



Attalea pycnocarpa versus *Attalea sagotii* (Arecaceae): the resurrection of a misunderstood Amazonian palm

LINA BOLIVAR^{1,5*}, ANDRÉS A. BARONA-COLMENARES^{2,3,6} & RODRIGO BERNAL^{4,7}

¹Universidad Nacional de Colombia – UNAL sede Amazonía, programa de Maestría en Estudios Amazónicos, Leticia, Amazonas, Colombia

²Instituto Amazónico de Investigaciones Científicas Sinchi, Leticia, Amazonas, Colombia

³Herbario Amazónico Colombiano Dairon Cárdenas López COAH, Instituto Amazónico de Investigaciones Científicas Sinchi, Bogotá, Colombia

⁴Reserva Natural Guadualito, Montenegro, Quindío, Colombia

⁵✉ lbolivarbetancur@gmail.com; <https://orcid.org/0009-0000-4025-1021>

⁶✉ abarona@sinchi.org.co; <https://orcid.org/0009-0004-4831-8840>

⁷✉ rgbernal@gmail.com; <https://orcid.org/0000-0002-9832-8498>

*Corresponding author: ✉ lbolivarbetancur@gmail.com

Abstract

Fieldwork in two localities of the Colombian Amazon reveals that the palm *Attalea pycnocarpa*, originally described from the Orinoco River in Venezuela, is a distinct species, and not a synonym of the acaulescent *A. sagotii*, as tentatively treated in the recent monograph of the genus. The species is redescribed, illustrated, and compared with *A. sagotii*.

Key words: *Attalea sagotii*, *Attalea pycnocarpa*, palms, amazon, Colombia

Introduction

Attalea pycnocarpa was described by Wessels Boer (1988: 299) based on a specimen collected by himself in 1967 near Puerto Ayacucho, Venezuela, along the Orinoco River. He described it as a 12-meter-tall palm, apparently scarce, that grew only on a small area of a periodically flooded mature forest. The specimen, now kept at U, only included a dry staminate inflorescence and old fruits.

In his revision of the genus *Attalea*, Henderson (2020) tentatively included *A. pycnocarpa* in synonymy under *Attalea sagotii* Trail ex Im Thurn (1884: 276) Wessels Boer (1965: 162), and he suspected that the type specimen of *A. pycnocarpa* could be a mixed collection, combining elements of *A. sagotii*—with which it shares similarities in rachillae and endocarp—and a tall-stemmed species.

In December 2004, one of us (RB) found a large *Attalea* palm along the Vaupés River, in the Colombian Amazon, but no complete specimens could be secured of this species, which appeared to be uncommon in the area. It was misidentified as *Attalea butyracea* and, based on this record, Galeano & Bernal (2010) mapped that species on the Vaupés River. In December 2021, RB and collaborators found the species again near Mitú, Vaupés, and collected a complete specimen, including flowers and fruits. A study of the specimens revealed that the palm was the same one described by Wessels Boer as *Attalea pycnocarpa*.

In 2022, the same species was found again, this time near Leticia, in the southernmost part of the Colombian Amazon, close to the Amazon River. Fresh staminate flowers and ripe fruits were collected and studied. Then, in 2024 another population was found near Villa Fátima, in Vaupés. All three populations shared common features: the scarcity of individuals (4–10 individuals at each population) and the extremely low number of adults.

Methods

Specimens of the tall-stemmed palms were compared with fresh collections of *A. sagotii*, which grows nearby at all mentioned localities. Morphological characters were contrasted both *in vivo*, in photographs and on herbarium specimens. Botanical terminology followed Henderson (2020) and Galeano & Bernal (2010).

Results

Comparison of vegetative and reproductive characters (Table 1) reveals that two clearly distinct taxa are involved, and that the tall-stemmed palm perfectly fits Wessels Boer's (1988) description of *Attalea pycnocarpa*. We therefore resurrect this previously misunderstood Amazonian palm, raising the number of recognized *Attalea* species to 31, relative to the most recent monographic treatment (Henderson 2020).

TABLE 1. Morphological comparison between *Attalea pycnocarpa* and *Attalea sagotii*.

| Plant part | Trait | <i>Attalea pycnocarpa</i> | <i>Attalea sagotii</i> |
|----------------------|--------------------------------|--|--------------------------------------|
| Habit | Stem | Caulescent | Acaulescent |
| | Total palm height | 6–18 m | 3.0–6.5 m |
| | Pinnæ undersurface | With waxy cover | Green, without waxy cover |
| Leaf | Veins on abaxial side of pinnæ | Parallel | Reticulate |
| | Leaf sheath indumentum at base | Conspicuous, red ferruginous on inner and outer side | Moderately ferruginous on outer side |
| | Inner side of leaf sheath | With red ferruginous fibrous cloth of fibers | Smooth, green, and without fibers |
| | Leaf sheath margin | With elongated (ca. 75 cm) flexible wooden-like wiry looking fibers | Smooth, sharp edges; without fibers |
| | Peduncular bract length | 88–200 cm | 100–116 cm |
| | Peduncle length | 60–80 cm | 20–70 cm |
| | Peduncular bract aperture | Widely open | Narrow and enclosing |
| | Umbo length | Ca. 26 cm | Ca. 10 cm |
| | Number of staminate rachillae | Ca. 230 | Ca. 90 |
| | | | |
| Inflorescence | Staminate rachillae length | 12–18 cm | 4–11.5 cm |
| | Staminate flower length | 17–18 mm | 5.2–9.8 mm |
| | Staminate petal shape | Spatulate | Fan-shaped |
| | Staminate petal apex | Rounded | Apiculate |
| | Staminate petal width | 0.3 mm | 0.5 mm |
| | Stamen number | 10–11 | 16–17 |
| | Size | 3.8–6.7 × 3.6–4.0 cm | 3–5.7 × 2–3.1 cm |
| | Shape | Ellipsoid to subglobose, with short apex | Ellipsoid, with elongated apex |
| | Mesocarp scent | Sweet and intense | Absent |
| | Mesocarp texture | Cottonish, thick and conspicuously oily | Fibrous, thin, and incipiently oily |
| Fruit | Endocarp texture | Soft and conspicuously hairy, covered by abundant soft adherent fibers | Harsh, covered by rigid fibers |
| | | | |
| | | | |
| Seedlings | Eophyll abaxial surface | Strongly folded | Slightly folded or almost smooth |
| | Eophyll margins | Sharply serrulate | Moderately serrulate |

Taxonomic treatment

Attalea pycnocarpa Wessels-Boer (1988: 299)

Type:—VENEZUELA. Amazonas: Puerto Ayacucho, 5°44'N 67°38'W, 28 July 1967, *J. Wessels Boer 1910* (holotype U n.v.).

Habit solitary. **Plants** 6–18 m tall. **Stems** 4–14 m long, 30 cm diam. **Leaves** 12–17; petioles virtually absent; sheaths with abundant, conspicuous, reddish-ferruginous indumentum on the abaxial and adaxial surfaces near base, the margins with abundant and conspicuous thick, soft, dark reddish fibers knit together forming a netlike cloth, and with long, cylindrical, flexible, woody fibers up to 75 cm long, 1.5 mm thick, along both margins at the base; rachis 5.6–10.0 m long, erect, rigid, and strongly rotated near the apex; pinnae 130–142 per side of rachis, regularly arranged along one plane, with parallel veins and waxy silverish indumentum on the abaxial side; middle pinnae 140–150 cm long, 5–7 cm wide, with a longitudinal band of ferruginous indumentum ca. 1 cm wide along the margin near apex. **Inflorescence** with peduncular bracts up to 200 cm long, 32.5 cm wide in its middle part, concave, with a conspicuous woody umbo to 26 cm long; staminate inflorescence with peduncle 80 cm long; rachillae ca. 230, 12–18 cm long, arranged all around rachis, covered with abundant silverish dusty indumentum; staminate flowers 19.2 mm long, in monads, slightly sunken in rachillae, absent from the adaxial surface of rachillae; staminate petals free, 1.1 cm long, spatulate, spoon-like, strongly curved on the apical half, coriaceous, smooth, with round margins and shortly acuminate apex; stamens 10–11, shorter than petals, anthers coiled reaching the roof of the curved petal, almost touching it; filament twisted. Pistillate inflorescence with rachis 57–72 cm long; rachillae 185, 17–18 mm long, with a zigzag form on the abaxial side, 9–21 pistillate flowers per rachilla. **Fruits** ca. 9 per rachilla, obovoid-subglobose, beaked, 3.8–6.7 cm long, 3.6–4.0 cm diam.; exocarp yellow ochre, with ferruginous indumentum and a darker brown basal aureola 2 cm wide; mesocarp thick, juicy and fleshy, oily and with a strong aromatic sweet odor, with abundant white yellowish fibers; endocarp elliptic with soft woolly cream-colored longitudinal abundant fibers, with a short beak at apex. Endocarps in cross-section with abundant fibers and strongly sclerified towards the center; seeds 1–2, solid in cross-section (Fig. 6)

Specimens examined: COLOMBIA. Amazonas: Leticia, km 18.8 Vía Tarapacá, Finca La Cascorba, near Pichuna stream, 87 m, 04°3.84'S, 70°0.27'W, 23 July 2022, *A. Barona et al. 6474* (COAH). Vaupés: Mitú, Vaupés river, Naná, 175 m, 01°00'N, 69°55'W, 24 November 2004, *R. Bernal et al. 3606* (COL); Vaupés: Mitú, Caño Cucura, km 14 on road to Monfort, 190 m, 6 December 2021, *S. Hoyos-Gómez et al. 4851* (HUA); Vaupés: Mitú, km 8 on road to Monfort, Ceima Cachivera community, 195 m, 01°13.57'N, 70°9.92'W, 12 April 2023, *A. Barona et al. 7086* (COAH); Vaupés: Villa Fátima, 178 m, 0°58.19'N, 69°56.40'W, 26 June 2024, *A. Barona et al. 8020* (COAH).



FIGURE 1. Distribution map of *Attalea pycnocarpa*. The star indicates the type locality; the circles show the new localities discussed here. Map was created using the Free and Open Source QGIS.

Distribution and habitat:—Only known from four populations in northwestern Amazonia, ranging from western Venezuela (Amazonas) to southern Colombia (Vaupés, Amazonas), at elevations of 80–195 m (Fig. 1). It is most likely also present in northwestern Brazil, as Colombian localities lie just 10–20 km from the border. The species is more common in low, flat areas that flood during the rainy season, but it also occurs in higher *terra firme* forests.



FIGURE 2. Difference in habit. A, C. *Attalea pycnocarpa*. B. Miguel Arcángel and *Attalea sagotii*. All photos by L. Bolívar, except C by A. Barona.

Common names:—Vaupés: palma ramo (Spanish), *papú*, *mia papú*, *ñamá papú* (Wanano); Amazonas: chapaja de altura, shebón (Spanish); both ‘chapaja’ and ‘shebón’ are widespread names in the region of Leticia for species of *Attalea*.



FIGURE 3. Distinctive leaf traits in *Attalea pycnocarpa*. A, B. Waxy indumentum on abaxial side of pinnae. C–E. Red-ferruginous fibrous cloth-like knit fibers and flexible wooden-like wiry-looking fibers on leaf sheath. F, G. Intense red ferruginous indumentum on abaxial side of leaf sheath. All Photos by L. Bolívar, except C by A. Barona.

Reported uses:—In Vaupés, the leaves are used for thatching.

Conservation status:—The conservation status of this species, although not formally evaluated, appears to be highly precarious based on our field observations. The areas where it has been found are deforested zones, pastures, and fragments of secondary forest whose future existence is uncertain for being adjacent to pastures and expanding farms. Until now the species has not been seen in mature, well-preserved forests.



FIGURE 4. A. Lina Bolívar holding *Attalea pycnocarpa* peduncular bract, notice umbo length. B. Miguel Arcángel and *Attalea sagotii* peduncular bract, notice umbo length. C. *A. pycnocarpa*, rachillae. D. *A. sagotii* rachillae. E. *A. pycnocarpa*, upper surface of peduncular bract. F. *A. sagotii*, upper surface of peduncular bract. G. *A. pycnocarpa* peduncular bract aperture. H. *A. sagotii*, peduncular bract aperture. All photos by L. Bolívar except G by A. Barona.

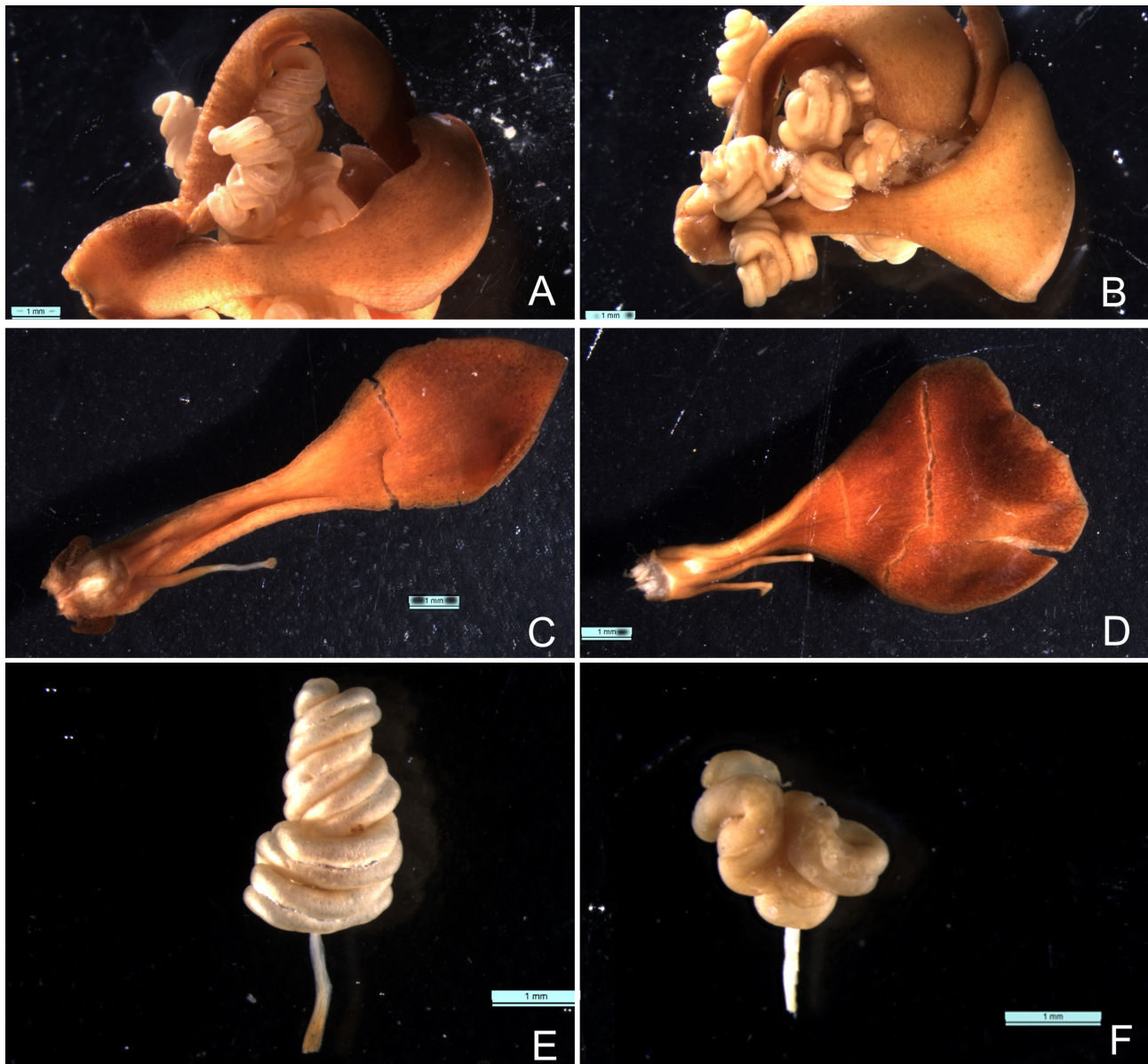


FIGURE 5. A. *Attalea pycnocarpa* staminate flower. B. *Attalea sagotii* staminate. C. *A. pycnocarpa* staminate flower petals. D. *A. sagotii* staminate flower petal. E. *Attalea pycnocarpa* stamen. F. *A. sagotii* stamen. Measurement legend corresponds to 1 mm. All photos by L. Bolívar and A. Barona.

Discussion

Attalea pycnocarpa and *A. sagotii* share a general scheme of traits that make them look apparently similar, especially when *A. pycnocarpa* is in juvenile phase and *A. sagotii* is not fertile. In the locality of Vaupés, for example, both species are known as ‘palma ramo’, even though people recognize them as different. In herbarium specimens, these species can be difficult to distinguish because they apparently share similar characteristics in the collected parts—particularly the ferruginous longitudinal band on the abaxial side of pinnae margin towards the apex, and the absence of flowers on the adaxial side of the male rachillae—although this trait is variable in *A. sagotii*. Flowers apparently look similar, but when taking a closer look, there are clear differences in petals and stamens, which are discussed below.

The most notable difference between the two species is the habit, with *A. pycnocarpa* being clearly caulescent and *A. sagotii* acaulescent (Fig. 2); but also *A. pycnocarpa* has unique traits, such as a waxy indumentum on the abaxial side of the pinnae, giving it a silvery appearance from a distance; parallel venation on abaxial side of pinnae (vs. reticulate in *A. sagotii*); a leaf sheath with a ferruginous fibrous cloth of knit fibers; abundant, intensely red-ferruginous

indumentum on the adaxial and abaxial side (vs. moderate to less ferruginous indumentum on the abaxial side in *A. sagotii*); and the presence of elongated (ca. 75 cm), flexible, wooden-like wiry fibers on the margins (Fig. 3). Rachillae in *A. pycnocarpa* are almost twice the length of those in *A. sagotii* (Fig. 4). The peduncular bract in *A. pycnocarpa* has a long umbo (ca. 26 cm) at its apex, and its aperture is wider than in *A. sagotii*, where it is narrower and enclosing the inflorescence or infructescence to a greater extent (Fig. 4).

Petals are notably more oblong and narrower at the middle in *A. pycnocarpa* (0.3 mm wide) giving them a spatulate shape, whereas in *A. sagotii* they are more obtuse (0.5 mm wide), giving it a fan-like shape (Fig. 5). The stamens in *A. pycnocarpa* are fewer in number and have an elongated, ice-cream cone-like shape, while in *A. sagotii* they are more numerous, shorter, broader and flattened at the top (Fig. 5). *Attalea pycnocarpa* also has larger fruits with a notable intense sweet scent in its thick, fleshy, oily mesocarp, whereas *A. sagotii* bears smaller fruits lacking these characteristics (Fig. 6).



FIGURE 6. A, C. *Attalea pycnocarpa* fruit. B, D. *Attalea sagotii* fruits. E, F. *A. pycnocarpa* endocarp. All photos by L. Bolívar except for D by A. Barona.

In general, *A. pycnocarpa* is a tall and slender palm with arched, erect, yellowish-green leaves that appear silvery due to a waxy coating, standing out as it reaches the forest canopy. It bears massive (ca. 2 m long) hanging infructescences (Fig. 7), with a widely open peduncular bract featuring a conspicuously long umbo. In contrast, *A. sagotii* is a large, acaulescent, understory palm up to ca. 5 m tall, with dark green pinnae lacking wax on the abaxial surface, and no traces of ferruginous indumentum or knit-like or tubular fibers on the petiole and sheath; its erect infructescences (Fig. 7) are enclosed by a narrowly open, case-like bract with a short, woody umbo. Table 1 summarizes the distinguishing features of both species.



FIGURE 7. A, C. *Attalea pycnocarpa* infructescence, in C Lewis Pinedo holding infructescence. B, D. *Attalea sagotii* infructescence. All photos by L. Bolívar except B by A. Barona.

Another difference seems to be the habitat preference: *A. pycnocarpa* thrives in flat or low-lying areas that usually flood during the rainy season, while *A. sagotii* is more commonly associated with *terra firme* forest, often in white-sand areas.

Based on the unusual distribution and the scarcity of *A. pycnocarpa* and considering how common hybridization is in the genus (Henderson 2020), one could think that it represents a hybrid of *A. sagotii* with a tall-stemmed species of *Attalea*. However, the only caulescent species of the genus that occurs at the three known localities of *A. pycnocarpa* is *Attalea maripa* (Aublet) Martius (1844: 123), but there are no characters in the former that might suggest any affinity with the latter. The other species one could also consider in a hybridization scenario would be *Attalea butyracea* (Mutis ex Linnaeus f.) Wessels Boer (1988: 312), a tall palm that is widely distributed in South America, including sparse localities in Amazonia, but this species was not seen at the Amazonas and Vaupés localities where *A. pycnocarpa* was collected.

Because of its tall stem, *Attalea pycnocarpa* would key out together with *Attalea cohune* Martius (1844: 121) and *Attalea speciosa* Martius (1826: 138) in dilemma number 8 of Henderson's (2020) key to species of *Attalea*. It differs from *A. cohune*, which grows in Central America and in the Magdalena River valley in Colombia, in its staminate flowers arranged in monads (vs. in dyads), absent from the adaxial surface of rachillae (vs. spirally arranged all around rachillae), and the somewhat smaller fruits (3.8–6.7 cm long vs. 5.2–8.3 cm long). It differs from *A. speciosa* in the long wiry fibers on the margins of the leaf sheath (vs. fibers absent), its lower number of stamens (10–11 vs. 21–36) and the smaller fruits (3.8–6.7 cm vs. 7.5–13 cm). *Attalea speciosa* occurs in central and eastern Amazonia, its closest locality being 820 km away from the nearest known record of *A. pycnocarpa*.

Acknowledgments

We thank Alejandro Campuzano, Félix Fierro, Blanca Martínez and Saúl E. Hoyos-Gómez for their support during field work in Mitú, Vaupés; Benjamín Rodríguez, for his support in fieldwork in Villa Fátima, Vaupés; and local palm researchers in Leticia, Miguel Ángel Arcangel, for his support during field work and personal initiative propagating this species in his maloca forest, and Lewis Pinedo, for his support during field work. Also in Leticia we dearly thank for their kindness and hospitality Melquisedec Marin López and his daughter Vivian Patricia Marin Elizalde, owners of 'La Cascorba' farm where the largest known population of *Attalea pycnocarpa* is found; as well as Educardo and Rosita, who kindly allowed us to examine an individual of *Attalea pycnocarpa* in their farm. Finally, a loving and special thanks to Luz Bolívar, mother of the first author, with whom the Leticia population was found, and whose presence, perseverance and enthusiasm during field work and in tracking the species in Leticia was invaluable; to her, the first author dedicates this article.

Author contributions

Conceptualization: RB, LB and AB; Methodology: RB, LB and AB; Field work in Vaupés: first and second time, RB, and third and fourth time, AB; Field work in Leticia: LB and AB; Formal analysis and investigation: LB, RB and AB; Writing—original draft preparation: LB; Writing—review and editing: RB, AB.

References

- Galeano, G. & Bernal, R. (2010) *Palmas de Colombia. Guía de Campo*. Editorial Universidad Nacional de Colombia, Bogotá, 688 pp.
- Henderson, A. (2020) A revision of *Attalea* (Arecaceae, Arecoideae, Cocoseae, Attaleinae). *Phytotaxa* 444: 1–76.
<https://doi.org/10.11646/phytotaxa.444.1.1>
- Im Thurn, E. (1884) Memoranda on the palms of British Guiana. *Timehri* 3: 219–276.
- Martius, C. (1826) *Historia Naturalis Palmarum. Part 4*. Weigel, Leipzig, Germany, 52 pp.
- Martius, C. (1844) Palmetum Orbignyanum. In: d'Orbigny, A. (Ed.) *Voyage dans l'Amérique méridionale* 7 (3): *Palmiers*. P. Bertrand, Paris, pp. 140.
- Wessels Boer, J. (1965) *Flora of Suriname. Palmae*. E. J. Brill, Leiden, 172 pp.
- Wessels Boer, J. (1988) Palmas indígenas de Venezuela. *Pittieria* 17: 1–332.