

EW COMBINATIONS IN *KUTCHUBAEA* (GARDENIEAE-RUBIACEAE)

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ABSTRACT: Based on evidence from recent phylogenetic analyses of DNA sequence data and critical morphological observations, *Ibetrulia surinamensis* and *Duroia oocarpa* are transferred to the genus *Kutchubaea*. Both species have several characters that are often used to distinguish *Kutchubaea* from other neotropical genera of the tribe Gardenieae, such as persistent interpetiolar stipules, cymose male inflorescences with well-developed branches and/or distinct pedicels, porate pollen grains released in monads, and ellipsoid fruits.

KEY WORDS: *Alibertia*, *Duroia*, *Ibetrulia*, *Kutchubaea*, Rubiaceae.

RESUMO: Baseado em análises filogenéticas recentes e acuradas observações morfológicas, *Ibetrulia surinamensis* e *Duroia oocarpa* se transferem ao gênero *Kutchubaea*. Ambas as espécies têm vários caracteres freqüentemente associados com *Kutchubaea*, entre os quais estípulas interpeciolares persistentes, inflorescências masculinas cimosas com ramos bem desenvolvidos e/ou pedicelos conspícuos, grãos de pólen porados liberados como mônadas e frutos elipsoídeos.

PALAVRAS-CHAVE: *Alibertia*, *Duroia*, *Ibetrulia*, *Kutchubaea*, Rubiaceae.

INTRODUCTION

The neotropical genus *Kutchubaea* Fisch. ex DC. comprises about 11 species of medium-sized to large trees. The genus is strictly South American, ranging from French Guiana and Colombia in the north to Bolivia in the south. While most species occur at low elevations, some species may occur above 1500 m altitude in the Andes or in the Guayana Highlands (e.g. *K. montana* Steyerl. and *K. morilloi* Steyerl.).

Kutchubaea is a member of the so-called *Alibertia* group (Persson, 2000), in which all genera are characterized by being dioecious and having pollen grains released in monads. *Kutchubaea* is distinguished from the other genera of this group by the following combination of characters: persistent interpetiolar stipules, cymose male inflorescences with typically well developed branches and/or pedicels, porate pollen grains, and ellipsoid fruits. In addition, most species have proportionally long and slender corollas which usually exhibit relatively high merosity [8–11-merous in most

species; however, *K. urophylla* (Standl.) Steyerl. is characterized by relatively short corollas and 6-lobed in male flowers].

The species of *Kutchubaea* are similar to some species of *Amaioua* Aubl. and *Duroia* L. f. which also have inflorescences with well-developed branches, porate pollen, and ellipsoid fruits. The species of these genera, however, are readily distinguished by their calyptrate stipules that are immediately shed as soon as the shoot expands, and in their generally shorter corollas which usually are 5–6-merous.

Kutchubaea is also similar to *Alibertia* s.l. (incl. *Borojoa* Cuatrec.) in having persistent stipules and porate pollen grains. Moreover, some species in *Alibertia* exhibit flowers with 7–9-merous corollas. *Alibertia* is, however, usually readily distinguished by their epedunculate, fasciculate male inflorescences, smaller corollas, and globose fruits vs. male inflorescences with well-developed branching, large corollas, and ellipsoid fruits in *Kutchubaea*. The exine of the

pollen also differs between these genera, being more fine-meshed in *Alibertia* (Persson, 1993).

In addition, species with well developed male inflorescences in *Kutchubaea* are also somewhat similar to those of *Stenosepala hirsuta* C. Perss. but this species is easily recognized by their aristate stipules and colporate pollen grains.

In recent phylogenetic analyses of the *Alibertia* group (Persson, 2000) based on DNA sequence data, *Kutchubaea* (*K. semisericea* Ducke) formed a strongly supported clade with *Ibetrulia surinamensis* Bremek. and *Duroia oocarpa* Spruce ex Standl. (syn. *Alibertia hispida*). The core of *Duroia*, however, appeared elsewhere in a separate clade together with *Amaioua* species. As a close relationship of *Ibetrulia* and *Duroia oocarpa* to *Kutchubaea* never has been suggested before, this result prompted a detailed morphological investigation.

This study revealed that both *Ibetrulia surinamensis* and *Duroia oocarpa* in fact share several characters that are often used to distinguish *Kutchubaea*, such as persistent interpetiolar stipules, pedunculate cymes or thyrses-like inflorescences with well developed branches, porate pollen grains released in monads, and ellipsoid fruits. Both species are further characterized by having 6-merous male corollas and 7-merous female corollas.

TAXONOMIC HISTORY

When Bremekamp (1934) first described *Ibetrulia surinamensis* Bremek., he placed it in a genus of its own because "in some of its characters it resembles the species of *Alibertia* A. Rich. in DC., whereas in others it comes nearer to *Duroia* L.f. and *Amaioua* Aubl.". In Bremekamp's view *Ibetrulia* primarily resembled *Duroia* and *Amaioua* in having a dense felt consisting of retrorse hairs on the corolla tube, but differed in having persistent stipules. In this character it "approached" *Alibertia*, but could be distinguished in having 6-7-merous flowers.

Standley (1936) was probably unaware of Bremekamp's publication, and published another name for this species, *Duroia melinonii* Standl. based on a specimen from French Guiana. Later, he described it again as *Alibertia dolichophylla* Standl. (Standley, 1940), based on a type specimen from Pará, Brazil. In both cases

no explanations for their placements were provided. Standley's decision to place the French Guianan specimen in *Duroia* was probably based primarily on the persistency of its stipules which were described as "circumscissile and caducous somewhat above the base, but not seen". After having examined the type of *D. melinonii*, however, it becomes clear that Standley misinterpreted this character, as the stipules are clearly persistent, but torn. The placement of the Pará specimen in *Alibertia* is more understandable as the stipules in this genus, just like in *Kutchubaea*, are persistent. Inflorescences in *Alibertia* are usually fasciculate, unlike in *Kutchubaea* in which the inflorescences have peduncles and/or pedicels commonly several centimetres long. The fact that the peduncle of the type specimen of *A. dolichophylla* is unusually short (only 12 mm long) can also have contributed to Standley's decision to place this species in *Alibertia*.

In his treatment of Rubiaceae for *The Botany of Guayana Highland*, Steyermark (1972) studied the types of both *A. dolichophylla* and *I. surinamensis* and could not find any differences that warranted generic separation "from *Alibertia*". Consequently, he transferred *I. surinamensis* to *Alibertia* and synonymized *A. dolichophylla* with it.

Disagreement about generic placement also characterizes the taxonomy of *Duroia oocarpa* Spruce ex Standl. Standley considered it a member of *Duroia*, and described it twice under this genus (Standley, 1931a, 1931b), once as *D. oocarpa* based on a fruiting specimen from the Guainia region of Venezuela, the other as *Duroia stenophylla* Standl. based on a specimen with male flowers from Iquitos, Peru. Additionally, Ducke (1932) described this distinctive species as *Alibertia hispida* Ducke based on material also from Iquitos.

According to Standley, the leaves of *D. oocarpa* were similar to those of *Duroia eriopila* L.f., but differed in being longer and narrower, and that the calyx in *D. eriopila* is truncate or denticulate (vs. lobate in *D. oocarpa*). Further he stated that this new species would key out as *D. hirsuta* (Poepp. & Endl.) K. Schum. in *Flora Brasiliensis*, but that the latter differed in having conspicuously different leaves and inflated branchlets. The typical circumscissile, cap-like

stipules of *Duroia* were not mentioned in the protologue of *D. oocarpa*, neither the persistency of the stipules.

Standley also compared *Duroia stenophylla* with *D. hirsuta* and essentially used the same characters to separate these two species as he did in his description of *D. oocarpa*. Neither this time was an explanation for the generic placement provided.

In contrast to Standley, Ducke described the stipules of this species as being long persistent, and this was probably his main reason for placing it in *Alibertia*.

Having examined the type specimens of *Duroia oocarpa* and *D. stenophylla*, both are without doubt equipped with persistent stipules. Therefore, Standley's decision to place this species in *Duroia* may have been due to the unusual size of the stipules, rather than their persistency.

From the evidence here presented, it is concluded that both *Ibetrulia surinamensis* and *Duroia oocarpa* are better placed in the genus *Kutchubaea*, as *K. oocarpa* (Spruce ex Standl.) C. Perss. and *K. surinamensis* (Bremek.) C. Perss. Both species possess all characters that are important to separate *Kutchubaea*, such as persistent interpetiolar stipules, pedunculate cymes or thyrselike inflorescences with well developed branches, porate pollen grains released in monads, and ellipsoid fruits. However, being equipped with characters that are unusual in *Kutchubaea*, their correct placement was previously rendered difficult. Such characters include the narrow leaf blades and the low corolla merosity of both species, the proportionally large stipules, narrowly triangular calyx lobes, and distinctive hirsute pubescence of *K. oocarpa*, and the short pedicels of *K. surinamensis*.

TAXONOMIC TREATMENT

1. *Kutchubaea surinamensis* (Bremek.) C. Perss., **comb. nov.** (Fig. 1).

Ibetrulia surinamensis Bremek., Rec. Trav. Bot. Néerl. 31: 266. 1934. *Alibertia surinamensis* (Bremek.) Steyerl., Mem. New York Bot. Gard. 23: 355. 1972. Type: SURINAME. Litanie River, XI.1903 (female fl), *Versteeg 310* (holotype, U).

Duroia melinonii Standl., Field. Mus. Nat. Hist., Bot. Ser. 11: 203. 1936. Type: FRENCH

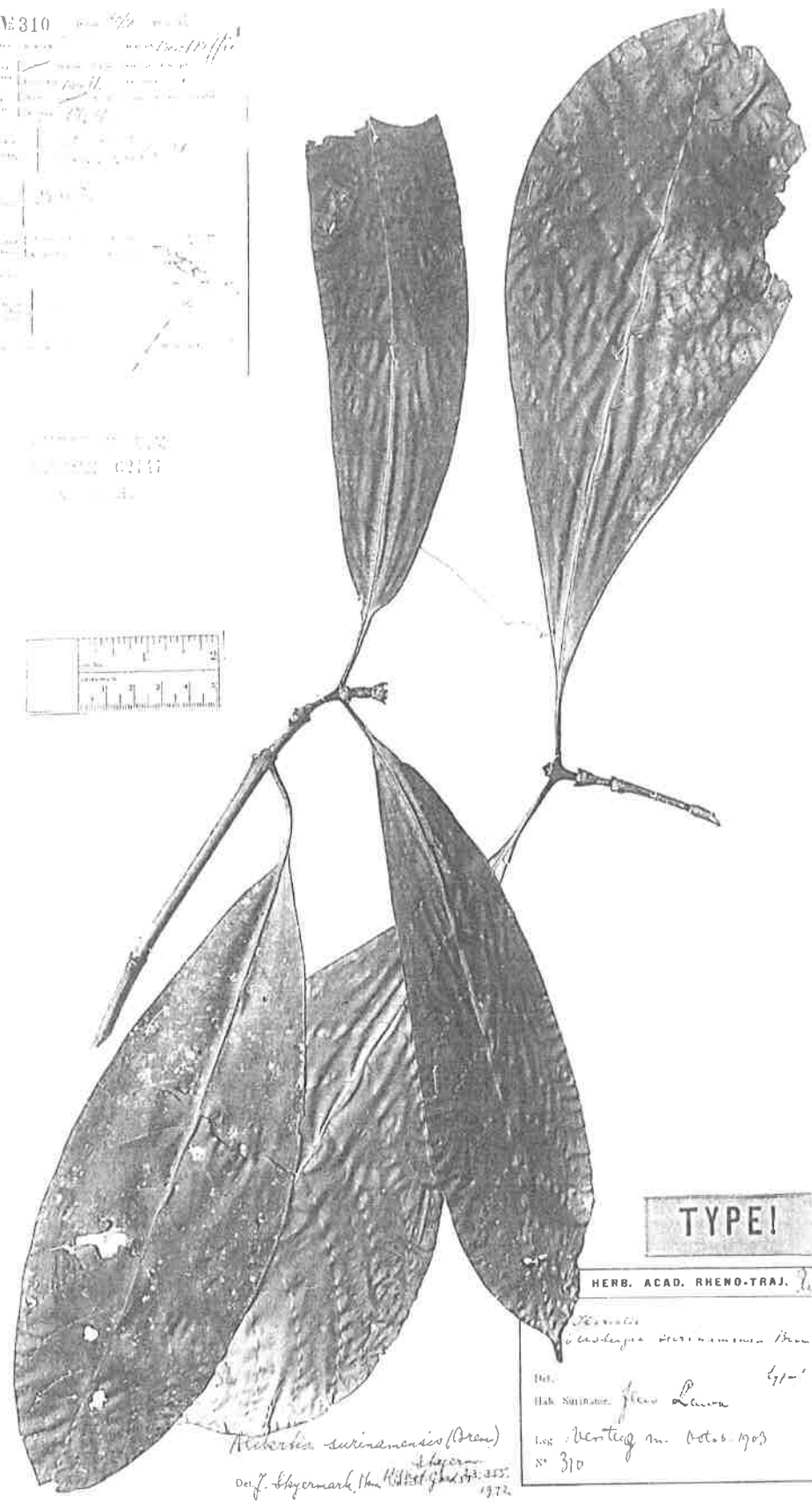
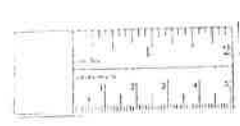
GUIANA: Without Locality, 1842 (male fl), *Mélinon s.n.* (holotype, P [s.n.]; isotype P [#158]).

Alibertia dolichophylla Standl., Publ. Field. Mus. Nat. Hist., Bot. Ser. 22: 107. 1940. Type: BRAZIL. Pará: Juruty Velho, civ. Pará [now Belém], silva terris altis argillosis ad meridiem lacus, 29.VII.1927 (male fl), *A. Ducke s.n.* (RB-22916) (holotype, F, photo-F at F; isotype, RB[2]).

Shrub or treelet (0.5–)1.5–5 m tall, dbh 1–3(–7) cm; branchlets 2–4 mm thick, sparsely pilose or glabrous. Stipules a sheath, which is somewhat lower intrapetiolarly, 2.5–4 x 2.5–5 mm, apex obtuse or rounded, rarely acute, upper portion membranaceous, lower portion chartaceous, glabrous or minutely puberulent outside (not visible to the unaided eye) with a pilose margin, inside glabrous and with basal colleters that produce resin, persistent, stem sometimes equipped with secondary supranodal stipules. Petioles 10–35 mm long, ca. 2 mm thick, sparsely pilose or glabrous; blades narrowly obovate to obovate, (9.5–)15–24(–26) x (3.5–)5–8(–12) cm, acute to decurrent at base, acuminate at apex, this to 3.5 cm long, usually glabrous throughout except often pilose along slightly revolute margin, rarely finely scabrid all over below, or minutely puberulent along midvein, when dry light to dark brown above, olive-green to brown below; secondary veins (8–)9–11(–12) on each side; domatia absent. Male inflorescence cymose, 5–10(–16)-flowered, typically bearing densely clustered 3-flowered dichasia, or sometimes a mixture of dichasia, monochasia, and solitary flowers, on a 12–35 mm long glabrous peduncle, this sometimes to 5(–10) mm long from which three secondary peduncles up to 15 mm long depart; male flowers on pedicels up to 3 mm long; calyx cup-shaped, 4–6 x 3–4 mm, lobate, minutely puberulent outside, antrorsely sericeous inside, lobes 5–6, widely deltoid, deltoid or ligulate, 1–3 x 1–1.5 mm, apex acute or obtuse; corolla salverform, 6-lobed, 23–33 mm long, white, creamy white, or yellowish, tube narrow, 9–15 mm long, 5 mm wide just above middle, 4 mm at top and 3 mm at base, densely retrorsely golden sericeous outside, retrorsely sericeous in upper two thirds inside, lobes narrowly oblong, 11–12 x 2.5 mm, acute at apex, puberulent

N. 310
Kutchubaea surinamensis
 Versteeg
 1903

Versteeg
 1903



TYPE!

HERB. ACAD. RHENO-TRAJ. *Recht*

Kutchubaea surinamensis Bremek.
 Det. *Versteeg*
 Hab. Suriname. *Versteeg*
 Loc. *Versteeg m. Oct. 1903*
 No. 310

Kutchubaea surinamensis (Bremek.)
 Versteeg
 Det. *Versteeg*
 1972

Figure 1 - Holotype of *Kutchubaea surinamensis* (Bremek.) C. Perss. (Versteeg 310, U).

outside, sparsely puberulent inside; stamens included, sessile, inserted in the upper portion of the corolla tube, anthers narrowly oblong, ca. 5 x 1 mm, apiculate at apex, base slightly cleft; style non-functional, included, ca. 11 mm long, ca. 1 mm wide, glabrous, with low ridges, style branches 2, connivent, ca. 3 mm long. Female inflorescence single-flowered, pedicel 10–11 mm long, glabrous; calyx slightly campanulate, 6 x 4–6 mm, lobate, minutely puberulent outside, densely sericeous inside, lobes 7, ligulate, 4 x 0.8–1.5 mm; corolla salverform, 6–7-lobed, 23–33 mm long, white, tube narrowly ellipsoidal, 9–15 mm long, 4 mm wide in middle, 3.5 mm at top 3 mm at base, densely retrorsely golden sericeous outside; lobes narrowly oblong, 14–18 x 2 mm, acute at apex, puberulent outside, more densely so in basal portion and along the middle, puberulent inside, stamens and style not seen, probably included. Fruit with pedicels to 5 mm long, ellipsoid, 3.4–5 x 2.7–3.2 cm; crowned with the persistent calyx, this 6–10 x 4–6 mm; 2-locular, with 11–12 seeds per locule, embedded in a fleshy pulp, exocarp somewhat glossy, glabrous, orange or yellowish at maturity when fresh, dark brown when dry. Seeds flattened-triangular with rounded edges, 14–17 x 8 x 4–5 mm.

Specimens examined: BRAZIL. Amapá: Tumuc Humac Mt., entre le Koulimapopann et Kounoichipann, 360 m, 31.VII.1972 (male fl), *Granville 1039* (CAY[2]); Rio Araguari, at mouth of Anicalhy, above Camp 14, 8.X.1961, *Pires et al. 51561* (NY). Amazonas: Distrito Agropecuário, reserva 1501 of the WWF/INPA MCS project, 02°24'–25'S, 59°43'–45'W, 50–125 m, *Boom et al. 8788* (U); Alvarães, estrada de Alvarães para a Vila Nogueira, 03°14'S, 64°48'W, 29.XI.1982 (imm fr), *Cid & Lima 3816* (NY); Manaus, Estrada do Aleixo, km 12, entrada à esquerda, 19.VI.1957 (fr), *Luís [L. F. Coêlho] 5515* (U); Reserva Florestal Ducke, Manaus-Itacoatiara, km 26, 02°53'S, 59°58'W, 3.IV.1996 (fr), *Vicentini & Silva 1173* (U).

FRENCH GUIANA. Saül and vicinity, Mont Galbao, NW peak, 525–700 m, 03°36'N, 53°16'W, 10.IX.1994 (male fl), *Boom 10776* (CAY, NY); Commune Saül, sentier de la crique Limonade, au km 4, 03°37'N, 53°13'W,

12.X.1992 (male fl), *Bordenave 307* (CAY, NY); Saut Vata, basin du Sinnamary, 126 m, 04°52'N, 52°58'W, 24.X.1992, *Bordenave 382* (NY) Face du Sud de la Montagne de Trois Pitons, NW de St Georges de l'Oyapock, 22.I.1981 (fr), *Cremers 7014* (CAY[2]); Régina, Mt. Tortue, 11 km WNW of the Appropague river, 200–450 m, 04°18'N, 52°22'W, 20.VI.1988 (fr), *Feuillet 10299* (NY, US); Monts Galbao, 10 km SW of Saül, NW top, 650 m, 10.V.1973 (fr), *Granville 1598* (CAY[2]); Sommet tabulaire, Zone Sud, ca. 50 km SE of Saül, 750 m, 22.VIII.1980 (male fl), *Granville 3553* (CAY[2], UB); Massif des Emerillons, centre Nord Forêt sur pente de colline granitique, à l'est des sources de l'Approupague, 500 m, 15.IX.1980 (male fl), *Granville 3869* (CAY[2]); Monts Bakra, Pic Coudreau, 700 m, 3.X.1980 (male fl), *Granville 4110* (CAY[2], UB); Montagne Bellevue de l'Inini, E Zone, Versant sous le vent, 550 m, 27.VIII.1985 (male fl), *Granville et al. 7862* (CAY); Saül, Circuit ORSTOM "Grand Fossé, P. K. 0.5 à Flanc de montagne, 19.IV.1972 (fr), *Granville B-4375* (CAY); Saül, Tracé Limonade, km 4, 26.IV.1972 (fr), *Granville B-4404* (CAY); Circuit ORSTOM "Grand Fossé, sur colline au P. K. 0.8 du village, 14.X.1972 (male fl), *Granville B-4579* (CAY[2], NY); Saül, Tracé ORSTOM Belvédère Est, PK 1.9, 6.XI.1974 (female fl), *Granville B-5183* (CAY[2]); US; Cr. Caiman, rive gauche de l'Oyapock, a environ 70 km de St. Georges, 18.IX.1973 (male fl), *Granville T. 1025* (CAY[2]); Mont Galbao, Secteur Est, 03°36'N, 53°17'W, 15.I.1986 (fr), *Granville et al. 8748* (NY, US); Saut. Forêt de Petit, 9.X.1989 (male fl), *Hallé 4102* (CAY); D. Z. de Saut-Dalles, Bassin du Sinnamary, 40 m, 04°33'N, 52°53'W, 23.X.1990, *Hoff 6813* (CAY[2]); Saül, Tracé Crique Limonade, 3.XI.1974 (male fl), *Maas et al. 2239* (CAY, NY, U); Commune Sinnamary, Station de recherche de Silvolab á Paracou, 8.VI.1995, *Molino 1440* (CAY); Saül, Limonade trail, 200–400 m, 03°37'N, 53°12'W, 7.IX.1982 (fr), *Mori et al. 14865* (NY) Saül, Mont Galbao trail, and trail to large fig, 03°37'N, 53°12'W, 13.IX.1989 (male fl), *Mori et al. 20884* (CAY, NY); Saül, Mont Galbao, 12.XII.1976 (fr), *Mori et al. 8749* (NY); Fleuve Appropague, Parépou à 16 km de son confluent, 24.VIII.1968 (male fl), *Oldeman B-1856* (NY); Montagne de Kaw,

11.VI.1969 (fr), *Oldeman B-2383* (CAY); Upper Appropague, sur la Cr. Calebasse, 22.VIII.1968 (fr), *Oldeman T-110* (CAY), 14.VIII.1968 (fr), *Oldeman T-1806* (CAY); Oyapok, montagnes de Trois Pitons, 8.VIII.1969 (male fl), *Oldeman T-461* (CAY), 9.VIII.1969 (male fl), *Oldeman T-471* (CAY); Fleuve Appropague, au saut Grand Japigny, rive gauche, 7.VIII.1968 (fr), *Oldeman T-75* (CAY); Riviere des Cascades, layon hydrologique ORSTOM, km 1, 11.I.1967 (fr), *Oldeman T-858* (CAY); Montagne de Kaw, along road, ca. 4 km W of Camp Caimans, 300 m, 04°35'N, 52°14'W, 9.III.1994 (imm fr), *Persson et al. 1930* (S); Montagne de Kaw, E end, ca 10 km from end of rd, 300 m, 04°32'N, 52°07' W, 10.III.1994 (fr), *Persson et al. 1948* (CAY, GB); Crique Tibourou, at crossing of Route de l'est (N2), ca. 30 km S of the Comté bridge, 04°29'N, 52°21'W, 12.III.1994 (fr), *Persson et al. 1960* (CAY, GB); 1–4 km S of Saül along western trail to Crique Limonade, 03°36'N, 53°12'W, 25.III.1994 (fr), *Persson et al. 2049* (CAY, GB); Vicinity of Saül, trail from airstrip towards Montagne Belvedere, 200 m, 03°38'N, 53°12' W, 27.III.1994 (fr), *Persson et al. 2067* (CAY, GB); Station des Nouragues, Bassin de l'Arataye, 04°03'N, 52°42'W, 20.VII.1989, *Sabatier & Prevost 2546* (CAY).

SURINAM. Nassau mountains, Marowijne River, Plateau A, E 1 km from camp 1 on line A, 430–520 m, 31.XII.1954 (fr), *Cowan & Lindeman 39022* (NY, U); Nassau Mountains, km 3.6, 1.III.1949 (fr), *Lanjouw & Lindeman 2338* (NY, U), km 6.1 km, 4.III.1949 (fr), 2422 (NY, U), km 4.6, 9.III.1949 (fr), 2560 (U).

DISTRIBUTION AND ECOLOGY: *Kutchubaea surinamensis* is a rainforest species occurring from sea level to 750 m altitude in French Guiana, Surinam, and in the central and eastern Amazon region of Brazil. Flowering specimens have been collected from July to November. Fruits have been recorded in January, March to June, August, September, and December.

Kutchubaea surinamensis is readily distinguished from most other species in *Kutchubaea* by the following combination of characters: shrub or treelet, obovate, usually glabrous leaf blades, usually long-pedunculate male inflorescences with densely clustered

small 6-merous flowers, and female inflorescences with small, 6–7-merous, solitary flowers. It is similar to *K. oocarpa* in having obovate leaf blades and 6-merous male flowers, but differs in being virtually glabrous on all vegetative parts and fruits (vs. usually by having abundant hirsute indumentum in *K. oocarpa*), smaller blades, shorter calyx lobes, and in having retrorse (vs. antrorse) pubescence on the corolla tube.

Kutchubaea surinamensis is also similar to *K. urophylla* in having 6-merous corollas with the tubes covered by retrorse hairs, but that species differs chiefly in having stipules up to 20 mm long (vs. 2–4 mm), and leaf blades that are pubescent (vs. glabrous) below.

Fruiting specimens of *Kutchubaea surinamensis* have often been confused with those of *K. insignis* Fisch. ex DC., from the same region. The latter species is however, readily distinguished by broader leaf blades and usually shorter petioles (10–15 mm vs. 10–35 mm).

NOMENCLATURE NOTES. In the protologue of *Ibetrulia surinamensis* Bremekamp (1934) cited two collections: *Versteeg 310*, from Litanie River, with one female flower, and *Versteeg 334*, from Lawa River, with male flowers. Steyermark (1972) regarded these collections as syntypes, probably because no type was indicated in the main text. However, as *Versteeg 310* is followed by the word type in parentheses in the legend of the illustration, Bremekamp had already selected the type (holotype), and *Versteeg 334* is thereby a paratype. This conclusion is also supported by the fact that “typus” is handwritten on the sheet at U of *Versteeg 310*, probably by Bremekamp.

Although there are two type sheets of *Duroia melinonii* at the P herbarium, Standley only cited one specimen. The labels on both read: “Herb. MUS. PARIS., Guyane Francaise, M. Mélinon 1842”. On one of the labels the species name and the word type are handwritten with black ink, on the other the same information is written with blue ink. On the latter sheet an additional label is attached which reads “158”. Comparing the handwriting of both labels with that of Standley’s, the label written in black ink is most similar to his. This fact, and that the label with the annotation “158” is not mentioned in

the protologue, strongly suggest that Standley only saw one specimen. Therefore, the specimen with the species name handwritten in black ink is considered the holotype, and the one annotated with blue ink is consequently an isotype.

2. *Kutchubaea oocarpa* (Spruce ex Standl.) C. Perss., **comb. nov.** Fig. 2.

Duroia oocarpa Spruce ex Standl., Publ. Field Columbian Mus., Bot. Ser. 7: 395. 1931. *Amaioua oocarpa* Spruce, *nom. nud.*, in Benth. & Hook. f., Gen. Pl. 2: 82 (1873). Type: VENEZUELA. Guainia Region, in sylvis umbrosis fluminis Guainiae, VI.1854 (fr), R. Spruce 3515 (holotype, K, photo-K at F[2]; isotype P-n.v., photo-P at F & MO).

Alibertia hispida Ducke, Notizbl. Bot. Gart. Berlin-Dahlem 11: 480. 1932. Type: PERU. Loreto: habitat prope Iquitos in silvis non inundatis [K-label reads «Iquitos (Peruvia orientali), loco San Juan, silva non inundabili»], 26.X.1927 (male fl), A. Ducke s.n. (Herb. RB 22913) (holotype, RB; isotypes, B-destroyed, K, US; photo-RB at RB).

Duroia stenophylla Standl., Publ. Field Columbian Mus., Bot. Ser. 8: 353. 1931. Type: PERU. Dept. Loreto: Mishuyacu, near Iquitos, 100 m, XII.1929 (male fl), G. Klug 699 (holotype, F 612578-n.v.; isotype, NY; photo-F at F).

Shrub or tree, to 12 m tall, dbh to 9 cm; branchlets 4–8 mm thick, densely adpressed- or patent-hirsute. Stipules narrowly oblong to oblanceolate or narrowly obovate, free, or rarely fused in lower third, 23–60 x 7–25 mm, apex acute to obtuse, rarely rounded, sparsely to densely patent- or adpressed-hirsute outside, glabrous inside with colleters in axel, persistent. Petioles (0.8–)1.5–4(–6) cm long, 0.2–0.3 cm thick, hirsute when young, glabrescent; blades oblanceolate, 15–41 x 4.5–12 cm, narrowly cuneate at base, caudate or acuminate at apex, apex 25 mm long, ± nitid, densely patent- or adpressed-hirsute on midrib, secondary veins densely to sparsely hirsute, intervenous areas sparsely hirsute or glabrate, when dry brown to dark brown above, light brown to brown below, secondary veins 12–20(–25) on each side, domatia absent. Male inflorescence cymose, 6–13-flowered, typically

bearing 3-flowered dichasia, side branches sometimes monochasial, or only having a single flower, usually on a densely hirsute or glabrescent peduncle up to 3.5 cm long, sometimes sessile; bracts small, awn-shaped; male flowers on pedicels up to 10 mm long; calyx cup-shaped, 2–5 x 5–7 mm, lobate, antrorsely hirsute outside, antrorsely sericeous to hirsute and with red colleters inside; 6-lobed, lobes narrowly triangular, 5–10 x 1 mm, apex acute; corolla salverform, 6-lobed, 42–45 mm long, tube cylindrical, 18–20 mm long, 5–6 mm wide, sparsely to densely antrorsely hirsute or glabrous outside, with a ring of sericeous retrorse hairs 6–11 mm above base inside, greenish or green; lobes narrowly triangular, 24–25 x 4–5 mm, acute at apex, antrorsely moderately hirsute or glabrescent outside, puberulent or glabrous inside, white or cream; stamens included, ± sessile, filament to 1 mm long, inserted in the middle of the corolla tube 9–12 mm from base, anthers lorate, 9–12 x 1 mm, apiculate at apex or apical connective process absent, slightly cleft at base; style non-functional, included, 17–18 mm long, ca. 0.5 mm wide, glabrous, style branches 2, connivent, with low ridges outside, 7 mm long, 1 mm wide. Female inflorescence single-flowered, pedicels not seen (covered by stipules); calyx cup-shaped, 6–7 x 7 mm (when flattened), lobate, sparsely to densely adpressed hirsute outside and inside, lobes 6, narrowly triangular, ca. 9 x 2 mm, apex acute; corolla ca. 52 mm long in bud, green, tube cylindrical, ca. 20 mm long, 5 mm wide, with streaks of antrorsely hirsute to sericeous hairs outside, lobes ca. 32 mm long, glabrous; stamens and styles not seen; ovary adpressed antrorsely hirsute. Fruit ellipsoid, to 7 x 4 cm, on pedicels up to 17 mm long, crowned by the persistent calyx, containing 30–40 seeds within a fleshy pulp, exocarp covered with antrorsely hirsute to patent-hirsute hairs, sometimes glabrescent, yellowish brown to dark brown when dry. Seeds flattened, spherical or broadly ellipsoid, to 10 x 10 x 5 mm.

Specimens examined: COLOMBIA. **Amazonas:** Araracuara, Villazul, Río Caquetá, L margin opposite Isla Sumaeta, 200–300 m, 00°39'S, 72°08'W, 3.XI.1989 (male fl), *Catalina et al.* 1106 (HUA); cuenca del Río Caquetá, 00°50'S, 71°50'W, 5.XII.1991 (male fl), *Duivenvoorden et*

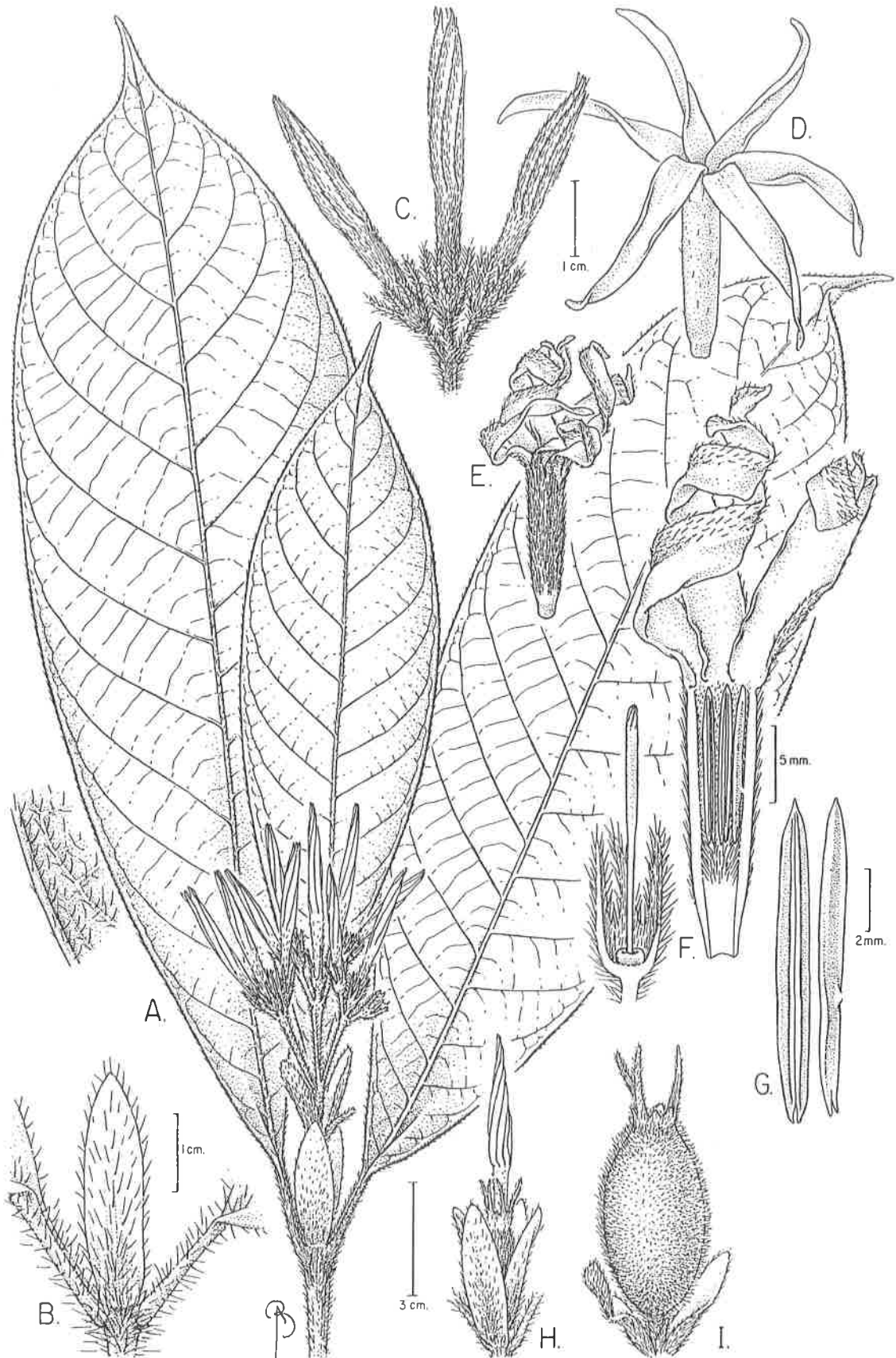


Figure 2 - *Kutchubaea oocarpa* (Spruce ex Standl.) C. Perss. **A.** Habit of flowering branch. **B.** Node showing stipules. **C.** Detail of male inflorescence. **D.** Male glabrescent corolla. **E.** Male corolla showing antrorse indumentum on tube. **F.** Male corolla and calyx cut open showing insertion of stamens and glabrous style. **G.** Close up of stamens in male corolla. **H.** Female flower in bud. **I.** Fruit. Drawn from the following collections: **A.** Prance et al. 8634, NY; **B, D** (Ducke s.n. RB-34690, NY); **C, E-G** (Vasquez & Jaramillo 15585, GB); **H** (Ducke 1768, NY); **I** (McDaniel & Rimachi 18546, MO).

al. 2311 (NY); Mun. Puerto Nariño, Parque Nacional Natural Amacayacu, Centro Administrativo Amacayacu (Indirena); trocha hacia Matamatá, 150 m, 03°47'S, 70°17'W, 20.III.1991, *Rudas et al.* 1667 (MO); Leticia, Corr. de Tarapacá, Parque Nacional Natural Amacayacu, Cabaña Lorena (Río Cotuhé), 100 m, 03°02'S, 70°00'W, 24.VI.1991, *Rudas et al.* 2405 (MO); Corr. La Chorrera, territory of Witotoo Jitomagaro indians, Río Igara-Parana, trib. of Río Putumayo, 17 km downstream from La Chorrera, 24.VI.1974 (fr), *Sastre* 3477 (COL); Río Carapaná between Las bocas and El Encanto, 150 m, 22–28.V.1942, *Schultes* 3866 (F[3]). **Caquetá:** Mun. Solano, Río Mesay, raudal Masaca, 300 m, 15.XI.1995 (male fl), *Cárdenas et al.* 6768 (MO); Araracuara, 00°37'S, 72°74'W, 16.XI.1991 (male fl), *Duivenvoorden et al.* 1107 (NY); Sierra de Chiribiquete, cerca del campamento base, 600 m, 0°56'N, 72°42'W, 27.XI.1992, *Palacios et al.* 2834 (MO).

VENEZUELA. **Amazonas:** 0.5–3 km N of San Carlos de Río Negro, ca. 20 km S of confluence of Río Negro & Brazo Casiquiare, 120 m, 01°56'N, 67°03'W, 5.V.1979 (male fl), *Liesner* 7206 (MO).

ECUADOR. **Sucumbíos:** Cuyabeno, quebrada La Hormiga, NW of Laguna Grande, 200 m, 00°00'S, 76°12–15'W, 6.XI.1987 (male fl), *Hecker & Hekking* 10117 (GB, U).

PERU. **Amazonas:** 2 km behind Caterpiza, banda este, en trocha, 180 m, 24.X.1979 (male fl), *Huashikat* 1033 (MO). Loreto: vicinity of Iquitos, Mishuyacu, 2.XI.1940 (male fl), *Asplund* 14244 (S); Maynas, Tamshiyacu, Estacion Biológica Quebrada Blanco, Camp. II, Tahuayo River, 04°23'S, 73°17'W, 12.VI.1985, *Castro* 483 (MO); Maynas. Yanamono, Explorama Tourist Camp, between Indiana and mouth of Río Napo, 130 m, 03°28'S, 72°48'W, 18.II.1981 (imm fr) *Gentry et al.* 31456 (AAU, F, G, MO); Mishana, Río Nanay, halfway between Iquitos and Santa Maria de Nanay, 20.III.1982 (fr), *Gentry et al.* 36493 (MO); Maynas, Yanomano Explorama tourist Camp, Río Amazonas above mouth of Río Napo, 130 m, 03°28'S, 72°50'W, 27–28.XII.1982 (male fl) *Gentry & Emmons* 38719 (MO); Maynas, Río Nanay, halfway between Iquitos and Santa Maria de Nanay, 140 m, 03°52'S, 73°30'W, 31.XII.1982, *Gentry & Emmons* 38769 (MO); Maynas, Dtto. Pevas, Caserio Colonia, Quebrada Sumón, 125 m, 03°20'S, 71°5'W, 31.III.1991 (fr),

Grández et al. 2393 (MO); Maynas, Dtto. Iquitos, Río Nanay near Amazonas, carretera de Picuruyacu, 150 m, 21.III.1974 (fr), *McDaniel & Rimachi* 18546 (MO); Vicinity of Iquitos, 120 m, 1977 (fr), *Revilla* 4314 (GB, MO); Maynas, Dtto. Iquitos, Río Nanay, near mouth, carretera de Astoria, 150 m, 10.IV.1973 (fr), *Rimachi* 171 (F, MO); Maynas, Dtto. Iquitos, Río Nanay, carretera de Astoria hasta la petrolera, 28.V.1975 (fr), *Rimachi* 1745 (MO); Maynas, Iquitos, Río Nanay, Picuruyacu rd, 20.VII.1978, *Rimachi* 3761 (MO); Maynas, Dtto. Iquitos, carretera de la Astoria, near mouth of Río Nanay, 3 km from Nanay, 12.VII.1973 (fr), *Rimachi* 462 (MO); Maynas: Dtto. Iquitos, Puerto Almendras, 122 m, 03°48'S, 73°25'W, 27.IV.1988 (male fl), *Ruíz* 1306 (GB); Maynas, Iquitos, km 44, road Iquitos–Nauta, 150 m, 04°10'S, 73°20'W, 13.XII.1988 (male fl), *Vásquez & Jaramillo* 11413 (MO); Prov. Maynas, Iquitos, Allpahuayo, Estación de IIAP, 04°10'S, 73°30'W, XII.1990, *Vásquez & Jaramillo* 15585 (CAS, GB[2], MO); Maynas, Iquitos, Allpahuayo, Estación de IIAP, 150–180 m, 04°10'S, 73°30'W, 27.V.1991, *Vásquez & Jaramillo* 16585 (MO); Maynas, Estación Biológica Callicebus, Río Nanay-Mishana, 130 m, 03°55'S, 73°35'W, 31.XII.1981 (imm fr), *Vásquez et al.* 2804 (GB, MO); Maynas, Cahuide, Río Itaya, 10.X.1984 (fr), *Vásquez & Jaramillo* 5678 (MO); Maynas, Mishana, Río Nanay, 130 m, 03°55'S, 73°35'W, 23.IX.1986 (fr), *Vásquez & Jaramillo* 7939 (MO); carretera Nauta–Iquitos, km 5, 200 m, 04°29'S, 73°35'W, 28.III.1987 (fr), *Vásquez & Arevalo* 8967 (MO); Loreto, Maynas, Mishana, Río Nanay half way between Iquitos and Santa Maria de Nanay, 140 m, 03°50'S, 73°30'W, 22.III.1979, *Gentry et al.* 26014 (MO); Maynas, Pto. Alianza, Qda. Tamshiyacu, 160 m, 04°08'S, 72°55'W, 28.V.1981 (fr), *Vásquez & Criollo* 1822 (MO).

BRAZIL. **Amazonas:** Mun. Maraã, Colonia dos Indios Canamarís, Rio Japurá, afluente do Rio Solimões, 01°50'S, 65°35'W, 31.X.1982 (male fl), *Cid & Lima* 3460 (NY); Reserva Florestal Ducke, rd. Manaus-Itacoatiara, km 26, Igarapé do Tinga, 02°53'S, 59°58'W, 15.V.1995 (fr), *Cordeiro et al.* 1559 (MO); Manaus, estrada do aleixo, 23.IX.1945 (female fl) *Ducke* 1768 (A, F, NY, R, US); Manaus, Pensador, 21.IX.1941 (male fl), *Ducke* 795 (F, MO, NY, R, UC, US); Esperança, ad ostium fluminis Javary, 2.II.1942 (male fl), *Ducke* 873 (F, MO, NY, R, UC,

US); Manaus, Estrada do Aleixo, 27.V.1933 (fr), *Ducke s.n.* (RB 24382) (RB[3]); Manaus, Pensador, X.1935 (male fl), *Ducke s.n.* RB 34690 (G, NY, RB[3], S, U, US); Mun. Borba, BR 230 Estrada Transamazonica, 26 km E of Sucunduri, 06°50'S, 59°00'W, 8.V.1985, *Henderson et al.* 369 (NY[2]); Mun. Humayta, near Livramento, on Rio Livramento, 12.X-6.XI.1934 (male fl), *Krukoff* 6861 (S, U); Reserva Florestal Ducke, rd. Manaus-Itacoatiara, km 26, Igarapé do Barro Branco a jusante da piscina, 02°53'S, 59°58'W, 2.XII.1994 (fr), *Nascimento & da Silva* 678 (MO, U); Reserva Florestal Ducke, rd. Manaus-Itacoatiara, km 26, 02°53'S, 59°58'W, 23.III.1995 (fr), *Ribeiro & Assunção* 1581 (MO); Reserva Florestal Ducke, rd. Manaus-Itacoatiara, km 26, Igarapé do Acará, 02°53'S, 59°58'W, 31.V.1995 (fr), *Vicentini et al.* 986 (MO). **Rondônia:** km 217-9 Madeira-Mamoré railroad, 2-4 km E of Anuã, 18.XI.1968 (male fl), *Prance et al.* 8634 (F, GH, MG, NY, R, S, U); vicinity of São Lorenzo mines, 09°33'S, 65°06'W, 26.XI.1968 (male fl), *Prance* 8903 (MG, NY, S, US).

BOLIVIA. **Beni:** Vaca Diez, Cachuela Esperanza, 1 km S of village, 170 m, 10°32'S, 65°35'W, 25.IX.1996 (male fl), *Persson et al.* 280 (GB, LPB); Riberalta, Camino Santa Rosa, road (and trails) leading S from km 13 of Riberalta-Guyamerín rd, 11°02'S, 66°01'W, 19.XI.1989 (male fl), *Daly et al.* 6266 (MO, NY).

DISTRIBUTION AND ECOLOGY: *Kutchubaea oocarpa* is a rainforest species occurring in Colombia, Venezuela, Ecuador, Peru, Brazil and Bolivia, on terra firme over white sand, usually below 300 m altitude, rarely to 600 m. Flowers have been recorded in February, April, May, and from September to December. Fruits have been found from March to July, September, October, and December.

Kutchubaea oocarpa is recognised by its large stipules, large and distinct calyx-lobes, and usually hirsute vegetative parts and fruits. It is similar to *K. surinamensis* in having narrowly obovate to obovate leaf blades. Further, the male flowers are similar to this species and to *K. urophylla* in being 6-merous, but differs by having antrorse (vs. retrorse) hairs on the corolla tube (when indumentum is present).

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