THE SIMABA GUIANENSIS COMPLEX IN NORTHERN SOUTH AMERICA.

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SUMMARY

With additional data from specimens not studied by previous workers, the confusing ***Simaba guianensis*** *compex was re-analyzed.* ***Simaba polyphylla*** *is recognized as a distinct species and two subspecies of* ***S. guianensis*** *are maintained.* ***Simaba polyphylla, S. guianensis*** *ssp.* ***guianensis,*** *and* ***S. guianensis*** *ssp.* ***ecaudata*** *are keyed, described, and illustrated and specimens examined are cited for each. Specimens of* ***S. guianensis*** *ssp.* ***ecaudata*** *show great morphological diversity but can be separated into three groups. Further collecting may provide information that shows these groups to be worthy of separate taxonomic status.*

In the last several years, the genus **Simaba** has been the subject of considerable botanical interest, with three new taxa described (Feuillet, 1983; Cavalcante, 1983; Thomas, 1984). Much of this renewed interest is due to the large number of specimens collected in recent years and now available for study. While preparing a treatment of the Simaroubaceae for Flora Neotropica, I have studied many specimens that were unavailable to Cavalcante when he prepared his revision of **Simaba** in 1983.

Simaba section **Tenuiflorae** is characterized by relatively small flowers and leaves and includes species found throughout Amazonia and the Guianas. Three species of this section, **S. orinocensis** H.B.K. (including **S. multiflora** Adr. Juss.), **S. crustacea** Engl. (possibly also synonymous with **S. orinocensis**), and **S. obovata** Spruce ex Engl., have in common strongly flattened fruits. The remaining taxa, the distinctive **S. monophylla** (Oliv.) Cronquist and the problematic **S. guianensis** Aubl. complex, have drupaceous, lenticular fruits. The taxonomic confusion associated with the **Simaba guianensis** complex is a result of large morphological variability, particularly in habit, leaves, and flowers. Using the specimens available to me and building on published literature (Cavalcante, 1983; Cronquist, 1944; Engler, 1874), I investigated this confusing group.

The results of this study differ from Cavalcante's treatment in recognizing **S. guianensis** ssp. **polyphylla** as a separate species. **S. guianensis** ssp. **ecaudata** is here

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maintained as a single subspecies but I have discerned several morphological trends which may, ultimately, prove to be worthy of taxonomic status. Below are a detailed key, complete descriptions, specimen citations, and discussions of each of the taxa of this complex.

KEY TO TAXA OF THE **SIMABA GUIANENSIS** COMPLEX

1. Rachis and petiole 11-35 cm long; lvs with (5-)11-23 leaflets; lateral leaflet bases often oblique; leaflets often puberulent abaxially.....
.....3. **Simaba polyphylla** (Cavalcante) W. Thomas

1. Rachis and petiole 0.9-9(14) cm long; lvs with (1-)3-7(-13) leaflets; lateral leaflet bases cuneate to narrowly so or rarely oblique; leaflets always glabrous abaxially....2

2. Shrub or small tree, 0.3-5(-8) m tall; leaflet apices usually caudate or acuminate; filaments 2.2-3.2 mm long; appendages 1.5-2.2 mm long; inflorescence small and few-branched, 0.8-6 cm long.....1. **Simaba guianensis** Aublet ssp. **guianensis**

2. Tree or large shrub, (3-)6-18(-30) m tall; leaflet apices rounded to acute or occasionally slightly acuminate; filaments (2.7-)3.6-5.6 mm long; appendages (1.2-)2.2-2.6 mm long; inflorescences often robust and many-branched, at least in those specimens with acuminate leaflet apices or unusually short filaments or appendages.....
.....2. **Simaba guianensis** ssp. **ecaudata** (Cronquist) Cavalcante

1. **Simaba guianensis** Aublet ssp. **guianensis**, Hist. Pl. Guiane 1:400, tab. 153. 1775. **Quassia** crocea Vahl, Eclog. Amer. 3: 12. 1806. **Quassia guianensis** (Aublet) D. Dietr., Syn. Pl. 2: 1416. 1840. TYPE: FRENCH GUIANA: "habitat in sylvis Orapu," **Aublet s.n.** (HOLOTYPE, BM).

Aruba guianensis Aublet, Hist. Pl. Guiane 1: 293, tab. 115. 1775. **Simaba aruba** St. Hil. in DC., Prodr. 1: 734. 1824. nom. illeg. **Zwingera aruba** (St. Hil. in DC.) Spreng., Syst. 2: 319. 1825. nom. illeg. **Quassia aruba** (St. Hil. in DC.) D. Dietr., Syn. Pl. 2: 1416. 1840. nom. illeg. TYPE: FRENCH GUIANA: " habitat in sylvis Aroura, " **Aublet s.n.** (HOLOTYPE, BM).

Simaba cuspidata Spruce ex Engl., In Mart. Fl. Bras. 12(2): 212. 1874. TYPE: BRAZIL. Amazonas: "ad oram septentrionalem fluminis Amazonum ad ostium fl. Rio Negro," **R. Spruce 1751** (HOLOTYPE, B destroyed; LECTOTYPE, chosen here, NY; ISOLECTOTYPE, P).

Shrub or small tree, 0.3-5(-8) m tall; leaves imparipinnate, leaflets 3-7, 8.5-30 cm long (including petiole and terminal leaflet); petiole (0.9-)1.8-9 cm long; terminal leaflet 5-19 cm long, 1.7-6.4 cm wide, narrowly elliptic to elliptic or occasionally narrowly obovate, ± sessile or with petioles to 2.5 cm long, apices caudate to acuminate, bases attenuate to narrowly cuneate; lateral leaflets usually narrowly elliptic, occasionally elliptic, ovate or obovate, apices caudate to acuminate, bases attenuate to narrowly cuneate, occasionally oblique; larger lateral leaflets 4.3-17.5 cm long, 1.6-5.7 cm wide; inflorescence terminal or from uppermost leaf axils, slender, paniculate, puberulent; main axis at anthesis 0.8-6 cm long, 0.5-1 mm in diam at base of new growth; pedicels 1-4 mm long, puberulent, usually subtended by a small pendulous; gland;

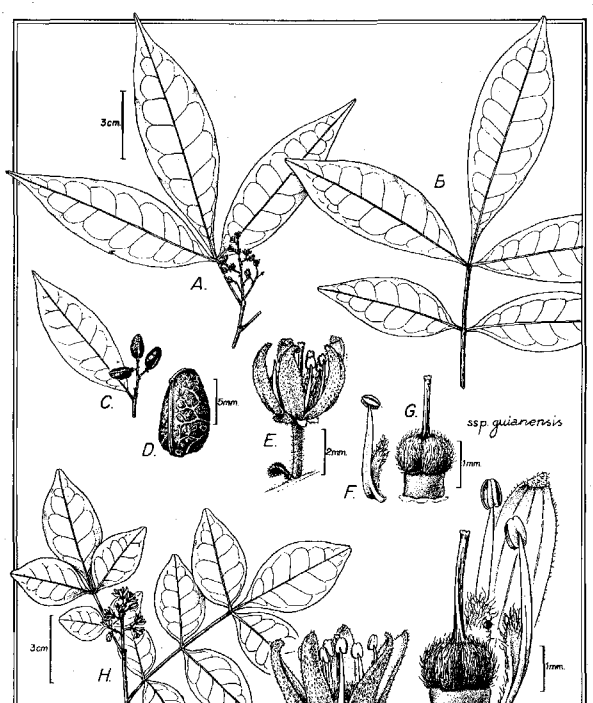

Fig. 1. A-G, **Simaba guianensis** ssp. **guianensis**. A: Inflorescence and trifoliolate leaf; B: 5-foliolate leaf; C: Infructescence with unifoliolate leaf; D: Drupe; E: Open flower; F: Stamen with ciliate appendage; G: Gynophore and gynoecium. (A, E-G drawn from Egler 46443; B from **Irwin et al. 54912**; C-D from **Prevost & Grenand 960**.) H-J, **Simaba guianensis** ssp. **ecaudata**. H: Inflorescence and leaves; I: Open flower; J: Stamens with ciliate appendages, gynophore, and gynoecium. (H-J drawn from **Ducke 14109**.)

calyx (4-)5-merous; sepals 0.4-0.8 mm long, transversely deltate to triangular, puberulent; petals 5, 4-5 mm long, 1-2.2 mm wide, narrowly elliptic to elliptic, abaxially puberulent, cream to yellow, yellowish-orange, or white; stamens 10; filaments 2.2-3.2 mm long; appendages 1.5-2.2 mm long, 0.5-0.7 mm wide, ciliate distally, free portion 0.6-1.5 mm long; anthers 0.5-0.6 mm long; gynophore 0.3-0.6 mm high, 0.9-1.4 mm wide at base, ± narrower distally; gynoecium of 5 separate carpels with a common style, 0.3-1 mm high, 0.6-1.3 mm broad, oblate to transversely ellipsoid, short tomentose; style 0.2-0.5 or 1.3-1.5 mm long (short- and long-styled flowers); drupes 1 per flower, rarely more, 1-1.6 cm long, 0.6-1.1 cm wide, ellipsoid, lenticular, rugose and yellow to orange when ripe, epicarp fleshy and sometimes slightly winged.

Selected Specimens Examined:

BRAZIL. AMAPÁ: trail from Porto Terezinha to Área Industrial, R. Cowan **38457** (NY); Along Rio Araguari between Cachoeiras Travessão and Santa Maria, **J.M. Pires et al. 50393A** (US); Rio Araguari 5 hours above Rio Mururé, **J.M. Pires et al. 50476** (NY); Rio Jari, Cachoeira das Guaribas, **W. Egler & H. Irwin 46443** (NY); Tumuc Humac, 3 km à NNW du Mitaraka Nord, **J. de Granville 84520** (CAY, U). AMAZONAS: perto do Acampamento a 150 km de Humaitá, **G. Vieira 199** (NY, US); Amazon River at mouth of Rio Negro, **R. Spruce 1751** (NY, P). PARÁ: "in sylvis collinis prope cataractans Montanha medii fluminis Tapajos," **A. Ducke s.n. (RB 18944)** (S, U); Mun. de Oriximiná, Rio Trombetas, lado do Lago Mucura, **C.A. Cid 1819** (INPA,NY).

FRENCH GUIANA. S. Kourou, Montagne des Singes, **G. Cremers 7658** (CAY); Layon de Fini Saut direction 180° dans la valée de la crique Parépou, **Oldeman 2871** (CAY); ± 45 km SE of Saül, Sommet Tabulaire, 750 m, **G. Cremers 6344** (CAY); Massif des Emerillons, centre nord Face, **G. Cremers 6686** (CAY); Haut Mana, Saut Gros Tigre, **J. de Granville 4897** (CAY); Fleuve Ouaqui, au niveau de l'ancien degrad "Carbet Mitan," **J. de Granville 1789** (CAY); Haut Oyapock, crique Takululi, Saut Cambrouze, **J. de Granville 2471** (CAY); Haut-Maroni, Ile d'Antekoumpata, **C. Moretti 355** (CAY); Gourdonville, R. **Benoist 1531** (P-2); forest near Aroura, **Aublet s.n.** (BM).

GUYANA. Bartica-Potaro road, 87 mi, **Fanshawe (Forestry Dept.) F2737** (NY); Kanasenay, elev 350 ft, **Forestry Dept. G205** (NY); Locality unknown: **Krukoff 16222** (U).

SURINAM. BROKOPONDO: 8 km ESE of Bronsweg, **J. van Donselaar 2345** (U); Brownsberg Forest Reserve, **Forestry Bureau 3224** (U), **3263** (U), **6458** (U-2), **C. Vreden (LBB no.) 13710** (U); Suriname River near Gaddo, **Tresling 177** (U); Marowijne Creek of Gran Creek near Gran Dam, **J. van Donselaar 3768** (NY, U); Gran Rio, **J.F. Hulk 316** (U). MAROWIJNE: Nassau Mts., Plateau A, 520 m, **Maguire 40729** (NY); Nassau Mts., Plateau B, 525 m, **Maguire 40758** (NY); Nassau Mts., on slope, **J. Lindeman & R. Cowan 6971** (U); Upper Tapanahony, near Maboega, **J. Schulz 8199** (U); Lely Mts., SW Plateaus, 550-710 m, **J. Lindeman et al. 284** (US). NICKERIE: 0-5 km E of confluence of Lucie and Oost Rivers, **H. Irwin et al. 55525** (F, NY); Nickerie River, Blanche-Marie Falls, **P. Maas & J. Tawjoeran (LBB) 10924** (NY, U); lower slopes of Frederick Top, 3.5 km SSE of Juliana Top, 500 m, **H. Irwin**

et al. **54912** (NY); near Kayser Airstrip (and Zuidrivier), 45 km above confluence with Lucie River, **H. Irwin et al. 57704** (NY); Kalebo Dam project, W of road km 112, **J. Lindeman et al. 669** (NY, US); Sipaliwini savanna, "Moro Grande," 6 km W of M. Gr. dome, **F. Oldenburger et al. 442** (AAU, NY); Corantijn River near Wonotobo, **Stahel & Gonggryp (Forestry Bureau) 3025** (U). SARAMACCA: Emmaketen, 600 m, **Forestry Bureau 5668** (U); **5886** (U); Voltzberg near Raleighvallen, **A. Mennega 85** (U); Tafelberg, North Ridge, **Maguire 24801** (NY); Saramacca River, km 7, **Maguire 24867** (NY). SURINAME: Jodensavanne-Mapane Kreek area, **J. Schulz 8924** (U).

2. **Simaba guianensis** ssp. **ecaudata** (Cronquist) Cavalcante, Publicações Avulsas do Museu Goeldi, 37: 38. 1983. **Simaba guianensis** var. **ecaudata** Cronquist, Lloydia 7: 86. 1944. TYPE: BRAZIL. Maranhão: Ilha de São Luís, R.L. Fróes **11724** (HOLOTYPE, NY; ISOTYPES, A, G, MO, S-2).

Simaba nigrescens Engl. in Mart. Fl. Bras. 12(2): 213. 1874. **Simaba cuspidata** var. **nigrescens** (Engl.) Ducke ex Cronquist, Lloydia 7: 85. 1944. TYPE: BRAZIL. Pará: near Santarém, **Riedel 1604** (HOLOTYPE, B destroyed; LECTOTYPE, chosen here, K; ISOLECTOTYPES, LE, P, S).

Tree or large shrub, (3-)6-18(-30) m tall; leaves imparipinnate, 3-7(-13), 9-22 cm long (including petiole and terminal leaflet); petiole 1.4-5.1 cm long; rachis (including petiole) to 9 cm long; terminal leaflet (4-)4.5-12 cm long, (1-)1.3-5.6 cm wide, elliptic to slightly obovate or occasionally narrowly obovate, apices rounded to acute or acuminate or occasionally ± caudate, bases cuneate to narrowly so, ± sessile or with petioles to ca. 1 cm; larger lateral leaflets 3.1-9.8 cm long, (1-)1.9-4 cm wide, elliptic to ovate, rarely obovate, apices rounded to acute or acuminate, occasionally slightly caudate, bases cuneate, sometimes attenuate or narrowly cuneate, rarely oblique; inflorescences terminal or from uppermost leaf axils; paniculate, puberulent; main axis at anthesis 2-9(-13) cm long, (0.6-)0.8-1.7 mm wide at base of new growth; pedicels 1-3.5 mm long, usually subtended by a small pendulous gland; calyx (4-)5-merous; sepals 0.5-0.7(-1) mm long, deltate to transversely so, puberulent; petals (4-)5, (4.2-)4.5-5.9 mm long, 1.2-2.1 mm wide, narrowly elliptic, abaxially puberulent, usually white, occasionally pale yellow, cream or reddish-green; stamens 10; filaments (2.7-3.1-)3.6-5.6 mm long; appendage (1.2-1.5-)2.2-2.6 mm long, free portion (0.3 - 0.5) 1.5-1.7 mm long, 0.2-0.6 mm wide, narrowly ovate; anthers 0.6-0.8 mm long; gynophore (0.4-)0.6-0.9 mm high, 0.9-1.3 mm broad, subcylindric to tapering; gynoecium of 5 separate carpels joined by a common style, 0.3-0.8 mm high, 0.8-1.3 mm broad, pilose; style (0.2 - 0.4) 0.8-2.9 mm long, lobed at apex; drupe 1 per flower, rarely 2-3, 1.2-1.4 mm long, 0.7-0.8 mm wide, ellipsoid, lenticular, orange to green when ripe, epicarp thin and rugose or ± fleshy and smooth, glabrous or sometimes puberulent.

Simaba guianensis ssp. **ecaudata** can be distinguished from the typical subspecies by leaflet shape, by habit (usually), and by filament and appendage lengths. Within subspecies **ecaudata**, as defined here, there are three separate morphological types which

may ultimately prove to be separate taxa. Until more specimens, particularly flowering ones, have been collected, it is not possible to determine with confidence whether these three are distinct or whether they should be treated as a polymorphic ochlospecies (Prance, 1982).

Typical subspecies **ecaudata**, including the type of **Simaba nigrescens**, is characterized by rounded to acuminate leaflet apices, short inflorescence axes, and rugose, glabrous to puberulent fruits with a thin epicarp. A tree or occasionally a large shrub, it is widely scattered from Acre to Maranhão and Amapá, with most collections from western Pará and eastern Amazonas. A group of specimens from Guyana (**Tillett & Tillett 45631**, **Fanshawe 1244**, and **Forest Dept. CAP6169** has coriaceous leaves with somewhat caudate leaflets, but with blunt apices, robust inflorescences, and fleshier, smooth, and glabrous fruits with a thicker epicarp. The third morphological group (**Cordeiro 754**, **Prance et al. 8280** and **14322**, and **Rodrigues & Coêlho 2951**) is characterized by acute to acuminate or rounded leaflet apices, robust inflorescences, puberulent fruits, and extremely short staminal appendages. These trees are found in northern Rondônia and nearby Amazonas, with an outlier near Manaus.

Specimens Examined:

BRAZIL. ACRE: upper Rio Jurupary, 8-9°S, 70°W, **B.A. Krukoff 6226** (F, NY). AMAPÁ: Campo Verde, S da estrada da Zona Perimetral, **D. Austin et al. 7223** (NY). AMAZONAS: Manaus, Cachoeira Alta do Tarumã, **W. Rodrigues & L. Coêlho 2951** (NY-2); Rio Curuquetê, vic. Cachoeira São Bento, **G. Prance et al. 14322** (NY); Rio Madeira, Varadouro do Morcego, **A. Ducke s.n.** (**RB 18981**) (S, U). BAHIA: Estação Experimental de Belmonte, CEPLAC, **T.S. Santos 1101** (USP). MARANHÃO: Island of São Luis, **R.L. Fróes 11724** (NY, S-2), **11725** (S, UC). PARÁ: ca. 18 km E of Tucuruí and Rio Tocantins, **D. Daly et al. 981** (NY); Faro, Campos do Tigre, **A. Ducke s.n.** (**RB 18918**) (U); Santarém, km 35 da estrada do Palhão, **M. Silva & R. Souza 2508** (NY), **2281** (CAS, NY); Santarém, **Jobert 866** (P); near Santarém, **Riedel 1604** (K, P); E of Salgado lake, near Rio Curuá, **A. Ducke s.n.** (**RB 14110**) (S, U); Óbidos, **A. Ducke s.n.** (**RB 14109**) (K, S, U); Conceição do Araguaia, **A. Macedo 4058** (S, US). RONDÔNIA: Sub-base Proj. RADAM, Estrada Belmonte, **M.R. Cordeiro 754** (NY); 8 km E of Porto Velho, **G. Prance et al. 8280** (INPA, NY, S, U).

GUYANA. Groete Creek, Lower Essequibo River, **Fanshawe** (Forest Dept.) **F1244** (K, NY, S, US); Potaro road, 30 mi, **Forest Dept. CAP159** (K, NY, S); Kamarang River, Akapai, 470 m, **S. Tillett & C. Tillett 45631** (NY, US).

3. **Simaba polyphylla** (Cavalcante) Thomas, comb. nov. **Simaba guianensis** ssp. **popyphylla** Cavalcante, Publicações Avulsas do Museu Goeldi 37: 40. 1983. TYPE: BRAZIL. Amazonas: Manaus, estrada do Paredão, A. **Ducke 1410** (HOLOTYPE, NY; ISOTYPES IAN n.v., MG n.v., R n.v.).

Tree or large shrub, **3-40 m tall**; **leaves imparipinnate with** (5-)11-23 opposite or subopposite leaflets (**leaves subtending inflorescences often with less than 11**); pet-

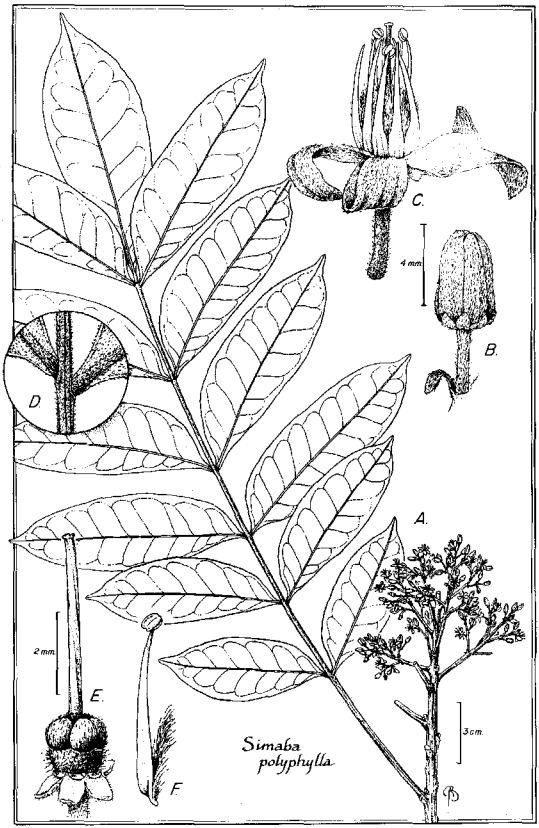

Fig. 2. **Simaba polyphylla**. A: Inflorescence and leaf; B: Bud; C: Open flower; D: Leaflet bases and rachis showing abaxial pubescence; E: Cynophore and gynoecium; F: Stamen with ciliate appendage. (Drawn from **M.R. Cordeiro 734.**)

iole 5-12 cm long, the rachis (including the petiole) 11-35 cm long; terminal leaflet (4.1-)9-13.5 cm long, (1.2-)3-5.5 cm wide, elliptic to slightly obovate or rarely ovate, the base cuneate, the attenuated apex with a rounded tip; lateral leaflets (3.6-)5.6-15 cm long, (1.2-)1.8-4.7 cm wide, elliptic or narrowly so, the base usually oblique, the attenuated apex with a rounded tip, subcoriaceous, glabrous or very sparsely puberulent above, glabrous or short tomentose beneath; petiolules to 3 mm long or leaflets sessile; inflorescence terminal, paniculate, stout, the main axis 2-10 cm long, 2-3.5(-5) mm in diam. basally, glabrous to puberulent, lower lateral branches often longer than main axis; flowering pedicels 2.5-5 mm long, puberulent, often subtended by small pendulous glands; sepals 5, (0.5-)0.7-0.8 mm long, triangular or widely so, pubescent; petals 5, 4.6-9 mm long, 1.8-2.2 mm wide, narrowly ovate to elliptic; stamens 10; filaments 3.1-5 mm long; appendage 1.9-2.3 mm long, free portion 1-2 mm long, pilose, even on face; gynophore cylindrical, 0.3-1.1 mm high, 0.9-1.6 mm broad, glabrous to pubescent; gynoecium of 5 separate carpels joined by a common style, 0.5-1.2 mm high, 1-1.6 mm broad, pubescent; style 3.5-4.6 mm long; fruit ellipsoid, lenticular, 1.4-1.8 cm long, 0.8-1.3 cm wide, black to brown or olive-brown, puberulent to glabrate, the epicarp slightly fleshy, rugose.

Simaba polyphylla can be recognized by its numerous leaflets which are often puberulent beneath and oblique at the base. Compared to **S. guianensis** ssp. ecaudata the inflorescences of **S. polyphylla** are usually smaller and the flowers often larger. Because these differences seem to be consistent and because specimens from Rondônia (not seen by Cavalcante) are even more distinct from ssp. **ecaudata** than the specimens from Amazonas, it is recognized here as a separate species, closely related to **S. guianensis**. **N.T. Silva 57819** does not fit well into either **S. polyphylla** or S. guianensis ssp. **ecaudata**. Although the leaflet shape is that of the latter, the flowers are closer to those of typical **S. polyphylla**.

Specimens Examined:

BRAZIL. AMAZONAS: Humaitá, near Três Casas, **Krukoff 6453** (BM, K, MICH, NY, S, US); Manaus, estrada do Paredão, **Ducke 1410** (NY); Manaus, Mindú, **Ducke 1440** (NY); São Paulo de Olivença, **R. de Lemos Fróes 20802** (K, NY); Rio Negro, Jauareté, **R. de Lemos Fróes 21224a** (K, NY, UC); Manaus-Porto Velho road (BR 319), km 240, **E. Lleras et al. P19619** (NY, S); Manaus-Itacoatiara road, km 29, Reserva CEPLAC, **Prance et al. 21676** (INPA, K, MEXU, MO, NY, U, US); PARÁ: Santarém, km 35 da estrada do Palhão, **M. Silva & R. Souza 2340** (NY, S, US); km 100 da Rodovia BR 14, **N.T. Silva 57819** (NY, S). RONDÔNIA: Rio Madeira, estrada Belmonte, **M.R. Cordeiro 734** (NY); Porto Velho, próximo ao aeroporto, **M. R. Cordeiro 645** (NY); Vila Rondônia, **N.A. Rosa 421** (NY); **B. Maguire et al. 56673** (K, NY).

ECUADOR. NAPO: Lagunas de Cuyabeno, 300 m, **J. Brandbyge et al. 33912** (AAU), **36142** (AAU).

PANAMA. COMARCA DE SAN BLAS: El Llano-Carti rd., 19.1 km from Interamerican Hwy., 9°19'N, 78°56'W, 350 m, **G. de Nevers 4247** (NY); Nusagandi ridge, running NW from Punta Mamá, 9°19'N, 78°15'W, 300-350 m, **G. de Nevers et al. 3722** (NY).

RESUMO

Dispondo-se de dados obtidos de amostras não vistas por outros pesquisadores o complexo de ***Simaba guianensis*** *foi reanalizado e dividido em* ***S. polyphylla*** *e S.* ***guianensis****, este último com duas sub-espécies. Apresenta-se chaves, descrições, ilustrações e amostras estudadas para* ***S. polyphylla****,* ***S. guianensis*** *ssp.* ***guianensis****, e* ***S. guianensis*** *spp.* ***ecaudata****. Exsicatas de* ***Simaba guianensis*** *ssp.* ***ecaudata*** *exibem ampla diversidade morfológica que permite reconhecer três grupos. Coletas adicionais talvez providenciarão informações indicando que estes grupos merecerão status taxonômico.*

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