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Studies in Neotropical Apocynaceae III: A revision of the genus *Secondatia* A. DC., with discussion of its generic classification

J. FRANCISCO MORALES

ABSTRACT

MORALES, J. F. (2003). Studies in Neotropical Apocynaceae III: A revision of the genus *Secondatia* A. DC., with discussion of its generic classification. *Candollea* 58: 305-319. In English, English and French abstracts.

A revision of the genus *Secondatia* A. DC. is provided, including keys, descriptions, illustrations, and collectors' index. Four species are accepted: *S. densiflora* A. DC., *S. duckei* Markgr., *S. floribunda* A. DC., and *S. schlimiana* Müll. Arg. After a discussion of its style head features, the genus is removed from tribe *Mesechiteae* and placed in tribe *Echiteae*, sensu Endress & Bruyns.

RÉSUMÉ

MORALES, J. F. (2003). Etudes des Apocynaceae tropicales III: révision du genre *Secondatia* A. DC., avec discussion de sa classification générique. *Candollea* 58: 305-319. En anglais, résumés anglais et français.

La révision du genre *Secondatia* A. DC. est présentée. Quatre espèces sont acceptées: *S. densiflora* A. DC., *S. duckei* Markgr., *S. floribunda* A. DC., and *S. schlimiana* Müll. Arg. Des clés de détermination, les descriptions et les illustrations de chaque espèce, ainsi que des index de collecteurs sont fournis. En se basant sur les caractéristiques de la tête du style, l'auteur discute la position du genre qui est retiré de la tribu *Mesechiteae* et placé dans la tribu *Echiteae*, sensu Endress & Bruyns.

KEY WORDS: APOCYNACEAE – Apocynoideae – Echiteae – Mesechiteae – *Secondatia* – South America.

Secondatia A. DC. is a small genus composed of lianas or rarely scandent shrubs, distributed from Colombia and Venezuela to southern Brazil, Bolivia, and Paraguay. The genus can be distinguished by its leaves without colleters along the midrib adaxially, conspicuous reticulate tertiary venation, terminal or subterminal inflorescences, calyx composed of two outer and three inner sepals, with alternisepalous calycine colleters, salverform corolla, without an annular corona or free corona lobes within, sessile anthers, annular disk, fusiform follicles, and truncate non-rostrate seeds. The genus was treated by WOODSON (1935), who recognized six species. Following the revision of genera without recent monographic studies (e. g. MORALES, 2002a, 2002b), a synopsis of *Secondatia* is given here. Four species are accepted: *S. densiflora* A. DC., *S. duckei* Markgr., *S. floribunda* A. DC., and *S. schlimiana* Müll. Arg.

Noteworthy morphological features

Tertiary venation

The leaf blades in *Secondatia* are characterized by having conspicuous reticulated tertiary veins (Fig. 1 B, Fig. 2 B, Fig. 3 B, Fig. 4 B).

In *S. duckei*, *S. floribunda* and *S. schlimiana* the tertiary veins are conspicuously impressed abaxially, while in *S. densiflora* the veinlets are slightly impressed, in all species, the reticulation is always obvious. This feature is very helpful to identify sterile or fruiting specimens. In the Neotropics, similar venation patterns in other genera of twining *Apocynaceae*, subfamily *Apocynoideae* are just found in *Odontadenia* and *Skytanthus*.

Calyx and sepals

The calyx is composed of two outer and three inner sepals. Although WOODSON (1935), characterized *Secondatia* in having sepals with one or two colleters, I have found that the colleters arrangement is quinquencial. Therefore, there is usually one sepal with 2 colleters, 1 sepal with no colleters, and 3 sepals with one colleter.

Fruits

The fruits of *Secondatia* are apocarpous fusiform follicles, which are one of the thickest in the Neotropics, similar in size to *Macropharynx* and *Peltastes*. In fruiting specimens, *Secondatia* is easily distinguished from these genera by its non-peltate and smaller leaves and truncate (vs. rostrate) seeds. Although a few species of *Odontadenia* also have similar fusiform follicles [e.g., *O. macrantha* (Roem. & Schult.) Markgr.], species of *Secondatia* are easily separated by the smaller corolla.

Tribal classification

The *Apocynaceae* s.l. are divided in five subfamilies (*Apocynoideae*, *Asclepiadoideae*, *Periplocoideae*, *Rauvolfioideae*, and *Secamonoideae*), based mostly in flower, fruit, and seed characters (ENDRESS & BRUYNS, 2000). Five tribes (*Apocynae*, *Echiteae*, *Malouetieae*, *Mesechiteae*, and *Wrightieae*) were recognized in the subfamily *Apocynoideae*. The tribe *Mesechiteae* is characterized by its style head with five longitudinally or at least basally projecting ribs, and anthers attached to the style head ribs by short hairs or cellular fusion. The most striking feature to distinguish this group is the ribs of the style head. *Secondatia* was placed in this tribe, together with other genera, such as *Allomarkgrafia*, *Mandevilla*, *Mesechites*, and *Quiotania*. Nevertheless, a detailed examination of the style head features of all species of *Secondatia* suggests that this genus is incorrectly placed in the *Mesechiteae* and a new tribal placement must be made. The style head in *Secondatia* is spool-shaped, slender in the middle and widest at the base (Fig. 1 D, Fig. 2 D, Fig. 3 D), without longitudinal or basal ribs. Two tribes have spool-shaped style-heads: *Echiteae* and *Wrightieae*. However, following ENDRESS & BRUYNS (2000), *Secondatia* should be placed within the tribe *Echiteae*, as suggested by the agglutinated thecae, anthers strongly attached at two points to the spool-shaped style head, and ovary with an annular disk (Fig. 1 D, Fig. 2 D, Fig. 3 D).

Taxonomic treatment

Secondatia A. DC., Prodr. 8: 445. 1844.

Type: *Secondatia densiflora* A. DC. (designated by WOODSON, 1935)

Fruticose lianas, more rarely scandent shrubs. Branchlets terete, subterete, or somewhat angulate when young, glabrous to glabrate, usually somewhat lenticellate at maturity, usually with milky sap, interpetiolar colleters inconspicuous. Leaves opposite, petiolate, mostly with several inconspicuous conical colleter in the axils; blade glabrous, firmly membranaceous,

without colleters along the midrib adaxially. Inflorescence a thyriform panicle, terminal, sub-terminal to more uncommonly axillary, few- to many-flowered, glabrous to glabrate, short pedunculate or sessile, bracts scarious; sepals five, essentially equal, usually imbricate, with two, one, or lacking basal colleters within, these entire, subentire, or inconspicuously lacerate apically; corolla salverform, glabrous to glabrate without; tube straight, not twisted around the stamens, without a corona, the limb 5-parted, actinomorphic, dextrorsely convolute, the corolla lobes somewhat spreading; stamens five, included and inserted in the lower part of the corolla tube; anthers connivent and strongly attached at two points to the style head, formed by two parallel thecae, the filaments shorts; auricles short, very inconspicuous, acute to shortly acuminate; carpels two, united at the apex; style head spool shaped, sessile or the style very short; ovules numerous, several-seriate, borne on an axile, biseriate placenta; disk 5-lobed or irregularly lobed or lacerate. Follicles 2, apocarpous, continuous, fusiform, glabrous or glabrate, dehiscing along the ventral suture; seeds numerous, dry, truncate, comose apically, smooth, minutely puberulent.

Four species are known, distributed from Colombia and Venezuela to Brazil, Bolivia, and Paraguay.

*Key to the species of **Secondatia***

1. Corolla lobes more than 1.5 cm long; ovary very sparsely and minutely puberulent *S. duckei*
- 1a. Corolla lobes less than 1.2 cm long; ovary glabrous 2
2. Leaves 3-4.7(-9) × 1.1-2.3(-3.4) cm; corolla lobes 8-12 × 2.5-4.5 mm; bracts 1-1.5 × 0.5 mm, relatively inconspicuous; style head sessile *S. floribunda*
- 2a. Leaves 5-12 × 2.5-6.5 cm; corolla lobes 3-5 × 3-4 mm; bracts 1-3 × 1 mm, conspicuous; style head supported by a short style, 1.5-2 mm long 3
3. Corolla lobes 3-5 × 3-4 mm; anthers glabrous, glabrate or apically puberulent *S. densiflora*
- 3a. Corolla lobes 9-12 × 6-8 mm; anthers minutely puberulent dorsally *S. schlimiana*

1. *Secondatia densiflora* A. DC., Prodr. 8: 445. 1844 (Fig. 1).

= *Secondatia densiflora* var. *genuina* Hassl. in Repert. Spec. Nov. Regni Veg. 12: 264. 1913 [nom. inval.].

Type: BRAZIL. S. loc., s. d. (fl, fr), *M. Martius 967* (lecto-, designated by WOODSON (1935): G-DC!; isolecto-: B [destroyed], photo F neg. 4472, BM!, G!, K!, M!, NY!, P!, W).

= *Secondatia peruviana* Poepp., Nov. Gen. Sp. Pl. 3: 71, tab. 281. 1845, **syn. nov.** **Type:** PERU. **Loreto:** Cuchero, Pampayaro, XII.1829 (fl), *E. Poeppig 1582* (holo-: W!; iso-: B [destroyed], photo F neg. 4480, BM!, F!, photo F neg. 56570, G-BOIS [2 sheets]!, G-DC!, GH!, L!, MO!, NY!, P [3 sheets]!).

= *Secondatia densiflora* var. *parviflora* Müll. Arg. in Mart., Fl. Bras. 6(1): 108. 1860. **Type:** BRAZIL. **Goiás:** S. loc., s. d. (fl), *C. Gardner 3325* (lecto-, here designated: G-DC!; isolecto-: BM!, photo at INB, CGE [2 sheets]!, E!, F!, G [2 sheets]!, K [2 sheets]!, NY [3 sheets]!, P [3 sheets]!).

= *Secondatia densiflora* var. *paraguariensis* Hassl. in Repert. Spec. Nov. Regni Veg. 12: 363. 1913. **Type:** PARAGUAY. **Amambay:** Sierra de Amambay, XI.1912 (fl), *E. Hassler 11420* (holo-: G!; iso-: BAF, BM!, photo at INB, G [5 sheets]!, K!, MO!, NY!, P!).

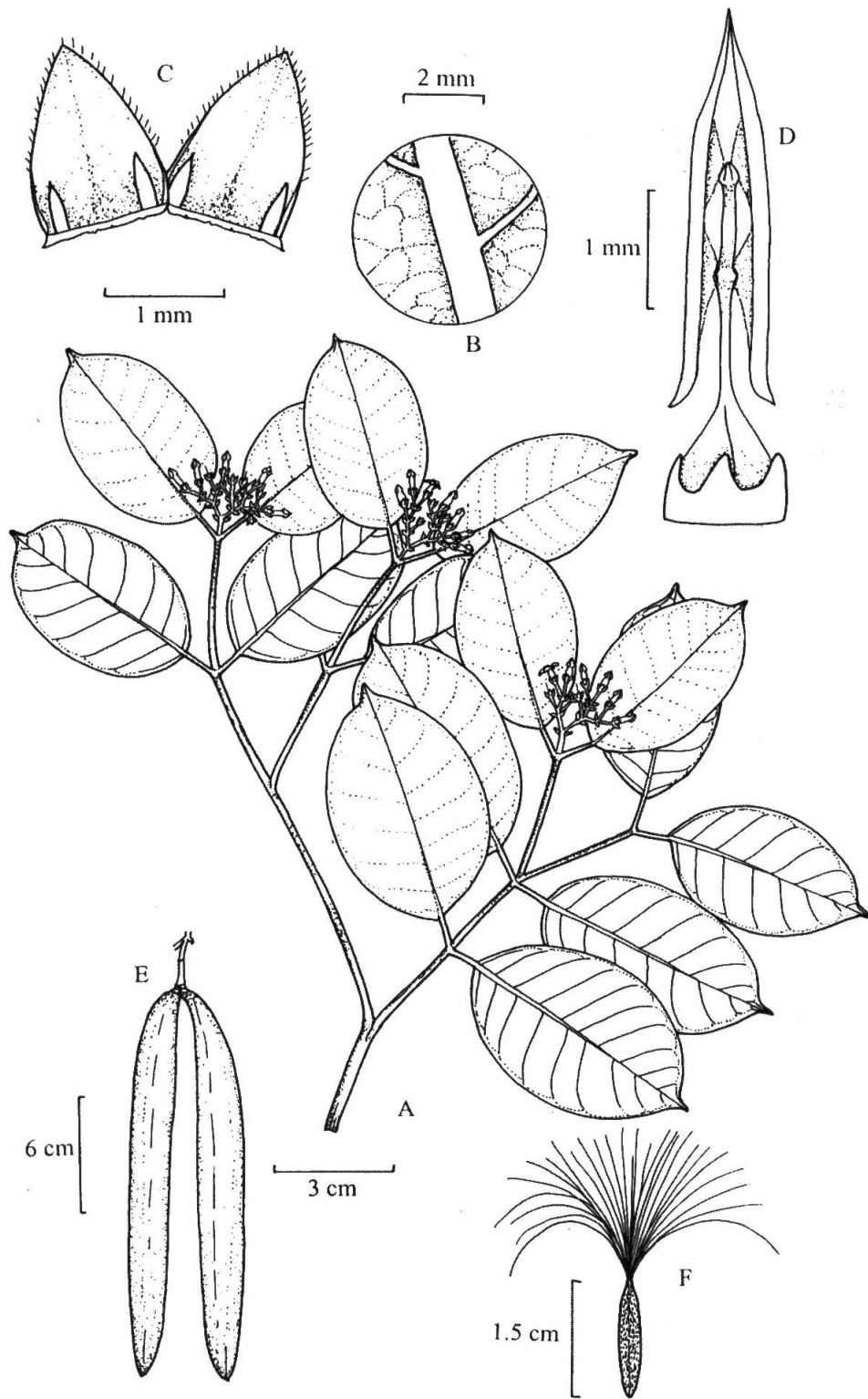


Fig. 1. – *Secondatia densiflora* A. DC. **A.** Flowering shoot. **B.** Close-up of the abaxially surface of the leaf blade. **C.** Sepal and colleters, adaxial view. **D.** Ovary, disk, style head, and anthers. **E.** Fruits. **F.** Seeds. [A-D, Hatschbach & al. 56001, HUA; E-F, Young 166, INB] [Drawing by the author]

- = *Angadenia elliptica* Miers, Apocyn. S. Amer.: 180. 1878, **syn. nov.** **Type: BRAZIL. Piauhy:** Paranagua, VIII.1839 (fl), *C. Gardner 2663* (holo-: BM!, photo at INB; iso-: CGE!, K!).

Liana, rarely scandent shrub; branchlets terete to subterete, glabrous to glabrate. Leaves: blade 5-12 × 2.5-6.5 cm, elliptic, firmly membranaceous, cuspidate or shortly acuminate apically, obtuse to acute basally, glabrous, tertiary veins slightly impressed, petiole 7-15 mm. Inflorescence terminal, subterminal, or axillary, densely agglomerate, glabrous to glabrate, conspicuously bracteate, peduncle 2-12 mm long, sometimes the inflorescence sessile, pedicels 2-6 mm, bracts 1-3 × 1 mm, scarious; sepals 1-1.5 × 1 mm, narrowly ovate, acute, glabrate and ciliate; corolla salverform, the tube pale green to greenish white, the lobes white to cream, glabrous to glabrate; tube 5-8 × 2 mm, very minutely and moderately to densely puberulent within, lobes 3-5 × 3-4 mm, narrowly obovate, densely pubescent basally, near the corolla mouth; stamens inserted near the base of the tube, anthers 3-4 mm, glabrous, glabrate, or apically puberulent, style head 1.5-2 mm, with a short style, 1.5-2 mm; ovary ca. 1 mm long, glabrous, disk shorter than the ovary, 5-lobed. Follicles 17-22 × 1.7-2.1 cm, continuous, glabrous; seeds 15-17 mm long, very minutely and densely puberulent, coma 35-50 mm long, cream.

Distribution, habitat, and ecology. – Widespread in South America, ranging from northern Colombia and eastern Venezuela through Brazil, Bolivia, and Paraguay, in caatingas, disturbed dry forest, gallery forest, dry savannas, sandy cerrados, and granitic outcrops at elevations of 0-1350 m.

Phenology. – Flowering specimens have been collected in nearly every month of the year; fruiting collections have been made from February through November.

Local names and uses. – Bellaco Huasca (Perú, San Martín, Chazuta); Candinha (Brazil, Ceará, Brazil); Cipó Jananba (Brazil, Maranhão, San Luiz). This species has been used in curare mixed together with seed of Ashipa (undetermined legume) and Ampihuasca (root of *Corduncillo* [*Piper* spp.]) (Peru, San Martín, *Schunke 6338*).

Secondatia densiflora is the most widespread and common species in the genus. It is characterized by its conspicuous inflorescence bracts, 3-5 mm long obovate corolla lobes, and relatively inconspicuous tertiary veins. This species is closely related to *S. floribunda*, but it is easily separated by its shorter corolla lobes (3-5 mm vs. 8-12 mm) and style head with a short style, not sessile.

Secondatia peruviana is relegated to the synonymy of *S. densiflora*. Its type in no way differs from that of *S. densiflora*. There are only weak differences in the anther pubescence. This feature is very variable in many genera of Neotropical *Apocynaceae* and glabrous, glabrate, or pubescent anthers are found sometimes even in the same inflorescence.

Gardner 3325 is selected as the lectotype of *Secondatia peruviana* var. *parviflora*, since this collection is better preserved than the other syntypes and is also represented in many herbaria.

Additional specimens examined. – **VENEZUELA. Anzoátegui:** Libertad, road from El Vigía to Buenos Aires, 27.XI.1981, *Davidse & González 19721* (F, INB, MO, NY, WAG). **Amazonas:** Atabapo Río Ocamo, near Cerro Mawedi, I.1990, *Fernández 6912* (MO); Atures, Limón de Parhueña, 1.VI.1992, *Gröger & Meier 460* (BON, MO, VEN). **Apure:** Pedro Camejo, between the Río Cinaruco and the southern part of the Galerías de Cinaruco, 29.IV.1977, *Davidse & González 12356a* (MO). **Bolivar:** Gran Sabana – Santa Ana road, 8.V.1995, *Benítez & D'Arcy 5201* (MO); Río Caroni, Tirika, V.1945, *Cardona 1154* (US); Raul Leoni, E of San Francisco, VI.1989, *Delgado 240* (MO, NY, PORT); Heres, Cerro Arimagua, I.1984, *Fernández 829* (MO, PORT); Raul Leoni, E of Pijiguaos, VI.1989, *Fernández & Delgado 5832* (MO, NY, PORT); around El Araguaney, 1987, *Stergios 11012* (MO, NY, PORT); between San Felix and Puerto Ordaz, VI.1964, *Steyermark 94270* (NY, US, VEN); Roscio, along Río Uairén, NE of Santa Elena de Uairém, 1.XII.1982, *Steyermark & Liesner 127420* (MO, VEN); Morichal de Guayapo, Bajo Caura, 19.IV.1939, *Williams 11893* (F); Cerro La Puerta, 26.I.1956, *Wurdack & Monachino 41371* (NY, US). **Sucre:** S of Santa Fé, Sucre, 19.XI.1981, *Davidse & González 19081* (MO); Sucre, W of Mochima, Cumana – Santa Fe road, 3.III.1979, *Plowman 7803* (F, K, MO, NY); Mochima mountain, S of Mochima, 16.XI.1973, *Steyermark & al. 108466* (MO, NY, VEN). **Zulia:** Colón, campo Rosario, 2.V.1979, *Bunting & al. 7549* (NY).

GUYANA. Turuk Wan, 6.XII.1957, *Cook 246* (K); Shuurutiuiu, 7.XI.1952, *Forest Department 558* (G, K); Takutu Essequibo region, S of Rupununi, 27.IV.1994, *Henkel & James 3790* (INB, NY, P, US); Savanna, VI.1871, *Pollard 108*

(K); Pirara, 1841 – 1842, *Schomburgk 421* (CGE, G, NY, P). S. loc., 1839, *Schomburgk 599* (BM [2 sheets], G-DC, K, P). S. loc., s. d., *Schomburgk 665* (G, K).

FRENCH GUIANA. Bassin du Hâ, 28.VIII.1987, *Granville & al. 9810* (CAY, P, U, US).

ECUADOR. **Napo:** Orellana, Huashito, N of Coca, 3-21.XI.1989, *Espinoza 107* (INB, MO, NY, USF); Jatun Sacha Biological Station, E of Misahuali, 30.XII.1987 (st), *Gentry & al. 60120* (MO, USF). Pastaza: S of Coca, near Río Tigüino, 7.I.1989, *Palacios & al. 3414* (MO, NY, USF).

PERU. **Junín:** near Herrera bridge, 12.V.1961, *Schunke 5633* (F, MO, UC), 3.XI.1962 (st), *Schunke 6198* (F, INB, K, MO, UC); E of La Merced, 4.XI.1962, *Schunke 6207* (F, K, MO [2 sheets], UC, US), *Schunke 6208* (F, K, MO, UC), *Schunke 6209* (F [4 sheets], MO, NY, UC); road to Quimire, S of Junín, 5.XI.1962, *Schunke 6221* (MO, UC, US). **Loreto:** Quistococha, Maynas, 20.IX.1979, *Ayala 1969* (AMAZ, MO); SW of Iquitos, 9.IX.1972, *Croat 20030* (MO, NY, US); Requena, Jeraro Herrera, Río Ucayali, XI.1981, *Poulain 88b* (INB, MO, P); Maynas, Río Nanay, near Caserío Santa Clara, 25.X.1976, *Revilla 1651* (MO); Pucallpa, Río Ucayali, IX.1942, *Sandeman 3322* (K [2 sheets]); Iquitos, Marañón, 1924, *Tessmann 4359* (G, NY); Previsto, 11.X.1962, *Woytkowski 7572* (F, K, MO, NY, US). **Madre de Dios:** Tambopata, Río La Torre and Río Tambopata, 23.III.1981, *Young 166* (INB, MO). **San Martín:** Chazuta, 4.X.1963 (st), *Schunke 6338* (F, MO, UC). S. loc., 1839 – 1840, *Gay s. n.* (P).

BRAZIL. **Acre:** Sena Madureira, basin of Rio Purus, Rio Iaco, 26.X.1993, *Daly & al. 7942* (NY, WAG); Rio Branco – Sena Madureira road, 23.X.1980, *Nelson 791* (MO, NY, US). **Amazonas:** Cruzeiro do Sul, road Treza de Maio, 20.X.1984, *Ferreira & al. 5165* (INPA, K, NY); Manaus, Cachoeira Grande, 30.XII.1943, *Ducke 1480* (F, NY); WNW of Itacoatiara, 10.VI.1981, *Lowe 4273* (K, INPA); Manaus, 26.X.1956, *Luiz s. n.* (INPA, MO); Manaus, 21.X.1971, *Maas & Maas 505* (NY, U); Rio Ituxi, W of Bôca de Curuquetê, 11.VII.1971, *Prance & al. 14114* (F, INPA, K [2 sheets], M, NY, P, S, U, US, Z); Rio Curuquetê, Cachoeira Santo Antonio, 16.VII.1971, *Prance & al. 14293* (NY); Nova Esperança, 31.VII.1941 (st), *Smith & Carter 619* (G, K, MO, NY, US); Rio Branco, Serra do Parauá, I.1909, *Ule 7940* (K). **Bahia:** Serra do Aeroporto, região de Barreiras, 5.I.1955, *Black 18094* (IAN, MO); Riachão das Neves, 13.V.1997, *França & al. 2286* (E, HUEFS); Serra do Rio de Contas, waterfall of Rio Brumado, 20.I.1974, *Harley & al. 15341a* (K); Chadapa Occidental da Bahia, SE of Correntina, road to Jaborandi, 27.IV.1980, *Harley 21842* (K, NY, Z); Rio de Contas, road to Livramento do Brumado, 23.XI.1988, *Harley & al. 26982* (K); Corrego Serra Negra, Oliveira dos Brejinhos, 12.X.1981, *Hatschbach 44180* (F, MBM, NY, US, Z); Corretina, Rio Corriente, Sete Ihlas, 9.VIII.1996, *G. Jardim 875* (CEPEC, NY). **Brasília:** Distrito Federal, Fercal, 10.XI.1986, *Dagoberto s. n.* (UB); Bacia do Rio São Bartolomeu, 26.IV.1979, *Heringer & al. 2073* (K, UB, US), 19.V.1980, *Heringer & al. 4809* (K, MO, UB, US, USF), 4.XI.1980, *Heringer & al. 5626* (K, MO, NY, UB, US, USF). **Ceará:** Piracuruca road, 29.II.1980, *Castro & Graça s. n.* (MO). **Goiás:** Formosa, 7.X.1976, *Hatschbach 39003* (MBM, MO, NY, P, US); Campo Belos, 17.X.1990, *Hatschbach & Guimarães 54715* (MBM, NY, Z); Campos Belos, road to Teresinha de Goiás, 9.XI.1991, *Hatschbach & al. 56001* (HUA, MBM, MO); Caldas Novas, Rio Quente, 21.XII.1974, *Heringer & Eiten 14151* (K, MO, NY, US); S de Caiapônia, road to Jataí, 26.X.1964, *Irwin & Soderstrom 7413* (NY, US); E of Cabeceiras, 17.XI.1965, *Irwin & al. 10431* (K, MO, NY, US); NW of Piranhas, 24.VI.1966, *Irwin & al. 17710* (F, K, MO, NY, US); S of Cavalcante, Chapada dos Veadeiros, 10.III.1969, *Irwin & al. 24196* (MO, NY); between Gama and Rio Corumbá, 19.X.1963, *Maguire & al. 57137* (F, K, NY, UB); Fazenda Maracanã, N of Caiapônia, 13.XI.1993, *Ratter & al. 7147* (E, K); Padre Bernardo, Fazenda Lagoa Santa, 18.XI.1993, *Silva 47* (INB, UB); Catalão, 8.IX.1998, *Souza & al. 21276* (ESA, INB); NE of Urucu, Fazenda Pindaíba, 5.X.1992, *Walter & al. 2011* (CEN, INB). Maranhão: N of São Mateus, 27.IX.1980, *Daly & al. 291* (F, INPA, K, MG, NY); Siland of São Luiz, 1940, *Froes 11899* (F, NY, US). **Mato Grosso:** Base Camp, 2.X.1967, *Argent & al. 6605* (E, K, NY, P); Rio Aripuanã, 20.X.1973, *Berg & al. 18695* (F, NY, P, Z); Pantanal, Rio Pixaim, Poconé, 26.X.1991, *Dubs 1231* (E, NY, Z); between Pontes and Lacerda and Vila Bela da Santíssima Trindade, 27.XII.1995, *Dubs 2011* (E, K, MBM, NY, S, U, Z); Chapada dos Guimarães, road to Agua Fria, 17.X.1996, *Dubs 2234* (E, K, NY, S, Z); S. loc., 1833, *Gaudichaud 138* (P [3 sheets]); Rio Brilhante, 22.XI.1970, *Hatschbach 25015* (K, MBM, MO, NY, Z); Fazenda Progresso, Rio Brilhante, 28.X.1970, *Hatschbach 25301* (K, MBM, MO, NY, P, US, Z); Serra da Pimenteira, Rio Verde, 12.XI.1973, *Hatschbach 33126* (MBM, MO, Z); Barra do Bugres, 23.X.1995, *Hatschbach & al. 63757* (NY); between Buriti and Cuiabá, 22.X.1973, *Prance & al. 19297* (NY); Cuyabá, 21.XI.1893, *Malme 1118* (BM, G, S); S. loc., 1891 – 1892, *Moore 368* (BM, NY), *Moore 734* (BM, K, NY); Xavantina – Cachimbo road, 18.XII.1967, *Philcox & al. 3558* (K, NY, P); road Buriti to Cuiabá, 22.X.1973, *Prance & al. 19297* (INPA, K, NY, US). **Mato Grosso do Sul:** Anastácio, W of Trevo, 17.X.1995, *Hatschbach & al. 63443* (MBM, MO, WAG); Coxim, Reserva do Exército, 19.IX.1996, *Simón & al. 26* (NY, UB). **Minas Gerais:** E of Rio Pandeiros, road to Januária, 18.III.1973, *Anderson 9107* (F, K, NY); S. loc., 1838, *Claussen 396* (P), 1839, *Claussen s. n.* (BM, G [3 sheets], G-DC, K [2 sheets]), 1840, *Claussen s. n.* (P [3 sheets]); Babilônia, Uberlândia, 27.IX.1987, *Deguchi & Tsugaru 1603* (MO); Barbacina, 12.XI.1884, *Glaziou 15222* (K, P [3 sheets]); Jquitiba, 24.XI.1893, *Glaziou 20408* (K, P); Bacia de Tres Marias, Felixlândia, 24.X.1959, *Heringer 18151* (F, HB); Ituiutaba, 20.IX.1945, *Macedo 500* (NY, US); Ituiutaba, 15.IX.1948, *Macedo 1225* (BM, MO, NY); Aqua Limpia, Calciolândia, Arcos, 7.X.1940, *Oliveira 191* (BM, MO); Paracatu, Fazenda Acangauá, 5.III.1989 (fr), *Pereira Neto & al. 280* (MO); Caratinga, APA Lagoa Silvana, 19.V.2002, *Soares & Cortate 46* (CESJ, MO); S. loc., 1816 – 1821, *St. Hilaire 1962* (P [2 sheets]), *St. Hilaire 1970* (P [3 sheets]); Perdizes, 27.X.1994, *Tameirao & Werneck 1175* (BHCB, INB). **Pará:** between Ilha do Anana and Igarapé, Santarém, 28.X.1950, *Black & Ledoux 10390* (IAN, MO); Marabá, Serra dos Carajás, 22.VIII.1984, *Rosa & Santos 4669* (INB, MG); Santarém, IX.1850, *Spruce 1082* (K); Santarém, front Alter do Chão, 11.VII.1991, *T.M.S. 147* (E, INPA); Portel, 8.X.1955, *Williams & Silva 18205* (IAN, MO). **Rio de Janeiro:** near Rio de Janeiro, 1878 – 1879, *Glaziou 11179* (K, P). **Rondônia:** Alvorada do Oeste, road to Costa Marques, 1.V.1987, *Ferreira 8998* (NY); between Riozinho and Rio Barão de Melgaco, 22.IX.1963, *Maguire & al. 56790* (NY); Tutumparaná – Porto Velho road, 24.XI.1968, *Prance & al. 8809* (A, F, INPA, K, MG, NY, S, U, US). **Roraima:** Ilha de Maracá, SEMA ecological reserve, 10.II.1988, *Ratter & al. 6268* (E, K, NY); falls of Madeira, X.1886, *Rusby 2392* (BM, F, G-BOIS, K, MO, NY, US). **São Paulo:** Mogi-Guaçu, 27.X.1989, *Buzato &*

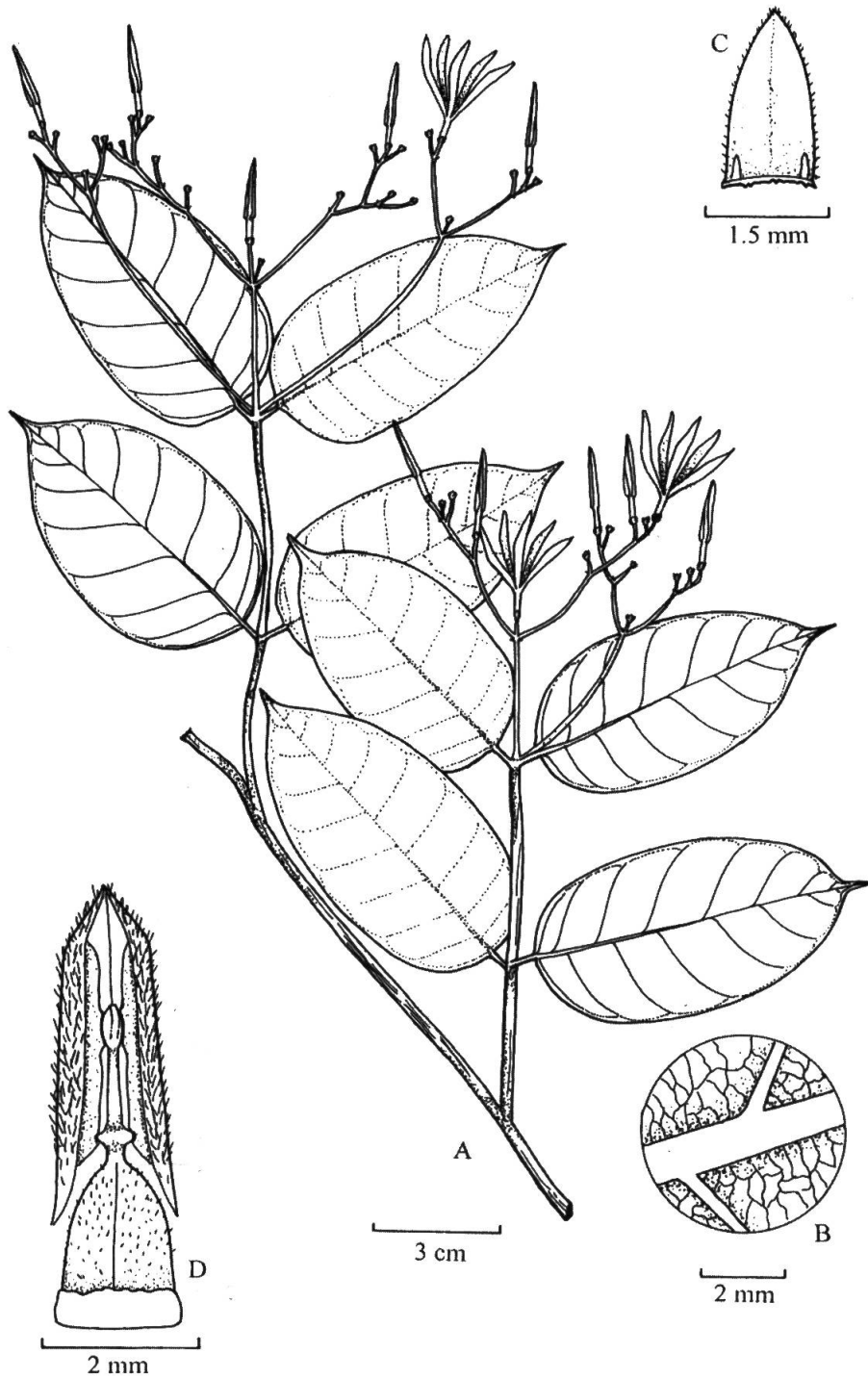


Fig. 2. – *Secondatia duckei* Markgr. **A**. Flowering shoot. **B**. Close-up of the abaxially surface of the leaf blade. **C**. Sepal and colleters, adaxial view. **D**. Ovary, disk, style head, and anthers. [Vicentini & al. 692, INB] [Drawing by the author]

Franco 22095 (ESA, INB, UEC); S. loc., 1838, *Claussen 336* (NY [3 sheets], P [2 sheets]); Jaboticabal, Fazenda Santa Izabel, Rio Mogi-Guaçu, 15.IX.1995, *Rodriguez 342* (F, NY, SP), *Rodriguez 352* (NY, SP); Paulo de Faria, Fazenda Filgueira, road to Riolândia, 13.X.1994, *Souza & al. 83* (ESA, INB). **State unknown:** Semidouro, 1845, *Pohl s. n.* (NY, P, W). **S. loc., s. d.:** (fl), *Allemão 979* (P); (fl), *Baillon s. n.* (P-BA); (fl), *Burchell 8028* (K, P); (fl), *Burchell 8103* (K); (fl), *Gardner 2662* (K); (fl), *Newman s. n.* (G); (fl), *Pinel s. n.* (CGE); (fl), *Riedel s. n.* (G-BOIS, LE, NY, P); (fl), *Sello s. n.* (K); (fl), *Sello 1654* (P).

BOLIVIA. La Paz: Nor Yungas, Valle de Huarinilla, Río Coroico, 5.XII.1994, *Beck 21627* (LPB); Nord Yungas, Milluguaya, XII.1917, *Buchtien 4371* (HBG, LPB, NY, US); Inquisivi, below Cajuata, near Puente Alegre, 27.XII.1989, *Dorr & Barnett 6849* (LPB, NY, USF); Sud Yungas, Río Phuri, entre Chulumani e Irupana, 14.III.1999, *Pendry & al. 604* (E, LPB); Sud Yungas, entre Chulumani y La Asunta, 3.VIII.1991, *Rea & al. 22* (LPB); Nor Yungas, N of Yolosa, road to Coroico, 21.III.1984, *Solomon & al. 11999* (INB, LPB, MO, USZ); Sud Yungas, entre Puente Villa y Chulumani, 16.XII.1999, Wood & Goyder 15470 (K, LPB). **Santa Cruz:** Chiquitos, Serranía de Santiago, 23.XI.1989, *Daly & Echeverre 6344* (LPB, NY, USZ, WAG); San Javier – San Ramón road, 4.XI.1977, *Evrard 8494* (BR, MO, G); S of San José de Chiquitas, Serranía de San José, 1.XI.1991, *Gentry & Foster 75431* (INB, MO, USZ); Velasco, El Refugio camp, 9.VII.1994, *Guillén & Coria 2145* (INB, MO); German Busch, El Carmen, Estancia Campo en Medio, 30.IV.1997, *Gutiérrez & Rojas 2027* (USZ); Noel Kempff National Park, Las Torres, 29.XI.1993, *Jardim & al. 223* (F, K, LPB, MO, USZ); Chiquitos, E of Roboré, road to Santiago de Chiquitos, 12.XI.1996, *Jardim & Mamani 3665* (INB, LPB, MO, USZ); Noel Kempff National Park, Flor de Oro, 18.XI.1993, *Killeen 6127* (F, MO, NY, USZ); Velasco, Noel Kempff National Park, La Torre Camp, 21.XI.1983, *Killeen & al. 6186* (INB, MO, USZ); Noel Kempff National Park, 14.I.1997, *Killeen & al. 8141* (G, LPB, MO, USZ); Chiquitos, Roboré – San José road, NW of Roboré, *Mostacedo & Abbott 2864* (INB, MO, USZ); Andrés Ibañez, vicinity of El Hondo, 29.XI.1988, *Nee 36982* (LPB, MO, NY); Andrés Ibañez, along Río Pantano, SE of Palmar del Oratorio, 9.XII.1988, *Nee 37106* (LPB, MO, NY, USF, USZ); Ichilo, N of Buena Vista, near Laguna Candelaria, 31.X.1990, *Nee 39631* (LPB, MO, NY, US, USF, USZ); Andrés Ibañez, N of Pedro Lorenzo, 22.XII.1994, *Nee 46064* (MO, NY, USZ); Velasco, Serranía Huanchaca, SE de estación Flor de Oro, 8.III.1992, *Perry & Cuellar 660* (LPB); Noel Kempff National Park, Huanchaca I, road to Río Pauserna, 5.XI.1995, *Rodriguez & Surubí 687* (INB, MO, USZ); Sara, 30.X.1916, *Steinbach 3113* (G, K); Río Moreno, 28.X.1925, *Steinbach 7301* (BM, E, F, G, G-DC, K, MO, NY, U); Noel Kempff National Park, Flor de Oro, 18.IX.1995, *Vargas & al. 3799* (INB, USZ); Chiquitos, S of San José de Chiquitos, 2.XI.1998, *Wood & Mamani 14124* (LPB); Ñuflo de Chávez, S de Concepción, road to Lomerio, 30.X.1999, *Wood 15091* (LPB).

PARAGUAY. Amambay: Estancia Carmen de la Sierra, Potrero Lili, 22.X.1991, *Soria 4711* (FCQ, MO); Cerro Corá National Park, Cerro Trébol, 13.VI.1996, *Zardini & Cardozo 45000* (AS, INB, MO). **Canendiyú:** Aguara Ñu, 8.X.1996, *Jiménez & Marín 1578* (BM, CTES, PY), *Jiménez & Marín 1578b* (BM, CTES, PY); Mbaracayú National Reserve, 31.X.1998, *Zardini & Chaparro 49497* (AS, INB, MO).

2. *Secondatia duckei* Markgr. in Notizbl. Bot. Gart. Berlin-Dahlem 11: 338. 1932 (Fig. 2).

Type: BRAZIL. Amazonas: Rio Negro, Curicuriary, 24.XI.1929 (fl), *A. Ducke 22432* (lecto-, here designated: K!; isolecto-: B [destroyed], photo F neg. 38744, G-BOIS!, P!, US!).

= *Secondatia adolphii* Azambuja in Ann. Missouri Bot. Gard. 36: 543. 1949, **syn. nov.**
Type: BRAZIL. Amazonas: Manaus, 14.IX.1945 (fl), *A. Ducke 1758* (lecto-, here designated: F!; isolecto-: RB, NY!, US!).

Liana, branchlets terete to subterete, somewhat flattened in young stems, glabrous. Leaves: blade 5.8-10.8 × 2.7-5.6 cm, elliptic, broadly elliptic, ovate, or ovate-elliptic, firmly membranaceous, the apex acuminate or cuspidate, the base rounded to broadly obtuse, glabrous, tertiary veins conspicuously impressed, petioles 4-7 mm. Inflorescence terminal, lax, many-flowered, glabrous to glabrate, inconspicuously bracteate, peduncle (2-)28-48 mm, pedicels 3-7 mm, bracts 1-2 × 0.5-1 mm, scarious; sepals 1.5-2 × 1 mm, ovate to narrowly ovate, acute, glabrate and ciliolate; corolla salverform, white to creamish white, glabrate or inconspicuously puberulent without; tube 5.5-7 × 2 mm, very minutely and densely puberulent within, lobes 15-21 × 2.5-3.5 mm, very narrowly elliptic to very narrowly ovate, puberulent basally; stamens inserted near the base of the tube; anthers 4-4.5 mm long, densely hispidulous dorsally, style head 1.5-2 mm long, sessile; ovary 1-1.5 mm long, very sparsely and minutely puberulent, disk conspicuously shorter than the ovary, irregularly lobed. "Follicles 19-20 × 3.5 cm, continuous".

Distribution, habitat, and ecology. – This rare species is restricted to northwestern Brazil and southeastern Colombia, in wet primary forest and similar related areas at elevations of 150-300 m.

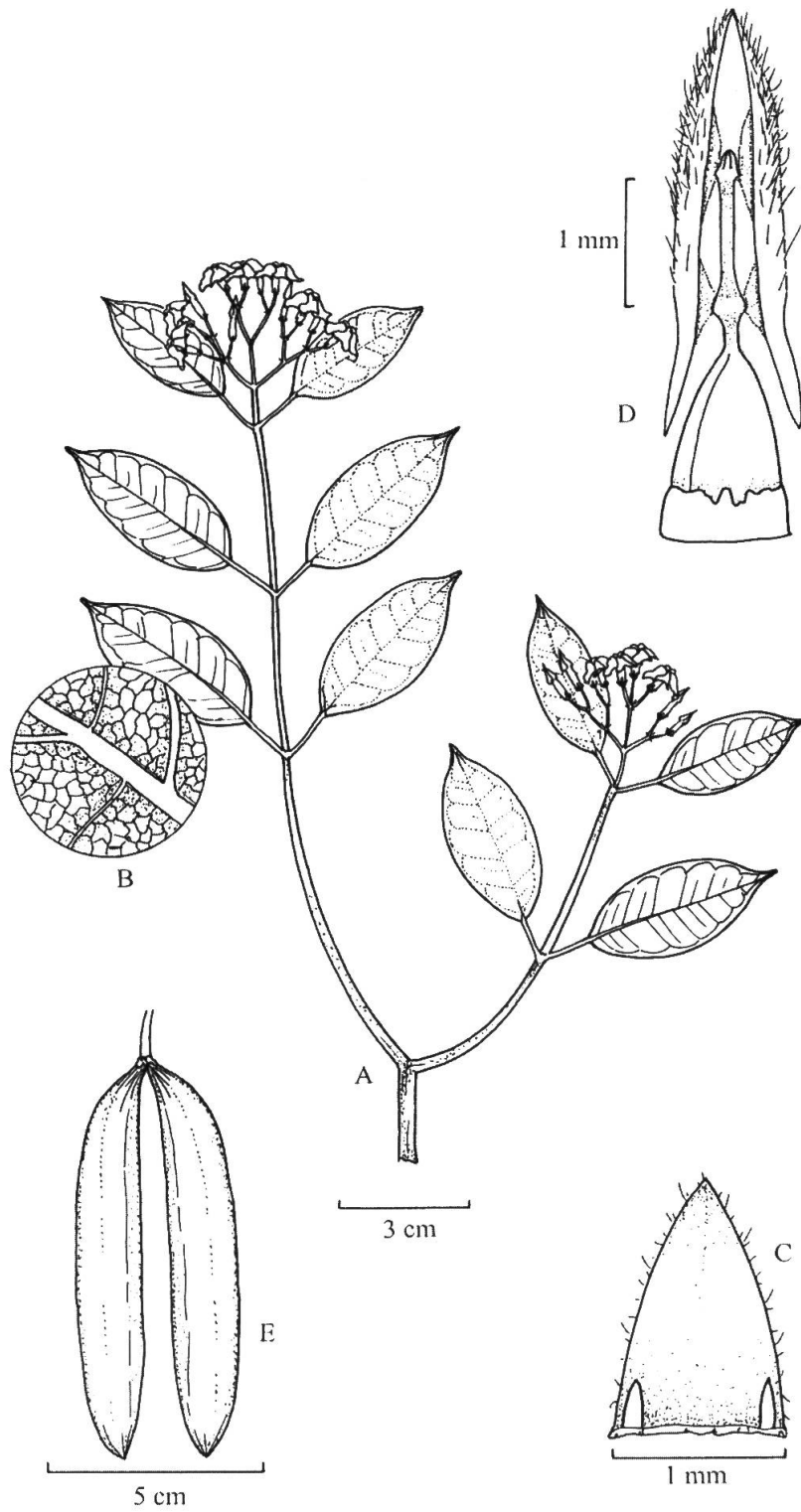


Fig. 3. – *Secondatia floribunda* A. DC. **A.** Flowering shoot. **B.** Close-up of the abaxially surface of the leaf blade. **C.** Sepal and colleters, adaxial view. **D.** Ovary, disk, style head, and anthers. **E.** Fruits. [**A-D**, Blanchet 3370, BM; **E**, Gardner 2232, BM]. [Drawing by the author]

Phenology. – Flowering specimens have been collected in September, October, and November.

Secondatia duckei is the most distinctive species in the genus and is unique and noteworthy in having elongate corolla lobes, 15-21 mm long and laxly-flowered inflorescences. The description of the follicles given here, was taken from the original protologue of *S. adolphii*; otherwise, no fruiting collections are known.

Secondatia adolphii is lectotypified here and *Ducke 1758* selected as the lectotype. The other syntype (*Ducke 2105*) was not located.

Additional specimens examined. – **COLOMBIA.** Amazonas: Aracuara, Río Caquetá, near Isla Sumaeta, 20.X.1990, *Alvarez & al. 1181* (HUA, JAUM).

BRAZIL. Amazonas: Manaus, 14.IX.1945, *Ducke 1758* (F); Reserva Florestal Ducke, Manaus, Itacoatiara, 15.IX.1994, *Vicentini & al. 692* (IAN, INB, INPA, K, MO, NY, SP, SPF, UB, WAG).

3. *Secondatia floribunda* A. DC., Prodr. 8: 446. 1844 (Fig. 3).

Type: BRAZIL. Bahia: Serra Jacobina, 1841 (fl), *M. Blanchet 3370* (holo-: G-DC!; iso-: B [destroyed], photo F neg. 4479, BM [2 sheets]!, G [2 sheets]!, G-BOIS!, NY!, P!).

= *Secondatia foliosa* A. DC., Prodr. 8: 446. 1844. **Type: BRAZIL. Bahia:** Serra Jacobina, s. d. (fl), *M. Blanchet 3635* (holotype, G-DC!; isotypes, BM [2 sheets]!, F [2 sheets]!, photo at INB, G [2 sheets]!, G-BOIS!, K!, M!, P [4 sheets]!, W).

= *Secondatia foliosa* var. *gardneri* A. DC., Prodr. 8: 446. 1844. **Type: BRAZIL. Ceará:** S. loc., 1838 (fl), *C. Gardner 1762* (holo-: G-DC!; iso-: BM!, photo at INB, CGE [2 sheets]!, G!, G-BOIS!, GH!, K [2 sheets]!, NY!, P [2 sheets]!, US!, W).

= *Secondatia foliosa* var. *petiolaris* Müll. Arg. in Mart., Fl. Bras. 6(1): 109. 1860. **Type: BRAZIL.** S. loc., s. d. (fl), *Pohl 1846* (lecto-, here designated: W!; isolecto-: F!, photo at INB, K!, NY!).

= *Secondatia foliosa* var. *lanceolata* Müll. Arg. in Mart., Fl. Bras. 6(1): 109. 1860. **Type: BRAZIL.** S. d., *F. Sello s. n.* (not located).

= *Angadenia pruinosa* Miers, Apocyn. S. Amer.: 177. 1878, **syn. nov. Type: BRAZIL. Piahy:** Oeiras, V.1829 (fr), *C. Gardner 2232* (holo-: BM!; iso-: K!, photo at INB).

Liana, branchlets terete to subterete, somewhat angulate in young stems, glabrous to glabrate. Leaves: blade 3-4.7(-9) × 1.1-2.3(-3.4) cm, elliptic to ovate-elliptic, firmly membranaceous, abruptly acuminate, acuminate, or obtuse-cuspidate, obtuse basally, glabrous, tertiary veins conspicuously impressed, petiole 10-14 mm. Inflorescence terminal to subterminal, rarely axillary, somewhat agglomerate, glabrous to glabrate, inconspicuously bracteate, peduncle 8-10 mm long, pedicels (3.5-) 5-8 mm, bracts 1-1.5 × 0.5-1 mm, scarious; sepals 1-1.5 × 1 mm, narrowly ovate, acute, very minutely and sparsely puberulent to glabrous or glabrate, inconspicuously ciliolate marginally; corolla salverform, white to creamish white, glabrous to glabrate without; tube 4.5-7 mm, densely puberulent within, lobes 8-12 × 2.5-4.5 mm, narrowly obovate, glabrate or puberulent basally; stamens inserted near the base of the tube, anthers 3-3.5 mm, minutely puberulent dorsally, style head 1.5-2 mm, sessile; ovary 1-1.5 mm long, glabrous, disk less than 0.5 mm, irregularly lobed or lacerate. Follicles 10-11 × 1.4-1.5 cm, continuous, glabrous; seeds unknown.

Distribution, habitat, and ecology. – Endemic to eastern and central Brazil, where it grows in mixed moist forest, rocky outcrops, sandy areas, and similar disturbed areas, at elevations of 0-1200 m.

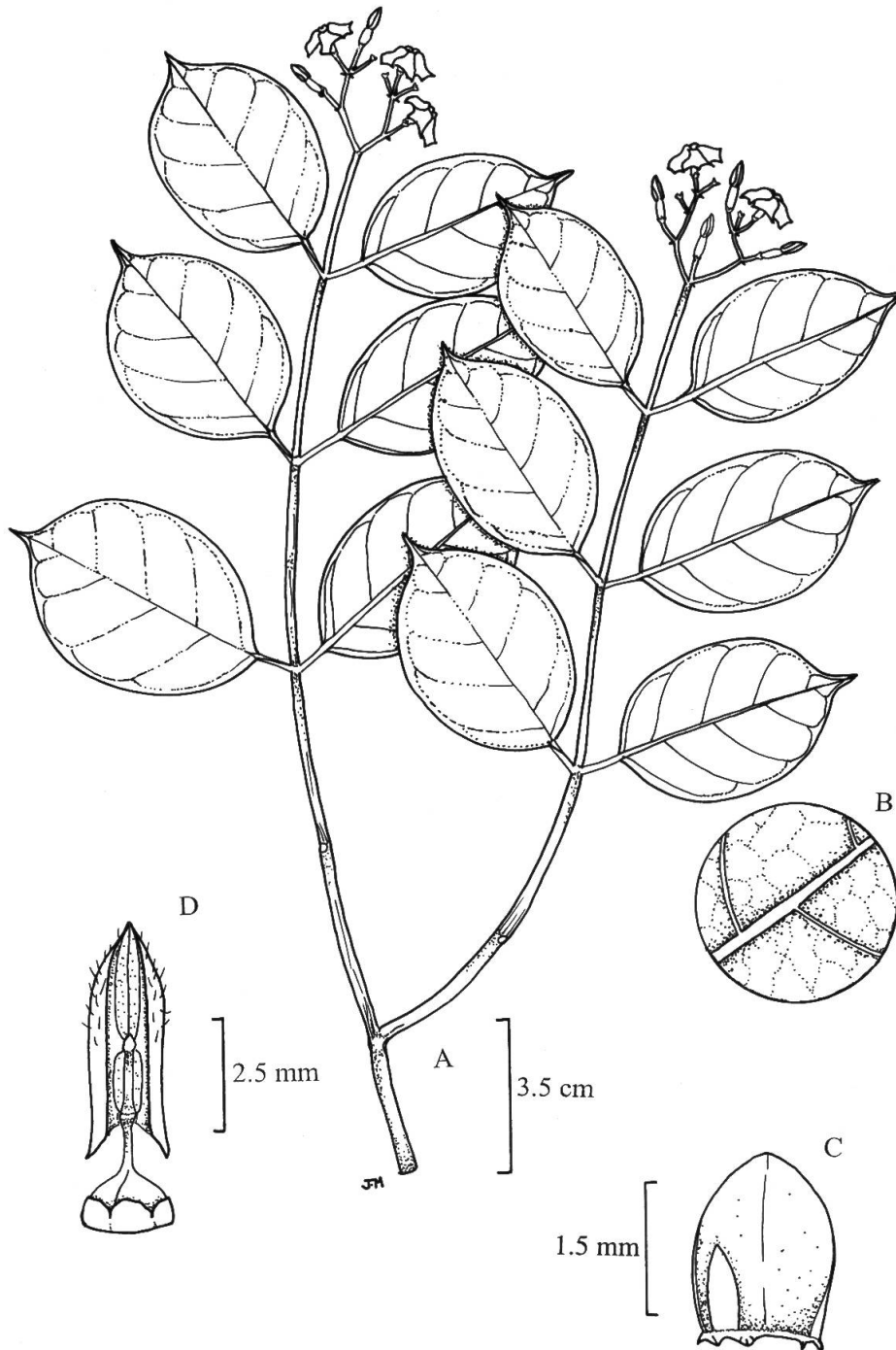


Fig. 4. – *Secondatia schlimiana* Müll. Arg. A. Flowering shoot. B. Close-up of the abaxially surface of the leaf blade. C. Sepal and colleters, adaxial view. D. Ovary, disk, style head, and anthers. [Schlim 510, NY] [Drawing by the author]

Phenology. – Flowering specimens have been collected from September through December. The only fruiting collection was collected in May. Several field notes report that the flowers are very fragrant when fresh (e.g., *Guedes 639*; *Harley & al. 50336*).

Local names. – Catuaba (Brazil, Ceará, Minas Gerais).

Secondatia floribunda is related to the widespread *S. densiflora*, which also has similar compact inflorescence structure, corolla shape, and anthers length. It is easily separated by the characters given in the key.

WOODSON (1936), who probably never saw the type, relegated *Angadenia pruinosa* Miers to synonymy under *Odontadenia lutea* (Vell.) Markgr. However, examination of the type collection (*Gardner 2232*) revealed that this name must be transferred to the synonymy of *Secondatia floribunda*.

Additional specimens examined. – **BRAZIL. Amazonas:** Manaus, road to Aleixo, 14.X.1941, *Ducke 1199a* (MO [in part]); São Paulo de Olivença, Rio Solimões, 19.VIII.1929, *Ducke 22430* (K, P). **Bahia:** Argogim, along BR 242, 16.X.1997, *Alves & al. 939* (INB, JPB); Morro do Chapéu, SE of America Dourada, 28.XI.1992, *Arbo & al. 5352* (CTES, K [2 sheets]); Rio Pardo, Encruzilhada, 24.V.1968 (st), *Belém 3633* (NY); exact locality lacking, 1856, *Blanchet s. n.* (G); Morro de Chapéu, Cachoeira do ferro Doido, 27.IV.1999 (fl), *Forzza & al. 1379* (CEPEC, NY); Abaíra, Engenho-Márques road, 26.IX.1992, *Ganev 1200* (HUEFS, NY); Piata, Abaíra, Samambaia, near Salao, Catolés-Barra do Catolés road, 19.X.1992, *Ganev 1268* (NY); Rio de Contas, Pico das Almas, 28.X.1988, *Harley & al. 25716* (CEPEC, F, K, NY, SPF, WAG); Barra do Estiva, road to Triunfo do Sincorá, 17.XI.1988, *Harley & al. 26487* (K, MO, NY, P, SPF); Abaíra, around Catolés, 24.XII.1991, *Harley & al. 50336* (CEPEC, HUEFS, K, MO, NY, SPF); Piatã, al O de Barreiras, 9.X.1981 (fl), *Hatschbach 44109* (MBM, NY, US, Z); Maracás, Gameleira, 21.XI.1985, *Hatschbach & Silva 50048* (K, MBM, MO); Abaíra, around Catolés, 19.XII.1991, *Hind & Queiroz 50016* (CEPEC, HUEFS, K, MO, NY [2 sheets], SPF). **Ceará:** Serra do Araripe, 12.XI.1976, *Bogner 1190* (K); Chapada do Araripe, Crato, 3.IX.1980, *Fernández & Matos s. n.* (EAC, MO); between Oeiras and Simplicio Mendes, 17.XI.1981, *Fernández & Nunes s. n.* (EAC, MO); Serra do Araripe, 26.V.1957, *Guedes 359* (IAN, MO), 13.IX.1957, *Guedes 639* (NY, US); Capoeira between Itauéiras and Floriano, 19.XI.1979, *Nunes & Martins s. n.* (EAC, MO). **Ceará:** Serra de Araripe, 13.IX.1957, *Ducke s. n.* (NY). **Minas Gerais:** Bello Horizonte, Serra do Taquaril, 23.X.1936, *Barreto 5077* (F, PAMG); Bello Horizonte, Penha de França, 23.XI.1937, *Barreto 9979* (F, INB, PAMG); between Lagoa do Cercado and São Jose de Mato Sinko, 23.X.1895, *Glaziou 21720* (G, K, P [3 sheets]); Jequitinhonha and Serra da Areia, 20.X.1988, *Harley & al. 25280* (K, MO, P); Dionísio, 23.XI.1976, *Heringer 16042* (NY, UB, US); O of Montes Claros, road to Agua Boa, 25.II.1969, *Irwin & al. 23889* (NY); Capoeira da Chapada, near Divisópolis, 12.XI.1959, *Magalhães 15646* (MO, RB); Araçuaí, Jequitinhonha, 13.IX.1959, *Magalhães 15647* (MO); Viçosa, 11.X.1930, *Mexia 5163a* (F, MO, VIC); Fazenda do Jose Alexandre, 20.XI.1930, *Mexia 5334a* (BM, G, MO, NY, US, VIC); Lagoa Santa, X.1864, *Warming s. n.* (C, NY, W). **Rio de Janeiro:** Serra do Estrella, 18.IV.1882, *Glaziou 12941* (G, K, P [3 sheets]). **S. loc., s. d.:** (fl), *Claussen s. n.* (NY, W); 1846, *Pohl s. n.* (NY, W); (fl), *Regel s. n.* (CGE); (fl), *Riedel s. n.* (CGE, P); (st), *Ule s. n.* (HBG).

4. *Secondatia schlimiana* Müll. Arg. in *Linnaea* 30: 416. 1860.

Type: COLOMBIA. **Santander del Norte:** Ocana, V.1846-1852 (fl), *L. Schlim 510* (holo-: G-DC!; iso-: BM!, BR!, F!, G!, photo F neg. 26883, G-BOIS [2 sheets]!, K!, NY!, P!, US!).

Liana; branchlets terete to subterete, minutely and inconspicuously puberulent when young, glabrous or glabrate at maturity. Leaves: blade (3.6-) 4.2-8 × 1.8-5 cm, elliptic to ovate-elliptic, firmly membranaceous, cuspidate apically, obtuse to rounded basally, glabrous, tertiary veins conspicuously impressed, petiole (5-) 8-14 mm. Inflorescence terminal, subterminal, or axillary, densely agglomerate, inconspicuously and minutely puberulent to glabrous or glabrate, conspicuously bracteate, peduncle (5-) 8-38 mm long, pedicels 0.2-7 mm, bracts 1-2 × 1 mm, scarious; sepals 1.5-2 × 1.5 mm, ovate, acute to obtuse, glabrous to glabrate; corolla salverform, white, glabrous to glabrate (except the lobes base); tube 7-9 × 2-2.5 mm, very minutely and moderately to densely puberulent within, lobes 9-12 × 6-8 mm, narrowly obovate, densely pubescent basally, near the corolla mouth; stamens inserted near the base of the tube, anthers 4-4.5 mm, densely to sparsely puberulent dorsally, style head 1.5-2 mm, with a short style, 1.5-2 mm; ovary ca. 1 mm long, glabrous, disk shorter or equalling the ovary, 5-lobed. Follicles unknown.

Distribution, habitat, and ecology. – This species is known disjunctly in southern Colombia and northern Brazil, in wet forest and disturbed vegetation at 100-400 m elevation.

Phenology. – Flowering specimens have been collected in March, April, May, and October.

Secondatia schlimiana is somewhat related to *S. densiflora*, from which it is easily distinguished by its longer corolla lobes. AZAMBUJA (1946) described the fruits of this species based on one collection made in Amazonas, Brazil. However, a careful examination of this specimen (*Ducke 1199*, RB, US), revealed that the fruits are from a species of *Forsteronia* and they were wrongly attached to a flowering collection of *S. schlimiana* (in fact, the leaves of the fruiting branchlet have colleters at the base of the midrib, adaxially, a feature somewhat common in *Forsteronia*, but lacking in *Secondatia*). Therefore, the fruits remain unknown for this species.

Additional specimens examined. – **COLOMBIA.** Cesar: Valledupar, 17.III.1948, *Castañeda 955* (MO). **Magdalena:** Baragona, E of Chiriguana, 9.IV.1958, *Fosberg 39403* (US). **Vaupés:** Circasia, Río Vaupés, 9.X.1939, *Cuatre-casas 7169* (COL, F, US). **S. loc.:** 1851-1857, *Triana 687* (BM).

BRAZIL. Amazonas: Manaus, estrada do Aleixo, 14.X.1941, *Ducke 1199* (RB, US [in part, except fruits]).

Doubtful species

Secondatia macnabii (Urb.) Woodson in Ann. Missouri Bot. Gard. 19: 385. 1932. ≡ *Orthechites macnabii* Urb., Symb. Antill. 6: 37. 1909. **Type: JAMAICA.** Liguanea, St. Andrews, s. d. (fl), *G. MacNab s. n.* (E).

Following the original description (mainly the style-head features), this species can not represent a *Secondatia*. Although the type has not yet been examined, by now I prefer to consider this taxon as a doubtful species.

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APPENDICES

APPENDIX 1: NUMERICAL LIST OF ACCEPTED TAXA.

1. *Secondatia densiflora* A. DC.
2. *Secondatia duckei* Markgr.
3. *Secondatia floribunda* A. DC.
4. *Secondatia schlimiana* Müll. Arg.

APPENDIX 2: INDEX TO NAMES IN SYSTEMATIC TREATMENT

Angadenia Miers

- elliptica* Miers (1)
pruinosa Miers (3)

Secondatia A. DC.

- adolphii* Azambuja (2)
densiflora A. DC.
peruviana Poepp. (1)
densiflora var. *parviflora* Müll. Arg. (1)
densiflora var. *paraguariensis* Hassl. (1)
densiflora var. *genuina* Hassl. (1)
duckei Markgr.
floribunda A. DC.
foliosa A. DC. (3)
foliosa var. *gardneri* A. DC. (3)
foliosa var. *petiolaris* Müll. Arg. (3)
foliosa var. *lanceolata* Müll. Arg. (3)
schlimiana Müll. Arg.

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