

*An undescribed and overlooked species  
of Sloanea (Elaeocarpaceae) from the  
Ecuadorian Amazon*

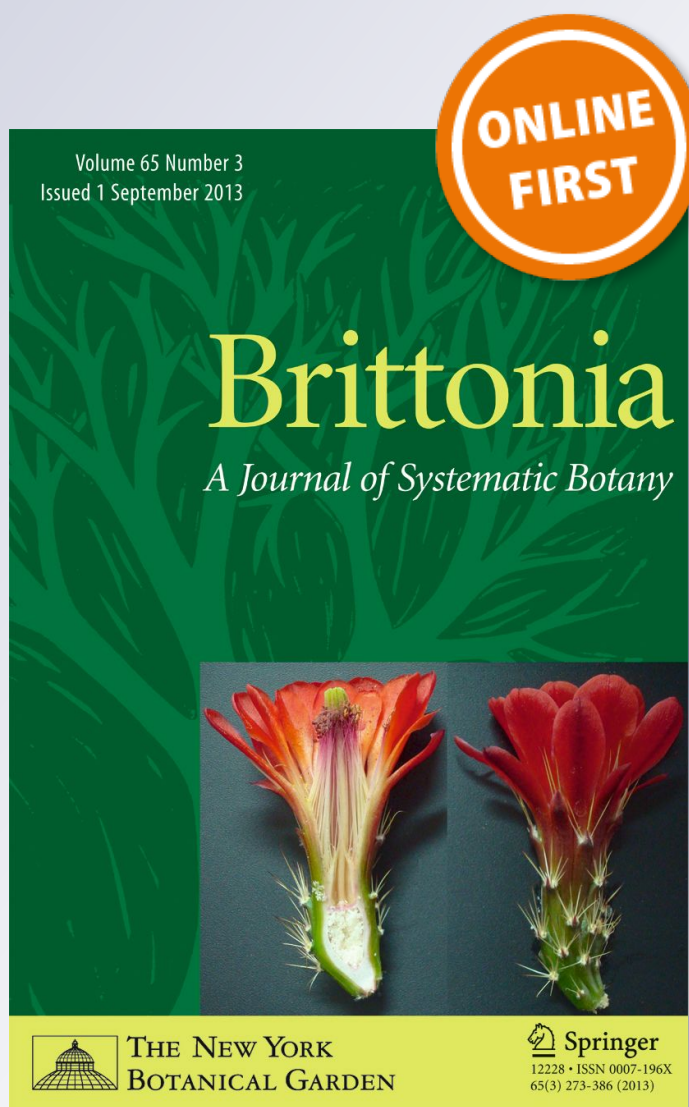
**Juan Ernesto Guevara Andino,  
Diana Fernández-Fernández & Nigel  
C. A. Pitman**

**Brittonia**

ISSN 0007-196X

Brittonia

DOI 10.1007/s12228-017-9511-3



**Your article is protected by copyright and all rights are held exclusively by The New York Botanical Garden. This e-offprint is for personal use only and shall not be self-archived in electronic repositories. If you wish to self-archive your article, please use the accepted manuscript version for posting on your own website. You may further deposit the accepted manuscript version in any repository, provided it is only made publicly available 12 months after official publication or later and provided acknowledgement is given to the original source of publication and a link is inserted to the published article on Springer's website. The link must be accompanied by the following text: "The final publication is available at [link.springer.com](http://link.springer.com)".**

## An undescribed and overlooked species of *Sloanea* (Elaeocarpaceae) from the Ecuadorian Amazon

JUAN ERNESTO GUEVARA ANDINO<sup>1</sup>, DIANA FERNÁNDEZ-FERNÁNDEZ<sup>2</sup>, AND NIGEL C. A. PITMAN<sup>3</sup>

<sup>1</sup>Department of Integrative Biology, University of California, Berkeley, CA 94720-3140, USA; e-mail: jeguevara@berkeley.edu

<sup>2</sup>Instituto Nacional de Biodiversidad, Herbario Nacional del Ecuador QCNE, Quito, Ecuador; e-mail: diana.fernandez@ambiente.gob.ec

<sup>3</sup>Keller Science Action Center, The Field Museum, 1400 South Lake Shore Dr, Chicago, IL 60605-2496, USA; e-mail: npitman@fieldmuseum.org

---

**Abstract.** A new and rare species collected in Amazonian Ecuador, *Sloanea jaramilloi*, is described, illustrated, and its morphological similarities with other species of *Sloanea* is discussed. It resembles *S. geniculata* but is distinguished by the absence of persistent, adaxially concave stipules in the young branchlets, 4–6 sepals not covering entirely the reproductive organs of the flower, entire leaves, and the large, rigid, stout bristles sparsely distributed on the fruits.

**Keywords:** Amazonia, Ecuador, *Sloanea*, taxonomy.

---

*Sloanea* L. is the second largest genus of Elaeocarpaceae and comprises approximately 200 species, of which about 120 are neotropical (Smith, 1954; Smith, 2001; Sampaio, 2009). Smith (1954) claimed that the center of diversity for this group is northern Amazonia and the Guyana Shield region, but the genus is just as diverse in Central and western Amazonia (Boeira, 2010; Castañeda, 1981).

In Ecuador, *Sloanea* is particularly diverse in Amazonia, with 25–30 species in the region (Jaramillo, 2003). This number should increase because new species will almost certainly be found (e.g., Guevara et al., 2016). Located in northern Amazonian Ecuador, Yasuní National Park is the only strictly protected area in north-western Amazonia, and it has been a focus of botanical collecting during the past 20 years (Pitman et al., 2001; ter Steege et al., 2013). The park is known for its high levels of diversity in many taxonomic groups such as amphibians, birds, and plants (Bass et al., 2010; Funk et al., 2012). The forests of the Chocó region are also unusually diverse (Gentry, 1982a, b). Several new species of *Sloanea* have been described for the Colombian Chocó (Palacios-Duque & Alonso, 2005, Palacios-

Duque & Alonso, 2012), and these new taxa are expected to occur in the humid forests of Chocó region in Ecuador as well. To date, however, a systematic or taxonomic study for this genus in the above-mentioned regions is still needed to have an accurate estimate of the true number of species of *Sloanea* for Ecuador.

Herein we describe a new species of *Sloanea* from Amazonian Ecuador based on an extensive analysis of morphological characters from specimens deposited at F, MO, QCA, QCNE, and QAP. We also compared the new species with images of type specimens found on JSTOR. In this work we used the sub-generic classification of Smith (1954) for the circumscription of the new taxa. Earlier works demonstrated that a single diagnostic character (the position of the calyx in relation to the bud) is consistent throughout the group and could be considered diagnostic for the circumscription of taxa to subgenus level (Sampaio, 2009; Guevara et al., 2016).

***Sloanea jaramilloi*** J. E. Guevara & D. Fernández, **sp. nov.** Type: Ecuador. Orellana: Parque Nacional Yasuní, carretera y oleoducto Maxus en construcción, Km 20, bosque

primario, colinas de suelos rojos, 00°33'S, 76°30'W, 250 m, 28–30 Jul 1993 [fr], *M. Aulestia* & *G. Grefa* 225 (holotype: QCNE 79523; isotype: MO). (Figs. 1, 2, 3).

**Diagnosis:** *Sloanea jaramilloi* differs from *S. geniculata* by the absence of persistent adaxially concave stipules in the young branchlets, 4–6 sepals not covering entirely the reproductive organs of the flower, entire leaves, and fruits sparsely covered by large, rigid, stout bristles.

*Subcanopy trees* up to 10–15 m tall and 15–25 cm diameter breast high (dbh). Branchlets strigose, cylindrical and slightly quadrangular at the apex of the twigs, striated; apical buds conical, densely strigose, without stipules. *Leaves* alternate; petioles 1–5.2 cm long, semiterete, canaliculated above, striated, densely hirsute, thickened at the insertion with the blade; blades 8.9–24.1 × 3.1–7.2 cm, coriaceous oblong-elliptical with margins entire, attenuate or rounded at base, slightly apiculate at apex, squamous between secondary and tertiary venation in the abaxial surface, young leaves with golden-white scales between secondary veins, margins entire, slightly undulate; midrib impressed in the adaxial surface, hirsute, prominent in the abaxial surface; secondary venation brochidodromous and anastomosed to the margins of the leaves, 17–22 secondary veins, prominent in the abaxial surface and ascendant, sparsely pubescent, tertiary veins oblique to the secondary veins, impressed in the adaxial surface, very prominent in the abaxial surface. *Inflorescences* axillary, paniculate, with very short peduncles 0.2–0.4 cm long, rachises 2.2–4.1 cm long, densely pubescent, deeply striate and quadrangular, with deciduous triangular bracts at the base of peduncles, 0.5 cm wide, 0.4 cm long; pedicels 0.8–1.6 cm long, stout, densely pubescent, finely striate and quadrangular; bracts triangular at the base of the individual pedicels, 1–1.5 cm long, commonly deciduous. *Flowers* with the receptacle, short and pubescent; sepals 4–6, not covering the reproductive organs before anthesis, 4–5.2 mm long, 3–5.3 mm wide, ovate, the apex acute-acuminate, the margins entire, slightly involute, yellow on the outer surface, densely covered by short appressed pubescence on the outer and inner surface but tending to be glabrous at the base of the inner surface. *Stamens* 80–100, 3.5–6 mm long, yellow with anthers orange, the innermost larger than the outermost, both functional; filaments 1.2–2 mm long, thick, angled, densely covered by appressed

pubescence, sometimes hirsute at the apex; anthers 2.5–4 mm long, densely pubescent, the connective long extended as an acuminate short and slightly pubescent awn, 0.12–0.19 mm long; anther sacs opening widely along entire long. *Ovary* 4–5 mm long, with four locules, 6 or 7 angled, ovate, densely pubescent, placentation axillary; style 4–7 mm long, densely pubescent, slightly hirsute at the base, but hairs appressed to the apex; stigma glabrous. *Fruits* capsular, 2.6–5.9 × 3–6.1 cm wide, rounded, opening by 4 rigid valves, valves 3–6 mm thick, opening to 90°, not reflexed, externally covered by dimorphic bristles, the shorter bristles 6–16 mm long, cylindrical, the longer ones 16–30 mm long, swollen at the base, rigid, stout and tapered to a sharp point. *Seeds* not seen.

*Distribution and habitat.*—Known only from Yasuní National Park in Amazonian Ecuador. It grows on hilly terra firme forests on clayey soils. The area corresponds to the Lowland Evergreen Forest of Napo-Curaray region (Ministerio del Ambiente del Ecuador, 2013). Some of the most abundant species in this region include *Batocarpus orinocensis* H. Karst. (Moraceae), *Brosimum utile* subsp. *ovatifolium* (Ducke) C. C. Berg (Moraceae), *Iriartea deltoidea* Ruiz & Pav. (Arecaceae), *Iryanthera hostmannii* (Benth.) Warb. (Myristicaceae), *Otoba glycyarpa* (Ducke) W. A. Rodrigues & T. S. Jaram. (Myristicaceae), *Pausandra trianae* (Müll. Arg.) Baill. (Euphorbiaceae). Other remarkable floristic elements are the endemics: *Andira macrocarpa* R. T. Penn. (Fabaceae s.l.), *Pentaplaris huaoranica* Dorr & C. Bayer (Malvaceae s.l.), *Strypnodendron porcatum* D. A. Neill & Occhioni f. (Fabaceae).

*Phenology.*—Adult trees have been observed with flowers from June to August, and fruits have been observed from September to March.

*Etymology.*—The specific epithet honors Jaime Jaramillo, a renowned Ecuadorian botanist who mentored most of the current Ecuadorian botanists who are leaders in their field. He also started the revision of the genus for the *Flora of Ecuador*.

*Conservation status.*—*Sloanea jaramilloi* is only known from three extant populations inside Yasuni National Park. The first is located between Kms 32.4 and 38.4 of the Maxus road, and the second around Km 20. The third population is located in the 25-hectare plot of the Yasuní Forest Dynamics Project (YFDP) of the Center for Tropical Forest Science (CTFS) (Fig. 4). In the plot, which includes more than 350,000 stems

2017]

GUEVARA ET AL.: SLOANEA JARAMILLOI (ELAEOCARPACEAE)



FIG. 1. Holotype of *Sloanea jaramilloi* (M. Aulestia & G. Grefa 225, QCNE).

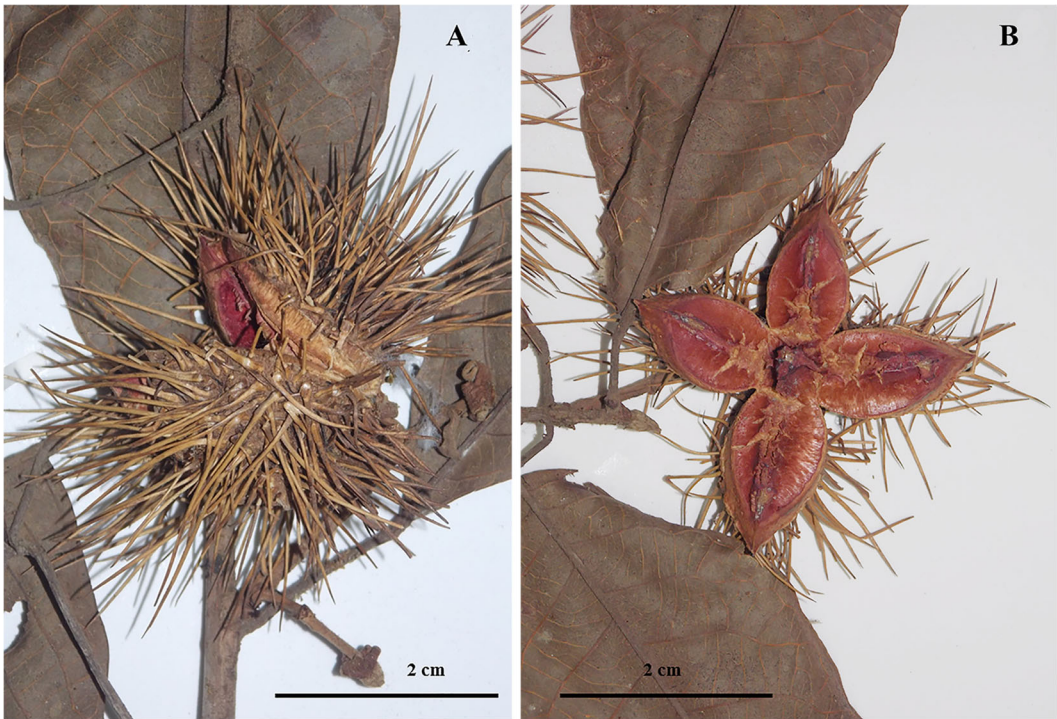


FIG. 2. *Sloanea jaramilloi*. A. Detail of mature fruit showing wall layers evident at the suture of the valve. B. Fruiting branch. (A, B from Jaramillo 21175, QCA).

with diameter at breast high (dbh)  $\geq 1$  cm, only two adult trees of this new species were recorded. Moreover, in a network of 82 one-hectare plots established in the Ecuadorian Amazon, which contained approximately 40,000 adult trees with dbh  $\geq 10$  cm, this species was not recorded (Pitman et al., 2001; Guevara et al., 2009, Pitman et al., 2014).

Due to the rarity, the small geographic range of this taxon and the scarce information about its ecology we suggest that this species be categorized as Near Threatened according to IUCN (2001) criteria.

**Additional specimens examined. ECUADOR.**

**ORELLANA:** Cantón Orellana, Parque Nacional Yasuní, Carretera y Oleoducto Maxus en construcción, Km 20, bosque primario, colinas de suelos rojos, 00°33'S, 76°30'W, 11–15 Aug 1993 [fl], *Aulestia* 282 (QCNE, MO); Cantón Orellana, Parque Nacional Yasuní, Km 34.7 de la vía Pompeya Sur-Iro, Pozo Capirón C, 00°40'S, 76°24'W, 19 Mar 2000 [fr], *Jaramillo* 21175 (QCA); Cantón Orellana: Carretera Pompeya Sur-Iro, Parque Nacional Yasuní, Km 38.4, transecto en dirección este-oeste, frente a la Estación Científica de monitoreo de fauna ONKONE-GARE, Ecuambiente S.A., 00°32'S, 76°22'W, 2 Nov 1994 [fr], *Jaramillo* 17536 (QCA); Cantón Orellana: Parque Nacional Yasuní, plano inundable, km 32.4, carretera

Pompeya-Iro, parcela 12, bosque primario, 0°36.008'S, 76°27.358'W, 6 Oct 1997, *Macía* et al. 1729 (QCA, MO).

*Sloanea jaramilloi* belongs to subg. *Sloanea* based on the 4–6 sepals that do not cover entirely the reproductive organs before anthesis. Smith (1954) posited that members of subg. *Sloanea* have anther sacs that dehisce longitudinally their entire length. This character is present in the new species and is the reason we to assign the plant to subg. *Sloanea*.

*Sloanea jaramilloi* differs from *S. geniculata*, the most similar species morphologically, by anastomosed secondary venation (which is an unusual type of second order venation in this group) versus eucamptodromous-semicaspedromous venation in *S. geniculata*, the absence of persistent canoe-shaped stipules clustered at the top of the branchlets in *S. jaramilloi* versus big lanceolate adaxially concave persistent stipules with margins entire in *S. geniculata*. Another notable difference is the large, stout, rigid sparsely distributed bristles on the fruits of *S. jaramilloi* vs. short, dense, easily detached spines in *S. geniculata*, the 6-angled ovary in *S. jaramilloi* vs. 3–5-angled in

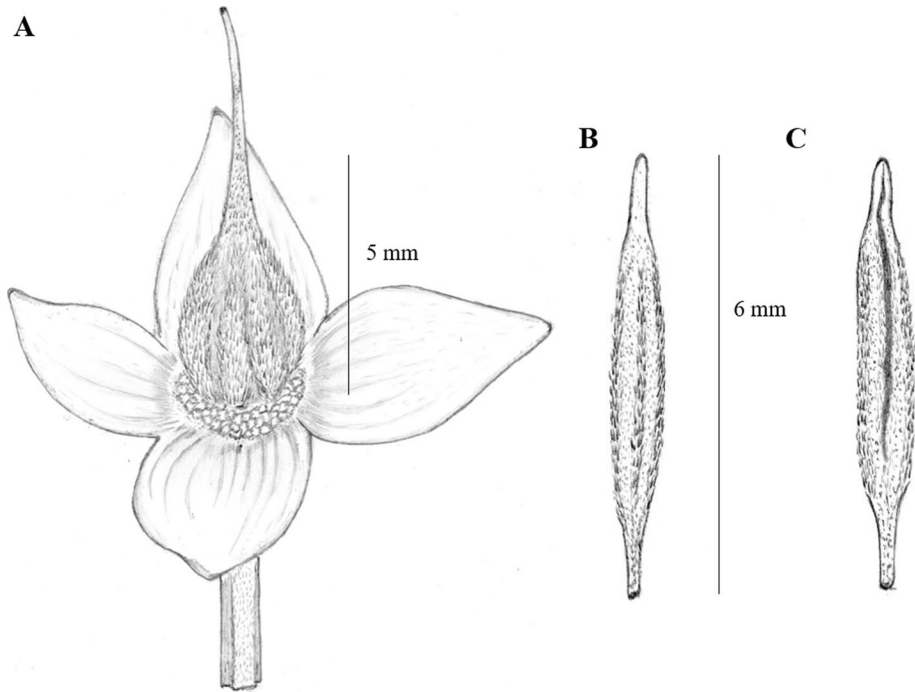


FIG. 3. *Sloanea jaramilloi*. A. Detail of ovary and sepals. B. Dorsal view of stamen. C. Ventral view of stamen (A–C from M. Aulestia & G. Greff 225 QCNE, MO).

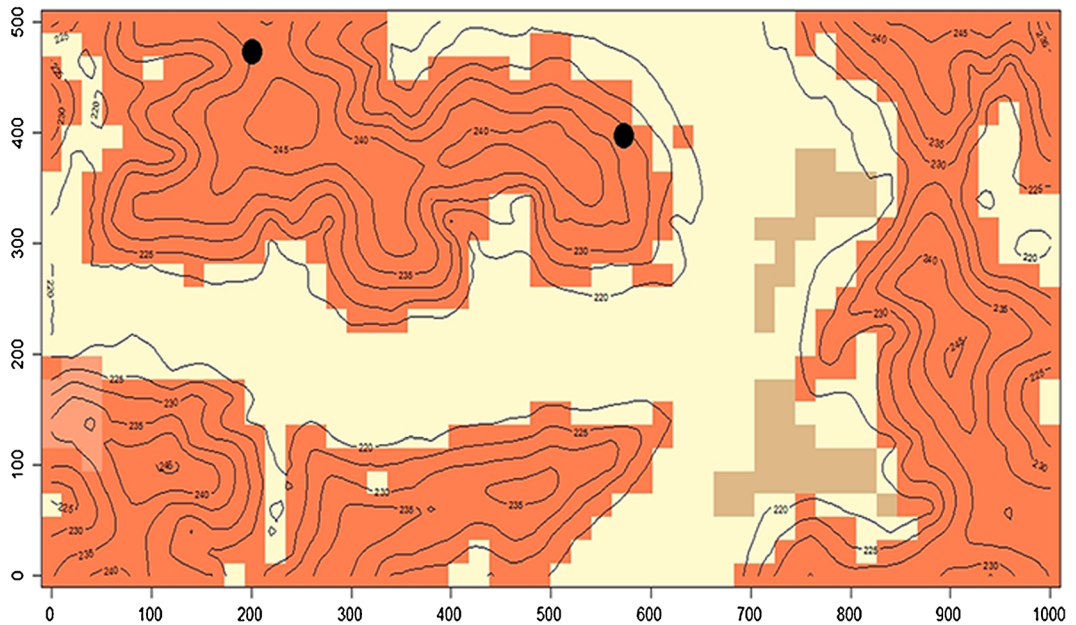


FIG. 4. Distribution of *Sloanea jaramilloi* in the CTFS 25 ha plot at Yasuni National Park, Ecuador. Black dots represent individuals with a dbh  $\geq 10$  cm recorded inside the plot. Map contours equal 5 meters. The two mature individuals are located in slopes and top of the hills of the 25 ha plot. The upper left corner of the plot is located at 00°40'51"S, 76°24'13"W.

*S. geniculata*. The new species can also be confounded with *S. gladyisiae*, which differs by having racemose inflorescence, 5–7 sepals that do not cover entirely the reproductive organs, the connective with a glabrate awn, and capsules opening by 4–6 reflexed valves, with short (8–15 mm long) semi-flexible spines densely covering the fruit.

### Acknowledgements

We are greatly indebted to Carmen Ulloa-Ulloa who provided useful comments on earlier versions of the manuscript. Consuelo Hernández provided the distribution map of the new species inside the CTFS 25 ha plot in Yasuni National Park. We also thank to the staff of Herbario Nacional del Ecuador (QCNE) and the Herbario de la Pontificia Universidad Católica del Ecuador (QCA) for their kind support. We specially thank Katya Romoleroux, Curator of Herbario QCA, who facilitated access to all the specimens deposited in this herbarium and used in this work. This work was supported by the Garden Club of America Grant in Tropical Botany.

### Literature cited

- Bass, S. M., M. Finner, C. N. Jenkins, H. Kreft, D. F. Cisneros-Heredia, S. McCracken, N. C. A. Pitman, P. H. English, K. Swing, G. Villa, A. Di Fiore, C. C. Voigt & T. H. Kunz. 2010. Global conservation significance of Ecuador's Yasuni National Park. *PLoS ONE* 5: 1–22.
- Boeira, A. S. P. 2010. O gênero *Sloanea* L. (Elaeocarpaceae) na Reserva Florestal Adolpho Ducke. Masters thesis, Instituto Nacional de Pesquisas da Amazonia, Manaus.
- Castañeda, M. D. A. 1981. Revisão taxonômica do gênero *Sloanea* Linnaeus (Elaeocarpaceae) na Amazônia Brasileira. Masters thesis, Fundação Universidade do Amazonas/ Instituto Nacional de Pesquisas da Amazonia, Manaus.
- Funk, W. C., M. Caminer & S. Ron. 2012. High levels of cryptic species diversity uncovered in Amazonian frogs. *Proceedings of the Royal Society B* 279: 1806–1814.
- Gentry, A. H. 1982. Phytogeographic patterns as evidence for a Chocó refuge. Pp. 112–136. *In*: G. T. Prance (ed.), Biological diversification in the tropics. Columbia University Press, New York.
- Guevara, J., N. C. A. Pitman, H. Mogollón, R. García-Villacorta, C. Cerón & W. Palacios. 2009. Floristic variation in Ecuadorian Amazonian terra firme tree communities. *Cinchonia* 9: 75–93.
- , D. Fernández-Fernández & W. Palacios. 2016. A new species of *Sloanea* (Elaeocarpaceae) subgenus *Quadrisepala* from Ecuadorian Amazonia. *Phytotaxa* 263: 147–153. DOI: <https://doi.org/10.11646/phytotaxa.263.2.7>
- IUCN (International Union for Conservation of Nature and Natural Resources). 2001. IUCN Red list categories and criteria, Version 3.1. IUCN, Gland, Switzerland and Cambridge, United Kingdom.
- Jaramillo, J. 2003. La taxonomía del género *Sloanea* L. (Elaeocarpaceae) en Ecuador. Ph.D. thesis. Pontificia Universidad Católica del Ecuador, Quito.
- Ministerio del Ambiente del Ecuador. 2013. Sistema de clasificación de los ecosistemas del Ecuador continental. Subsecretaría de Patrimonio Natural, Quito.
- Palacios-Duque, L. & J. L. Fernández-Alonso. 2005. Una nueva e interesante especie de *Sloanea* (Elaeocarpaceae) del Pacífico Colombiano. *Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales* 29(111): 179–182.
- & J. L. Fernández-Alonso. 2012. Dos nuevas especies colombianas de la sección *Brevispicae* del género *Sloanea* (Elaeocarpaceae). *Anales del Jardín Botánico de Madrid* 69(1): 91–95.
- Pitman, N. C. A., J. Terborgh, M. R. Silman, P. V. Nuñez, D. A. Neill, C. Cerón, W. A. Palacios & M. Aulestia. 2001. Dominance and distribution of tree species in upper Amazonian terra firme forests. *Ecology* 82: 2101–2117.
- , J. E. Guevara, M. Aulestia, C. Cerón, D. A. Neill, W. Palacios & G. Rivas. 2014. Distribution and abundance of tree species in swamp forest in Amazonian Ecuador. *Ecography* 37: 902–915.
- Sampaio, D. 2009. Revisão taxonômica das espécies neotropicais extra-amazônicas de *Sloanea* L. (Elaeocarpaceae) na América do Sul. Ph.D. thesis. Universidade Estadual de Campinas, Instituto de Biologia, Campinas/São Paulo.
- Smith, C. E. 1954. The New World species of *Sloanea* (Elaeocarpaceae). *Contributions of the Gray Herbarium of Harvard University* 175: 1–144.
- Smith, D. A. 2001. Elaeocarpaceae. Pp. 816–820. *In*: W. D. Stevens, C. Ulloa-Ulloa, A. Pool & O. M. Montiel (eds), *Flora de Nicaragua*, Vol. 1. Acanthaceae–Euphorbiaceae. Monographs in Systematic Botany from the Missouri Botanical Garden, no 85.
- ter Steege, H., N. C. A. Pitman, D. Sabatier, C. Baraloto, R. de Paiva Salomao et al. 2013. Hyperdominance in Amazonian tree flora. *Science* 342 (6156): 1243092–1–1243092-9.