 mm wide, acute; stamens 11 (only one anthetic flower of Ekman 9207 dissected), usually not united in pairs, glabrous, markedly differing in length, 2–4.5 mm long, adnate to the corolla tube near its base; filaments 0.5–2 mm long and ca. 0.2 mm wide, flat; anthers 1.5–2.5 mm long and ca. 0.5 mm wide, widest in the proximal third, tapering distally into a ca. 0.3 mm long, subulate connective appendage; pollen sacks 1–2 mm long, opening by lateral slits; rudiment of the ovary semiglobose, ca. 0.5 mm in diameter, slightly longitudinally ± grooved (impressions of filaments), without stylodia, densely hairy; **female flowers** (fig. 4c) ca. 8 mm long (pedicels excluded); calyx 6 mm long, ca. 7 mm wide, undivided in the proximal 2 mm, on the outside scattered or medium densely covered with ± appressed hairs of different length, on the inside densely covered with appressed hairs near the base and with spreading or appressed hairs on the lobes, without longitudinal ridges running down from the sinuses abaxially; area around the sinuses between the calyx lobes expanded and protruding outwards; calyx lobes 5 mm long, 4–5 mm wide, broadly ovate to ± triangular, acute and tapering distally, with revolute margins and ± raised veins abaxially; corolla brownish-black when dry, ca. 7 mm long, on the outside densely covered with appressed or slightly spreading, long, ± straight hairs, glabrous inside; tube 5.5 mm long and ca. 3 mm wide, barrel-shaped, widest in the middle; corolla throat ca. 2 mm wide; corolla lobes 5 mm long and 4 mm wide, ovate, acute; staminodia 4 (one of them smaller and shorter; only one anthetic flower of Ekman 9207 dissected), 4 mm long, adnate to the corolla tube 0.5 mm above its base, glabrous; filaments 3 mm long, ca. 0.2 mm wide; antherodes flat, lanceolate, 1.5 mm long and 0.6 mm wide, tapering into a tip distally; ovary 6-locular, as a whole 5 mm long, 2–2.5 mm in diameter, tapering into the ca. 2.5 mm long style and stylodia, densely covered with ± appressed, ± straight hairs; stylodia three, ca. 1.5 mm long; stalk of the **fruits** 2–3 mm long, ca. 2 mm thick proximally and 4 mm thick distally, still covered with indumentum; fruits (fig. 4d) 1 per cyme, 6-seeded, ± ellipsoidal to depressed globose, sometimes ± asymmetrical, up to 2 cm long and 2.5 cm in diameter when dry, detaching with the calyx, distally with a mucro-like remnant of the style, green when unripe, yellowish and partially tinged orange-brown when maturing, smooth and slightly shiny when alive (from color photos taken by J.R. Abbott and Pedro A. González Gutiérrez; color of fully ripe fruits still unknown), when dry dark to blackish-brown, ± shiny and with ± granulate surface (subepidermal stone cell granules!); young fruits medium densely covered with slightly spreading, ± straight hairs of different length; mature fruits glabrous except at the apex; fruit wall with a stone cell layer up to 1–2 mm thick when dry, becoming soft at maturity, with the epidermis adhering when dry; mesocarp scanty; calyx as a whole up to 2 cm wide and up to 0.4 cm high, gray to brownish when alive, on the outside

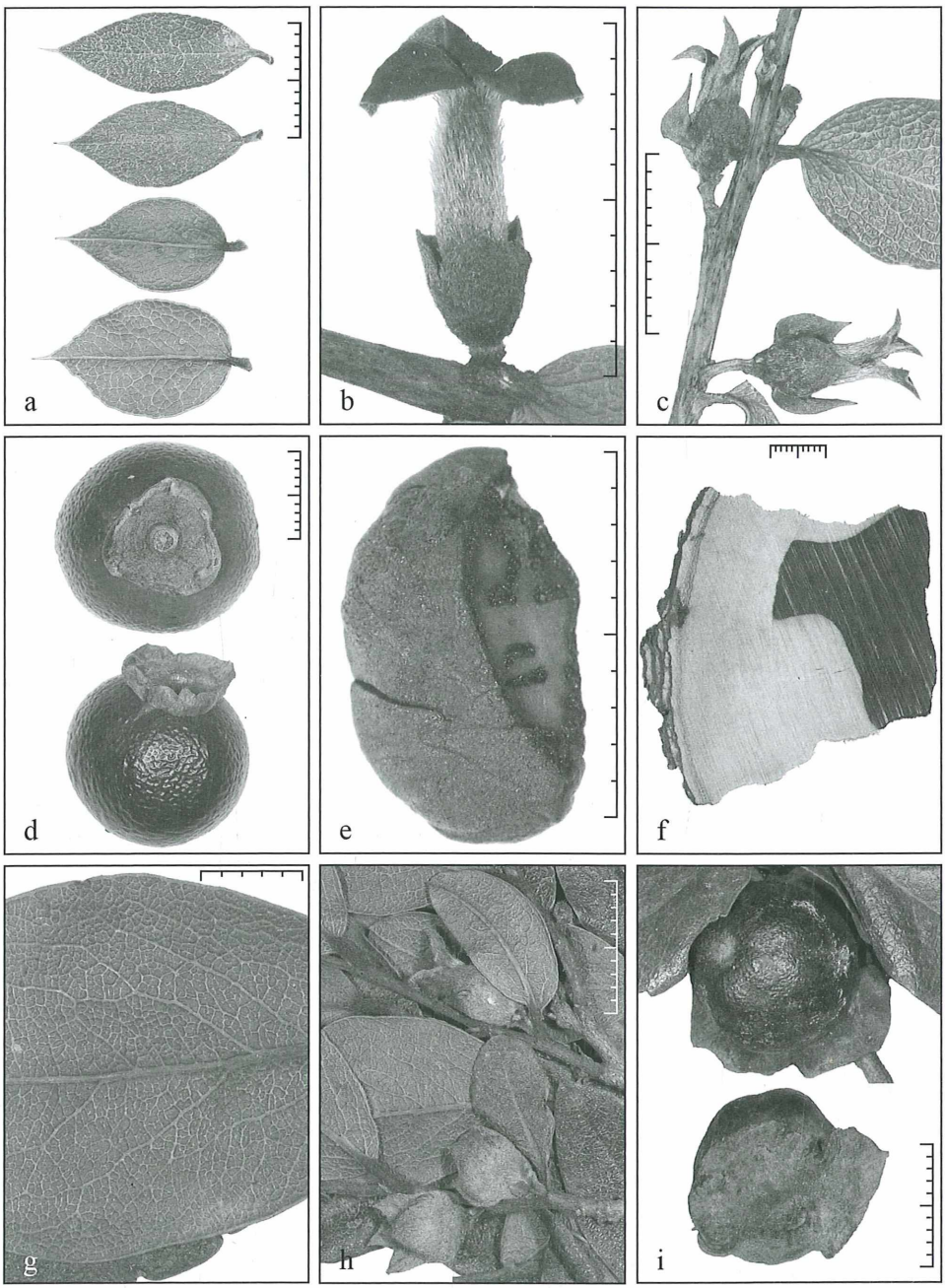

Fig. 4: *Diospyros grisebachii*: a: leaves showing the adaxial (the two on top) and abaxial sides (the two on bottom) (from Ekman 15766b [S]); – b: male flower (from Lopez Figueiras 239 [US]); – c: female flowers (from Ekman 15766b [S]); – d: fruits (from Abbott et al. 18937 [W]); – e: seed (from Fairchild 3888 [US]); – f: cross-section of trunk (from Rife s.n. [US]); — *D.* ×*leonis*: g: abaxial side of leaf, and h: leaves and female flowers (both from León & Roca 6269 [US, isotype]); – i: fruits (from León 14214 [NY]); – scale = 1 cm, except g = 5 mm.

thickened and obconical at the base, appressed, medium densely hairy on the outside, on the inside densely covered with ± spreading hairs in the distal half, with subparallel, straight, appressed hairs more proximally and glabrous near the base, without longitudinal ridges running down from the sinuses abaxially; area around and below the sinuses between the calyx lobes expanded and protruding out- and downwards; undivided (basal) part of the calyx 4 mm wide; lobes 7–8 mm long and ca. 7 mm wide, with ± raised veins abaxially, usually with margins bent like a brim downwards (fig. 4d) or sometimes ± flat and appressed like a bowl to the fruit; apex of the calyx lobes spreading or transversally revolute; seeds ± like the segments of an orange or bean-shaped (fig. 4e), 1.1 mm long, ca. 7.5 mm wide, 5 mm thick, with a strongly ruminate endosperm, gray or dark and often resinous when dry; outer tangential (periclinal) wall of the exotestal cells finely striate below the surface.

Notes: Unfortunately, the color of flowers and mature fruits is neither indicated in the literature nor on herbarium labels. Pedro A. González Gutiérrez (from Cuba; via e-mail, 14th Sept. 2012) seems to remember having seen the corollas colored pale yellow (the same as in *D. crassinervis*). He later (3rd Dec. 2012) sent me a photo taken by Sara Ilse Suarez which shows an older bud of a female flower with a still closed, pale yellow corolla. According to him, the fruits are very similar in color and shape to those of *D. crassinervis* and are edible. – ROIG (1916) reports that the heartwood becomes black in old plants.

Figure: twig and fruits (BISSE 1988: fig. 26a).

Distribution and phenology: It is an endemic species of Cuba and is known from 11 provinces, (fig. 6a). A distribution map is also presented by BISSE (1968). It was collected from sea level up to elevations of 550 meters. – It has been found flowering from May to July and from September to November. MÉNDEZ & RISCO (1999) are indicating it to flower from February to May. It has been collected in fruit from March to June and from October to January.

Habitat: BORHIDI (1996) reports it from "dry, thorny limestone shrubwoods (Lantano-Cordietalia)" in Spanish called "matorral xeromorfo costero y sub-costero (manigua costera sensu lato)" represented by the plant associations "Guayaco-Pithecellobietum guadelupensis", "Picrodendro-Burseretum simarubae", "Linociero-Savietum bahamensis" and "Casasio clusiifoliae-Ateramnetum lucidi" The species is on the other hand also a member of the "dry lowland xeromorph serpentine shrubwoods (Phyllantho-Neobracetalia)" in Spanish called "matorral xeromorfo espinoso sobre serpentina (cuabal)" represented by the associations "Rondeletio camariocae-Guettardetum clarensis" and "Erythroxylo minutifolii-Spirotecometum holguinensis" It is also known to occur in "limestone evergreen seasonal forests" ("bosque siempreverde mesófilo de llanura") with the association "Mastichodendro-Dipholietum salicifoliae" and in semideciduous forests on limestone ("bosque semideciduo mesófilo") with the association "Masticho-dendro-Cedreletum mexicanae"), both with canopy layers up to 18–25 m high. According to BISSE (1968), it occurs in the drier variant of the manigua costera generally called "cacti-thornbrush" and in the xerophytic vegetation of the cuabales on serpentine soil. *D. grisebachii* is mentioned in several other publications dealing with the vegetation of some areas, e.g., GUTIÉRREZ AMARO et al. (1984), MÉNDEZ & RISCO (1999), BARRETO VALDÉS et al. (2003, 2005, 2007), GODÍNEZ CARABALLO et al. (2005), FONG et al. (2005), DÍAZ et al. (2006), FIGUEREDO CARDONA et al. (2009), etc.

Fig. 5: *Diospyros grisebachii*: fruiting plant (Abbott et al. 18937), photos: courtesy of J. Richard Abbott.

Vernacular names: "ébano real" (SAUGET & LIOGIER 1957–1963, BISSE 1988, BARRETO VALDÉS et al. 2003, 2005, 2007, FONG et al. 2005, DÍAZ et al. 2006, FIGUEREDO CARDONA et al. 2009, and indicated also on several herbarium labels), "ébano" (MARTÍNEZ QUESADA 2006), "ébano negro" (ACEVEDO-RODRÍGUEZ & STRONG 2012), "espuela de rey" (HERNÁNDEZ CANO & VOLPATO 2004). In some places it is called "ebano carbonero", a name which is used for some other species of *Diospyros* with black heartwood as well (as discussed by ROIG 1916).

Use: According to SAUGET & LIOGIER (1957–1963) and MARTÍNEZ QUESADA (2006), the variegated, blackish wood is used in carpentry (ebanistería, artesanía). MÉNDEZ & RISCO (1999), BARRETO VALDÉS et al. (2003) and GODÍNEZ CARABALLO et al. (2005) report it as a source of valuable wood and honey (melífera, apícola). According to HERNÁNDEZ CANO & VOLPATO (2004), its roots are mixed with those of *Argemone mexicana* and a decoction is prepared to be orally ingested to eure cardiac afflictions. MÉNDEZ & RISCO (1999) and GODÍNEZ CARABALLO et al. (2005) are also indicating the species to be used in medicine.

Specimens examined: **Cuba**, La Habana, Santa Cruz del Norte (Havana), [23°9' N, 81°55' W], coastal thickets, (flbuds male), 23 May 1918, **Bro. (Brother) León (= J.S. Sauget) & L.H. Daniel 7782** [GH, NY]; – Cerrote, Jibacoa (Havana), [23°9' N, 81°51' W], on limestone rocks, (fr), 2 Jan. 1929, **Bro. (Brother) León (= J.S. Sauget) & J.T. Roig 13759** [GH n.s., NY]; – Isla de la Juventud, Isla de Pinos, Sierra de Casas, [21°53' N, 82°48' W], on bare rocks, (defl male), 8 Dec. 1920, **E.L. Ekman 12564** [S], "small tree"; – Isle of Pines, vicinity of Columbia, Cerros de Guanabanas, [21°51' N, 82°46' W], limestone, (st), 19–21 Mar. 1916, **N.L. Britton, E.G. Britton & P. Wilson 15637** [NY, US], "tree 7 m"; – Matanzas, ad Jibarita, NE a pag. Playa Girón, [ca. 22°4' N, 81°2' W], in silvis calcareis litoralibus, (st?), 10 May 1970, **A. Borhidi, O. Muniz & S. Vazquez s.n.** [BP n.s. (dig. photo)]; – Cienfuegos, on the western shore of Cienfuegos bay, Calicito, near Antón Recio, [22°7' N, 80°32' W], seashore, (fr), 11 Apr. 1930, **Bro. (Brother) León (= J.S. Sauget) 14320** [FHO (fragm.), GH, NY], "shrub 3–4 m"; – Milpa, [22°4' N, 80°27' W], (st female), 9 Apr. 1927, **J.G. Jack 5117** [A], "dense shrub or small tree 10 ft. high"; – same locality: near the coast, (fr), 3 Apr. 1926, **W.R. Singleton 508** [A], "8' shrub"; – Cienfuegos, camino a la Costa E of Castillo de Jagua, [22°3' N, 80°28' W], on coral limestone, (st), 1–20 Jul. 1950, **R. Howard, W. Briggs, P. Kamb, I. Lane & R. Ritland 232** [A, K, LL, MICH, NY, UC], "shrub to 8' tall"; – Sancti Spíritus, Rio Toyaba [= Tayaba], Trinidad, [21°49' N, 80°1' W], rocky bank, (st), 15 Mar. 1910, **N.L. Britton, E.G. Britton & P. Wilson 5575** [NY], "shrub 3 m"; – Ciego de Ávila, Cayo Coco, en Punta colorada, 3–4 m, [22°30' N, 78°25' W], bosque costero, (st), 19 Sep. 1988, **A. Perez Asso 1969** [NY]; – Camagüey, Sierra de Cubitas, mogotes Paso de los Paredones, [21°36' N, 77°47' W], in silvis semideciduis carsticis calcareis, (st?), 16 Jul. 1970, **A. Borhidi & O. Muniz s.n.** [BP n.s. (dig. photo)]; – Holguín, Sabanaso (prope Mir ad occident. versus), [20°48' N, 76°41' W], in sylva, (fr), 26 Oct. 1915, **E.L. Ekman ser. III 6526** [AAU, F, G, GB, MICH, NY, S, US]; – Aguas claras prope Holguín, [20°57' N, 76°16' W], in charrascales, (st female), 28 Jul. 1916, **E.L. Ekman ser. III 7662** [S], "arbor parva"; – El Yareyal, Savannas, [20°52' N, 76°20' W], (fr), 21 Mar. 1932, **Bro. (Brother) León (= J.S. Sauget) 15516** [GH, NY]; – near Holguín airport, 100 m, ca. 20°50' N, 76°20' W, charrasco vegetation on limestone over serpentine, rather dense forest dominated by *Lysiloma*, (st), 13 Jul. 1985, **A.H. Gentry 51053** [MO], "tree 5 m, sterile"; – Municipio Rafael Freyre, en la carretera Santa Lucía (Rafael Freyre) a Holguín, cerca 12–13 km de Santa Lucia, 20°59'2.7" N, 76°2'35.2" W a 20°59'7.1" N, 76°2'29.4" W (WGS 84 map datum), cuabal (matorral xeromorfo sobre serpentina), (fr), 18 May 2004, **J.R. Abbott, E. Bécquer Granados & P.A. González 18937** [FLAS n.s., HAJB n.s., W], "shrub 3 m tall; maturing fruits yellowish"; – San German, inter Alto Cedro et Cacocum, [20°36' N, 76°7' W], in sylva, (st), 5 Aug. 1915, **E.L. Ekman ser. III 6345** [S]; – eruptive mountains about Holguín, side of Loma Pilon, [20°52' N, 75°47' W], (fr), 7 Apr. 1909, **J.A. Shafer 1229** [F, NY (+ carp.), US], "shrub 3 ft.; fruit green"; – Granma, El Dudoso, west of Ensenada de Mora (GH: El Dudoso, Pilón), [19°54' N, 77°19' W], coastal cliffs, (fl female, yfr), 27 Jul. 1949, **Bro. (Brother) Alain (= E.E. Liogier) & Bro. (Brother) Chrysogone 1087** [GH, NY]; – Santiago de Cuba, Bayate, Picote, 550 m, [20°21' N, 75°48' W], in cacum. mont. clacar., (defl, flbuds male), 16 Jul. 1916, **E.L. Ekman ser. III 7398** [S]; – Monte Picote, a foothill at the southern end of Sierra de Nipe, near Palmarito del Cauto, 400 m, [20°21' N, 75°48' W], (st), 29 Jan. 1956, **C.V. Morton 9731** [DUKE, US]; – Bahia de Santiago, Renté, [ca. 20°1' N, 75°52' W], (flbuds

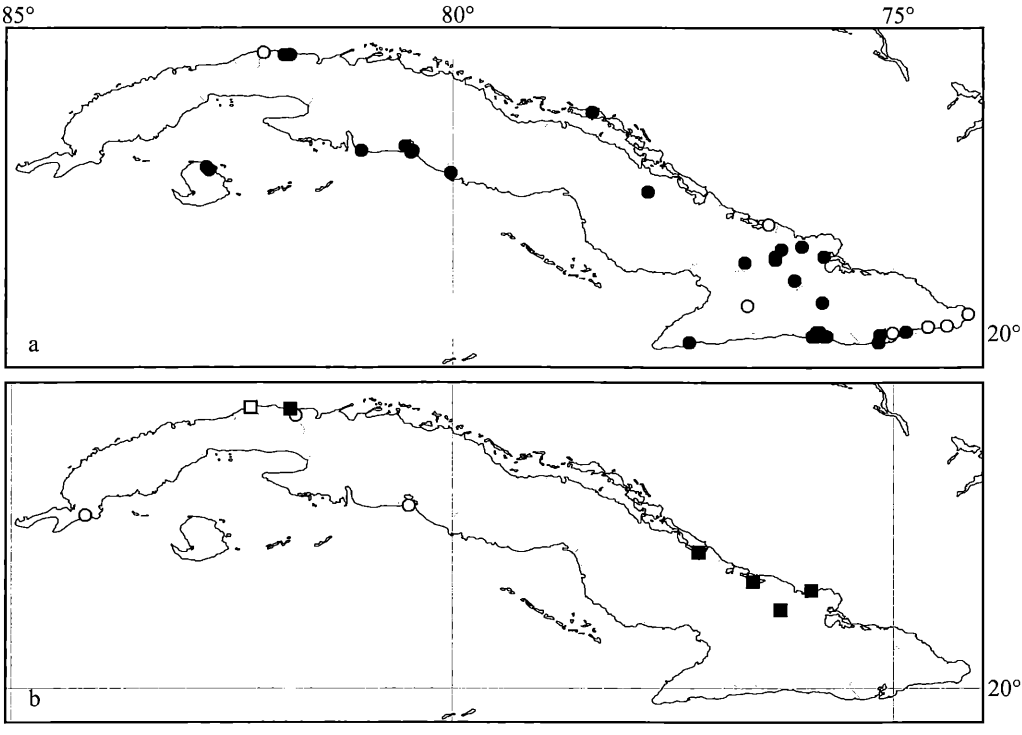

Fig. 6: Distribution of *Diospyros grisebachii* (a; specimens studied: ●, additional localities given by BISSE (1968): ○); — *D.* ×*leonis* (b; specimens studied: ■, type locality: □, BISSE (1968): ○).

female), 30 Jul. 1918, **Bro. (Brother) Hioram 2045** [NY]; – same locality: manigua [thickets], (fl female), Oct. 1944, **Bro. (Brother) Clemente 4277** [US]; – Santiago Bay, [ca. 20°1' N, 75°52' W], coastal thickets, (flbuds male), Nov. 1949, **Bro. (Brother) Clemente 7115** [GH]; – Santiago, ad later. occident. Santiago Bay, [20°1' N, 75°52' W], in pascuis, (fr), 21 Oct. 1916, **E.L. Ekman ser. III 8025** [AAU, S]; – Santiago de Cuba, [ca. 20°1' N, 75°50' W], coastal thickets, (fl male), Jul. 1928, **Bro. (Brother) Clemente 259** [GH]; – Cabanas Bay, [19°58' N, 75°55' W], coastal thicket, (fr), 17–20 Mar. 1912, **N.L. Britton & J.F. Cowell 12821** [NY], "shrub 2 m"; – road to El Morro, [19°59' N, 75°52' W], (fr), 26 Dec. 1953, **Bro. (Brother) Alain (= E.E. Liogier) & M. López Figueiras 3553** [GH]; – carretera de Punta Gorda, en la zona entre el Puente de la Mina y la Estación de Radio, [19°59' N, 75°52' W], (fl male), 30 Sep. 1951, **M. Lopez Figueiras 239** [US]; – prope Cabo Cruz, [19°59' N, 75°51' W], in collibus calcareis, (fl male, fl female), 10 Jun. 1918, **E.L. Ekman ser. III 9207** [F, K, MICH, S, US]; – cercanías de El Morro de Santiago de Cuba, [19°58' N, 75°52' W], manigua [thickets] costera, (fr), 21 Mar. 1954, **M. Lopez Figueiras 1156** [US]; – same area: in fruticetis calcareis carsticis, (fr), 21 Oct. 1969, **A. Borhidi & O. Muniz s.n.** [BP 2× n.s. (dig. photos)]; – ad Aguadores, [19°58' N, 75°47' W], collibus calcareis, (fr), 19 Nov. 1917, **E.L. Ekman ser. III 8949** [G, K, NY, S]; – El Salado Estate, road to Siboney, [19°58' N, 75°45' W], (fr), Jun. 1948, **Bro. (Brother) Clemente 5090** [GH n.s., NY]; – Guantánamo, vicinity of Guantánamo, Caimanera, [19°59' N, 75°9' W], dry hill, (fr), 19–31 Mar. 1909, **N.L. Britton 1893** [NY], "shrub 1 m"; – same locality: in limestone terraces, (fl male), 24 Nov. 1922, **E.L. Ekman 15766a** [G, NY, S], (fl female), **15766b** [S]; – same locality: in rupibus, (fr), 23 Sep. 1914, **E.L. Ekman ser. III 2861** [LL, S], "frutex vel arbor"; – Guantánamo Bay, United States Naval Station, [19°54' N, 75°10' W], hillside, (fr), 17–30 Mar. 1909, **N.L. Britton 2098** [NY (+ carp.)], "tree 7 m"; – same area: dry calcareous cliffs, (fr), 24 Mar. 1932, **D. Fairchild 3888** [A n.s., US]; – near Guantánamo Bay, [19°54' N, 75°10' W], (fr), 1919, **H.L. Ford s.n.** [US]; – Baitiquiri, [20°1' N, 74°51' W], (st), 1 Apr. 1952, **E.E. Smith 501** [US]; – not located: eastern Cuba, (st), 1925, **Gill & Whitford 108** [WIS (MAD)]; – eastern end of the island, (st), 1919, **C.H. Rife s.n.** [NY, US, both including a slice of wood].

***Diospyros* ×*leonis* (BRITTON & P.WILSON) STANDL.**, Publ. Carnegie Inst. Wash. 461 (4): 80 (1935), – [fig. 4g–i, 6b, 7].

≡ *Maba leonis* BRITTON & P.WILSON, Bull. Torrey Bot. Club 53 (7): 462 (1926).
≡ *Diospyros* ×*leonis* (BRITTON & P.WILSON) BORHIDI, Bot. Közlem. 62: 26 (1975), comb.illeg.

Typus: Cuba, Ciudad de La Habana, near Cojímar, [23°10' N, 82°18' W], coastal thickets, (fl female), 22 Jun. 1916, **Bro. (Brother) León (= J.S. Sauget) & Fath. (Brother) M. Roca 6269** [holotype: NY (fig. 7), isotypes: FHO (fragm.), GH, P, US].

Shrub up to 4 m tall; leaf lamina broadly lanceolate to elliptic, less frequently narrowly lanceolate or obovate, (0.6–) 1.5–3.3 (–5) cm long, (0.5–) 0.8–2.2 (–3.7) cm wide; areas between the veinlets glabrous (only few scattered hairs present on veinlets), ± sunken (slightly alveolate) abaxially (fig. 4g); leaf apex usually with a 1–2 mm long, spiny, dark mucro; calyx (fig. 4h) more densely hairy on the outside.

Note: It is very similar to *D. crassinervis* (KRUG & URB.) STANDL. (see WALLNÖFER 2007). This seems to be the hybrid of *D. grisebachii* with either *D. crassinervis* (s.lat.) or perhaps *D. caribaea* (A.DC.) STANDL. Based on Ekman's assumption and studying the corresponding specimen numbered 19053, URBAN (1926) described the hybrid *Maba* [= *Diospyros*] *caribaea* × *M. grisebachii*, which is also mentioned by SAUGET & LIOGIER (1957–1963). The latter kept, however, "*D. leonis*" as a distinct species. Regarding it (*D. leonis*), BISSE (1968) expressed a different opinion: he considers it as the putative hybrid *D. crassinervis* × *D. grisebachii*. According to him, this taxon is only poorly known because of the absence of fertile material. The type shows, however, flowers (fig. 4h) and the collection León 14214 immature fruits (fig. 4i). Field studies are needed to ascertain the true identity of these plants.

Distribution, habitat, and phenology: It is known only from Cuba (fig. 6b; compare also the distribution map presented by BISSE 1968). It was collected at low elevations. The habitat of *D.* ×*leonis* is essentially the same as that of *D. grisebachii* (see above). BORHIDI (1996) indicates it for the association "Lantano involucratae-Cordion sebestenae", and GODÍNEZ CARABALLO et al. (2005) reports it from the "bosque siempreverde micrófilo (bosque seco)" (= evergreen, microphyllous, dry forest) with a canopy up to a height of 15 m. – It has been found flowering in June and in fruit in October.

Vernacular name: "tagua de costa" (Curbelo 543).

Use: According to GODÍNEZ CARABALLO et al. (2005), it is a source of valuable wood and honey.

Specimens examined: **Cuba**, Ciudad de La Habana, near the buildings W of Cojímar, [23°10' N, 82°18' W], coastal thickets, (st), 26 Aug. 1915, **Bro. (Brother) León (= J.S. Sauget) & Bro. (Brother) Hioram 5609** [paratypes: GH, NY]; – La Habana, Jibacoa, [23°9' N, 81°51' W], coastal thickets, (st), 3 Jan. 1928, **Bro. (Brother) León (= J.S. Sauget) 13241** [GH]; – same locality and collector: (st), 30 Mar. 1929, **13856** [F, WIS (MAD)], "shrub 4 m"; – (fr), 10 Oct. 1929, **14214** [NY], "shrub 3–4 m"; – Camagüey, Pastelillo, [21°32' N, 77°13' W], on limestone tuffs, (st), 24 Jun. 1924, **E.L. Ekman 19053** [G, NY, S 2×], "shrub" (1 specimen at S shows long reiterating- or water-shoots); – Las Tunas, La Joya [?], Puerto Padre, [ca. 21°12' N, 76°36' W], in rocky shore, (fr), 22 Nov. 1930, **M. Curbelo 543** (5341 in Herb. J.T. Roig) [NY], "shrub"; – Holguín, Cerro de Fraile, [20°53' N, 76°17' W], in silvis fruticosis serpentinosis decliv. septentr., (st?), 27 Sep. 1975, **A. Borhidi, R. Capote & R. Oviedo s.n.** [BP n.s. (dig. photo)]; – Municipio Rafael Freire, Playa Pesquero, margen este del Estero, [21°6' N, 75°56' W], bosque siempreverde micrófilo con abundancia de *Coccoloba diversifolia*, (st), 29 Feb. 2012, **P.A. González-Gutiérrez 1202-15** [HAJB n.s. (dig. photo of a living twig)], the collector noted (via e-mail): leaves completely glabrous.

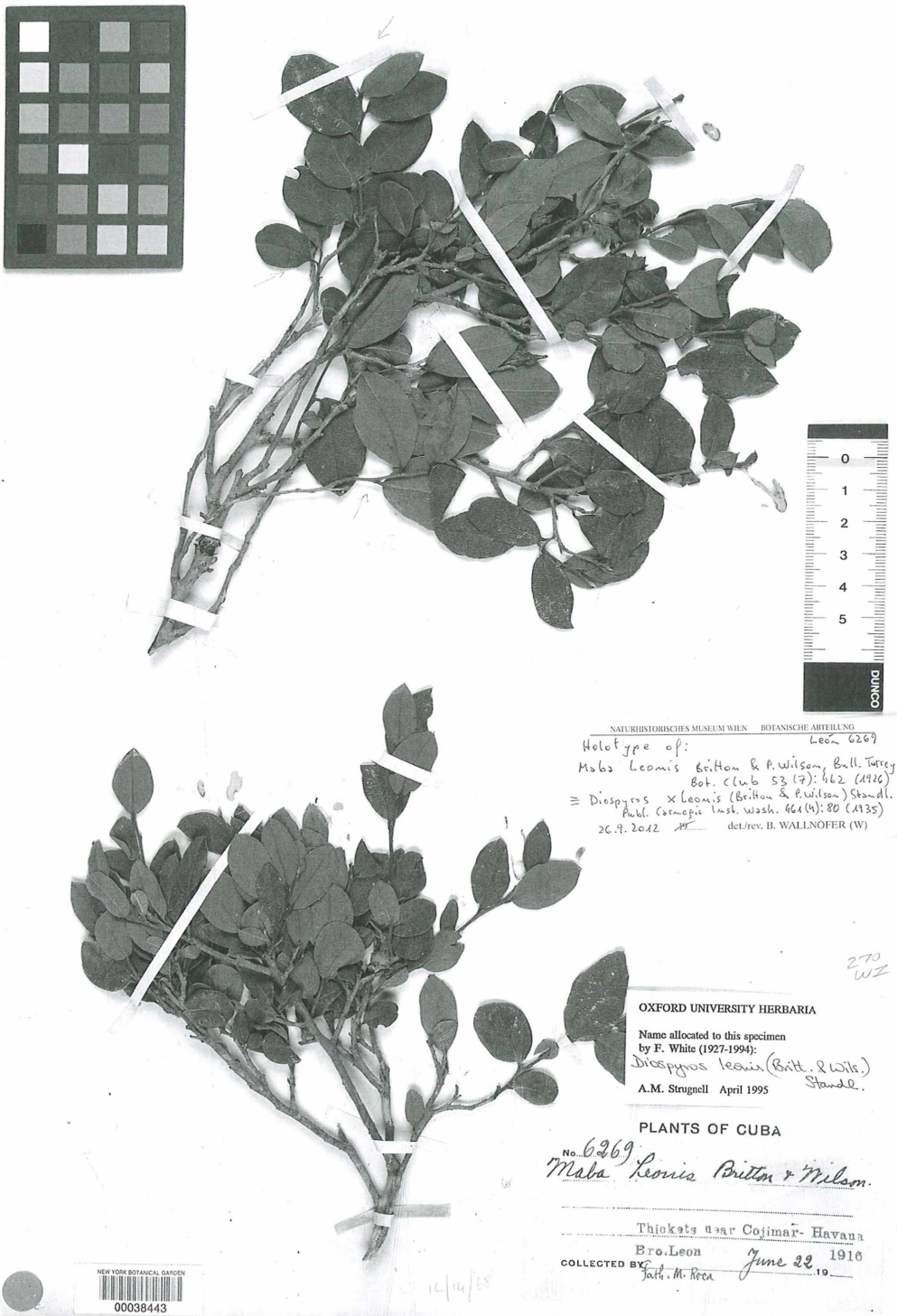

Fig. 7: Holotype of *Diospyros ×leonis* (BRITTON & P.WILSON) STANDL. [NY].

Key for the Cuban species (based mainly on characters of dry leaves)

1 Apex of most leaves tapering into an up to 2 mm long, spiny, light or black mucro; lamina of mature leaves glabrous on both sides (rarely with some scattered, appressed hairs on veins) 2

1* Apex of leaves not tapering into a mucro; lamina of mature leaves glabrous or hairy 3

2 Lamina of mature leaves (0.3–) 1–1.8 (–3.4) cm long, (0.15–) 0.5–1 (–2.5) cm wide; areas between the veinlets ± flat abaxially *D. grisebachii*

2* Lamina of mature leaves (0.6–) 1.5–3.3 (–5) cm long, (0.5–) 0.8–2.2 (–3.7) cm wide; areas between the veinlets ± sunken (slightly alveolate) abaxially *D. ×leonis*

3 Leaf lamina on abaxial side covered with a dense layer of minute, grayish-white papillae (giving the leaf surface a grayish appearance) and medium densely with long, appressed, light, thin hairs; leaves usually much longer than 10 cm, markedly discolorous; fruits large, densely covered with rusty-brown hairs; cultivated for fruits *D. blancoi* ("*discolor*")

3* Leaf lamina on abaxial side not covered with a dense layer of minute papillae 4

4 Petioles 10–15 mm long; lamina of mature leaves usually much longer than 10 cm, glabrous or only with remote, appressed, small, two-armed hairs (one of the arms is very short); fruits large, glabrous when mature; cultivated for fruits *D. digyna* ("*ebenaster*")

4* Petioles 1–6 (–7) mm long; lamina of mature leaves usually less than 10 cm long, glabrous or hairy (hairs if present simple); fruits not exceeding ca. 3 cm in diameter; native species 5

5 Lamina of mature leaves markedly discolorous (orange-brown abaxially), medium densely covered with ± patent [to be studied on leaves which have not been strongly pressed], up to 1.5 mm long hairs on both sides; calyx very densely covered with ± patent, orange-brown hairs; [see WALLNÖFER 2009: revision part 2] *D. halesioides*

5* Not as above 6

6 Lamina of mature leaves especially abaxially with markedly reticulate, raised and often lighter-colored veinlets 7

6* Not as above 9

7 Lamina of mature leaves glabrous (except for some remote, appressed hairs on the veins abaxially); area between the veinlets slightly sunken but not deeply alveolate abaxially; [see WALLNÖFER 2007: revision part 1] *D. caribaea*

7* Lamina of mature leaves hairy and deeply alveolate (with cavities) between the veinlets abaxially; – *D. crassinervis* s.lat. 8

8 Alveoles on mature leaves [for this do not use leaves of reiterating or watershoots] large and ± irregular in shape, ± deeply cavernous (with veinlets markedly decreasing in thickness and disposed on different levels), medium densely covered with 0.1–0.25 mm long, flexuose, spreading, blond to light brown hairs (the latter ± horizontally oriented within or pointing ± vertically out of the alveoles); central and eastern part of Cuba; [see WALLNÖFER 2007: revision part 1] ..... *D. crassinervis* subsp. *crassinervis*

8* Alveoles small and ± regular in shape, ± shallow (less deep; veinlets more uniform), medium densely to densely covered with very small, 0.04–0.08 (–0.13) mm

long, straight, whitish, ± appressed hairs (the latter pointing ± towards the base of the alveoles); western part of Cuba; [see WALLNÖFER 2007: revision part 1] ..... *D. crassinervis* subsp. *kubal*

9 Lamina of mature leaves glabrous on both sides; long- and short-shoots present; calyx lobes on female flowers and fruits triangular to narrowly triangular, 5–10 mm long, (2–) 3–3.5 (–4.5) mm wide, acute, spreading or ± flexed out- and downwards; ovary glabrous; occurring only in Western Cuba (Península de Guanahacabibes in Pinar del Río); [see WALLNÖFER 2010: revision part 3] ..... *D. anisandra*

9* Lamina of mature leaves with scattered, appressed hairs abaxially (glabrescent when old); all shoots ± equal; calyx lobes on female flowers 0.8–2 mm long, 2–3 mm wide, on fruits 2–3 (–4) mm long and 5–6 (–7) mm wide, broadly rounded, less frequently truncate or sometimes emarginate, rarely slightly tipped, usually ± appressed to the fruit (but sometimes slightly spreading distally); ovary ± densely hairy; occurring only in Western Cuba (Pinar del Río and Isla de la Juventud); [see WALLNÖFER 2011: revision part 4] ..... *D. tetrasperma*

Keys have been published also by SAUGET & LIOGIER (1957–1963), BISSE (1988) [with *D. anisandra* missing] and BISSE (1968) [for "subgenus *Maba*" only].

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