Attalea blepharopus Mart. (Arecaceae) from Bolivia Revisited since Martius

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Attalea blepharopus Mart. (Arecaceae) from Bolivia revisited since Martius

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Abstract

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Populations in Bolivia of an *Attalea* Kunth species *(Arecaceae)* with regularly spaced pinnae were historically assigned to *Attalea butyracea* (Mutis) Wess. Boer, which also occurs in Colombia, western Venezuela and northern Ecuador. During a recent fieldtrip to the Chapare province in Cochabamba department (central Bolivia), we visited the Yuracaré people's territory that Alcide d'Orbigny mentioned as harboring a large and distinct palm, *Attalea blepharopus* Mart. Based on its morphology, we recognize the species as distinct from *Attalea butyracea* and designate a lectotype based on the original illustrations and an epitype based on a recent complete collection. The species is described in details and illustrated with photographs for the first time.

Keywords

ARECACEAE – *Attalea* – Bolivia – Typification

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Introduction

The availability of complete and well-preserved herbarium samples collected during the past centuries is usually rare, especially when it comes to tropical floras and countries that, at the time, usually lacked appropriate herbaria to safeguard those vouchers. This is most common in the case of palm specimens, not only because they require a greater dedication of time to collect and document the sample, but also because in prior times field trips logistics were more difficult. The expeditions carried out by the French naturalist Alcide d'Orbigny (1802-1857) in Bolivia between 1830 and 1833 (Martius, 1847) are a clear example. From the material collected on these expeditions, Martius described several new palm species and the type collections were deposited in Berlin (B) and Paris (P) herbaria. The Berlin herbarium was badly damaged during the World War II (Glassman, 1999).

Burret (1929) reviewed the material at B and accepted the name under the new combination: *Scheelea blepharopus* (Mart.) Burret. Balslev & Moraes (1989) listed it as *S. blepharopus* and mentioned that Burret (1929) described this species based on the illustration of d'Orbigny (Fig. 1) published by Martius (1847). Due to the lack of additional botanical collections, Glassman (1972) considered the name as doubtful. Later it was considered as synonym of *Attalea butyracea* (Mutis) Wess. Boer by Henderson (1995) and Henderson et al. (1995) as well as many other names such as *A. macrolepis* (Burret) Wess. Boer from Venezuela (Stauffer & Fariñas, 2006), but *A. blepharopus* Mart. remained poorly studied due to the lack of original specimens.

The collection of *A. blepharopus* in P consists only of a fragment of the original linedrawing by d'Orbigny during his expeditions in Cochabamba, in the lowlands of central Bolivia. Because modern botanical collections of this species are scarce, it was mostly referred to be the "Palla" palm. This common and generic name was mentioned to have a wide geographical extension in Bolivia, cited as *A. butyracea* (Moraes, 2004). But *A. butyracea* s.s. occurs only in Colombia, Venezuela and north-eastern Ecuador.

The fragmented knowledge about *A. blepharopus* and also the fact that the name is considered to be "provisionally accepted" by Govaerts et al. (2015), challenged us to seek for more field data on this species and its type locality in order to

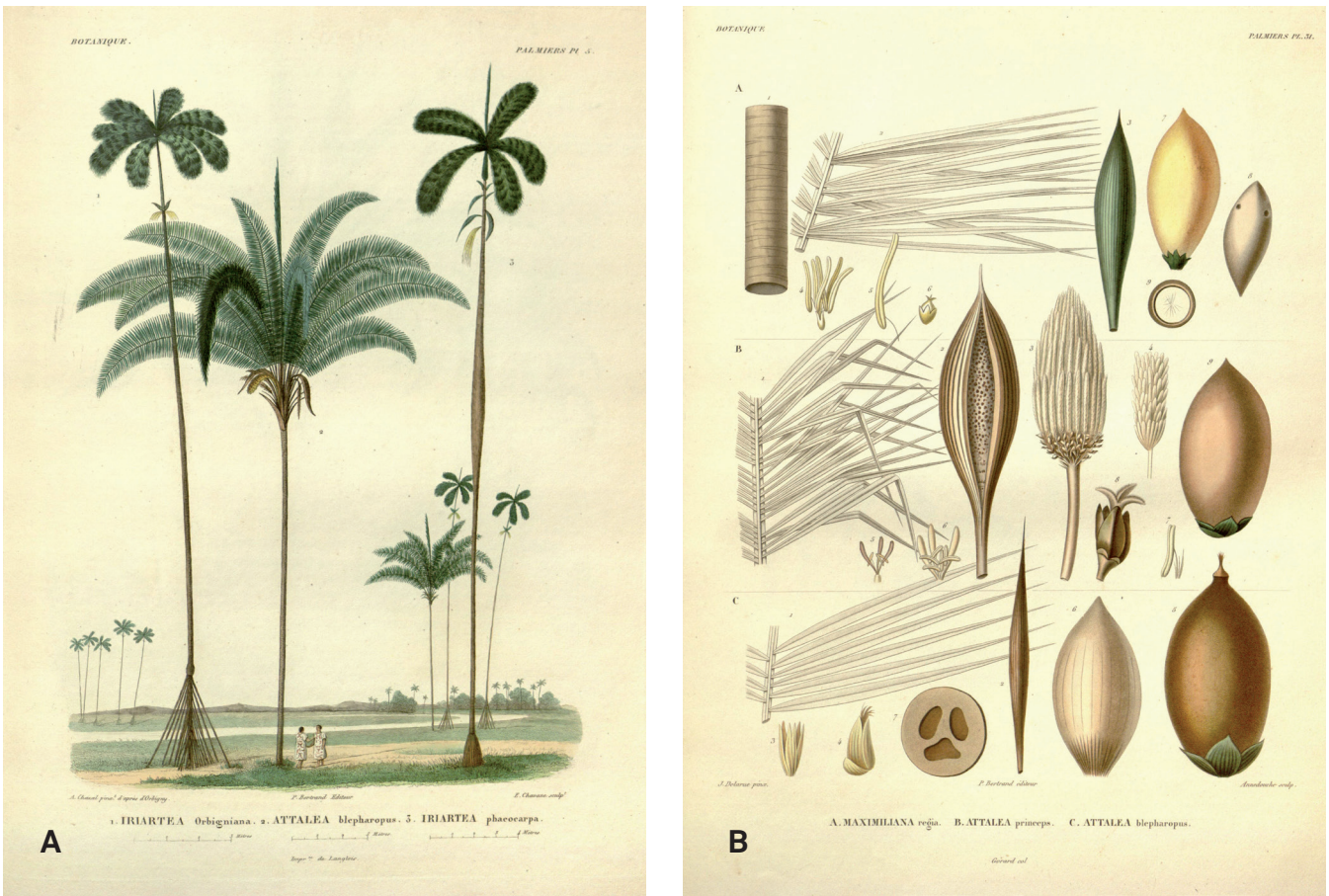

Fig. 1. – Lectotype of *Attalea blepharopus* Mart. **A.** General habit in the center (Martius 1847: tab. V, fig. 2). **B.** Details of both sterile and fertile material (Martius 1847: tab. XXXIC).

contribute to the taxonomy of the genus *Attalea* in Bolivia. In the context of the "Attalea project" funded by the "French Programme pour un Partenariat Régional (PPR - AMAZ)", we gained field experience during our explorations in the Western Amazon including a better understanding of the morphological identity of *A. butyracea*. Thus, the only remaining mystery was the identity of *A. blepharopus.* Based on more than 400 descriptors in the context of this project, the information collected in the field has enriched both, knowledge and accurate recognition of this poorly known species. Those data allows the new detailed description presented here and discussing the unique morphology of *A. blepharopus* among the genus. We also designate a lectotype for this species on the original drawing in the absence of any available original material and an epitype based on a recent collection by the authors.

Attalea blepharopus Mart. in Orb., Voy. Amér. Mér. 7(3): 116. 1847.

≡ *Scheelea blepharopus* (Mart.) Burret in Notizbl. Bot. Gart. Berlin-Dahlem 10: 541. 1829.

Lectotypus (designated here): **Bolivia:** "Yuracares" (Martius, 1847: tab. V, fig. 2; tab. XXXIC); isolecto-: P [P01797296]!) (Fig. 1).

Epitypus (designated here): **Bolivia. Cochabamba:** Prov. Villa Tunari, Isinota, 16°44'07"S 65°38'07"W; 203 m, 10.IV.2015, *Moraes & Pintaud 2518* (LPB!; isoepi-: BOLV!, G!, NY!, P!) (Fig. 2).

Solitary, monoecious, arborescent, medium-sized *palm*, 12-19 m high, 50-58 cm diameter, *stem* 6-8 m, covered by persistent and woody leaf bases on obliquely-8 ranked with thick fibrous margins that form a net of fibers 1-5 mm wide. *Leaves* sessile leaves 18-21 ascending and arching distally, 7-8 m long, apical leaves upright, green lustrous adaxially, glaucous abaxially; sheath ca. 140 cm long × 40 cm wide at base; petiole 50 cm long, *rachis* 6.6-7.6 m long, slightly carinate adaxially, rounded abaxially, initially with a dense appressed grey-white indumentum, aging thin and glaucous white adaxially, thin, appressed, dark reddish-brown abaxially; prophyll not seen. *Pinnae* 185-195 per side, rather stiff, regularly arranged and inserted on one plane, lanceolate to subulate, lower segments hanging, upper ones held distichously on distal part of rachis, 120-130 cm long and 8-10 cm wide, very thin waxy-glaucous indumentum on stomata lines, elongated, basal pulvinulus prominent, swollen, shallowly channeled, light green, apex not bifid, basal pinnae: 2.5-3 cm × 135 cm, medial pinnae: 8.2-9.4 cm × 124-126 cm and apical pinnae: 1-1.5 cm × 43 cm; proximal five pinnae densely grouped, subsequent segments not grouped and progressively more distant (1.5 to 8 cm from each other). *Inflorescences* (2 staminate and one pistillate, 1 infructescence and 15-20 old ones on same individual) erect; staminate inflorescence with *peduncular bract* fusiform in bud stage, boat-shaped, widely open at anthesis, fibrous, plicate, deeply sulcate, dark reddish brown with thin, appressed, finely lepidote indumentum, ca. 2 m long; peduncle subulate, dorso-ventrally compressed, erect, slightly recurved, glabrous, pale yellow at anthesis, ca. 100 cm long; rachis 55-62 cm long, terete, pale yellow at anthesis, glabrous; *rachillae* 180-193, ascending-spreading, stiff and spirally arranged on the rachis, swollen base, finely covered with a silvery-white indumentum made of stellate-hairy scales, flower pits spirally arranged, basal rachillae 18-25.3 cm long with 322-334 flowers, medial rachillae 22.5-24.3 cm long with 250-262 flowers and terminal rachillae 12-14 cm long with 248-259 flowers; *staminate flowers* inserted solitary, total length of 14-17 mm, sessile, cream and strongly scented at anthesis; sepals 3 connate basally, triangular, membranous, glabrous, 4-6 mm long; petals (3) free, slightly divergent and flexuose, firm fleshy, 14-16 mm long, caducous immediately after anthesis; *stamens* (6), filament length 1-1.5 mm, deltate, basifixed, connective narrow: thecae contiguous, yellow, anthers 2-3 mm long, linear sagittate, apex obtuse, base auriculate, dehiscence latrorse, pistillode length ca. 0.5 mm, trifid; pistillate inflorescence with peduncular bract erect, slightly recurved, peduncle ca. 50 cm, dorso-ventrally compressed, pale yellow, appressed, lepidote reddish-brown indumentum, 25-30 peduncular bracteoles, 2-9 cm long, triangular-winged, apiculate to mucronate, central part glabrous, lateral wings covered with an appressed lepidote, reddish-brown indumentum; rachis 88-92 cm long, 5-7 cm wide, elliptic in cross section, dorso-ventrally compressed, pale yellow, sparse reddish-brown, lepidote, appressed indumentum; terminal rachilla 15-18 cm long, basal diameter 2.6-3.1 cm; length of basal pistillate part 8-9 cm with 24-27 *pistillate flowers*, length of apical staminate part 7-9 cm with 20-50 staminate flowers; pistillate flowers spirally arranged, rachillae ascending, 160-175, dorso-ventrally compressed, zigzag in form, pale yellow, glabrous, subtending bract 4-8 cm long, triangular-winged, acuminate, membranaceous, phylotaxys alternate, pistillate flower receptacle rounded, superficial, triangular-acuminate; length of pistillate portion of basal rachillae 8-11 cm with 7-9 pistillate flowers, median rachillae 13-17 cm with 9-16 flowers and apical rachillae 7-13 cm with 4-8 flowers; pistillate flowers with pedicel of 1.5-2 mm, pale yellow turning brown, ovoid, 2.4-3 cm long, sepals free, concave-deltate, cartilaginous, pale yellow, turning brown, glabrous adaxially, glabrescent abaxially, initially with a whitish-brown lepidote appressed indumentum, triangular-acute, glabrous, 2.7-2.8 cm long; petals concave-deltate, cartilaginous, pale yellow, turning brown, glabrous adaxially, glabrescent abaxially, initially with a thin, felt-like, white, lepidote indumentum, triangular-acute, glabrous, 2-4 cm long; staminodial ring free from corolla, cupular, cartilaginous, whitish-brown, lepidote, appressed indumentum, 9 mm heigth, 16 mm external diameter and 1.5-2 mm thickness;

gynoecium pyriform, 3-carpellate, *ovary* 11 mm high, 16 mm width, covered with a brown floccose lepidote indumentum, stylar column of 7 mm, trifid, stigma angular, subulate, pale yellow, finely covered with a silvery-white indumentum made of stellate-hairy scales, apex pointed; inserted alternate-spiral; floral bracteole deltate, cartilaginous, brown, glossy dark brown, cartilaginous, margin ciliate; basal rachillae total length of 0-3 cm, 0-12 cm long of proximal sterile part, 6 mm long of distal sterile part, with 20-30 staminate flowers, 8-9 cm total length of median rachillae with 25-35 flowers and 7 mm of total length for apical rachillae without flowers; staminate flowers not seen; staminate flowers in triads, 10 mm long, pedicel 1 mm. Infructescence with fruits densely packed, remaining perianth cupular, brown, 1.8-2.6 × 4.2-44 cm, greyish-brown, lepidote, appressed, partially caducous external indumentum, staminodial ring adnation free, plate-like, irregularly split, looking densely ciliate for the emergence of abaxial indumentum, light brown turning dark brown, hard, cartilaginous, glabrous adaxially, covered with a dense felt-like brown indumentum abaxially, 7-8 mm high; sepal concave-deltate, brown, cartilaginous, glabrous adaxially, with an appressed brown-lepidote indumentum abaxially, 2.6 cm length; petals broadly triangular acute, same color, texture and indumentum as sepals, 2.4 cm length. Barrel-shaped *fruits*, 6.4-7.5 × 4.8-5.1 cm, beak narrowly conical with a broad flat base, brown, silvery-grey lepidote appressed indumentum, ca. 9 mm long, trifid; exocarp covered with a dense brown lepidote indumentum, orange-brown to light brown, thickness 4 mm, fibers rounded in cross section, solitary, dispersed, longitudinally arranged, anastomosing, orange-brown; mesocarp 4-5 mm thick, orange, fleshy and fibrous, fibers filiform in middle mesocarp, flattened, bristle in inner mesocarp, fibers thickness very thin in middle mesocarp, 0.2-0.3 mm wide in inner mesocarp, arrangement of fibers very abundant in middle mesocarp, numerous, longitudinal in inner mesocarp, orange in middle mesocarp, dark glossy brown in inner mesocarp, inner mesocarp fibers adnate to the endocarp; endocarp narrowly ellipsoid; seeds 1-2, elliptical, 3.5-4 cm long. *Seedling* slender cylindrical, radicle axial, 2.6 mm diameter; four 1st adventitious roots, 2nd adventitious roots lateral forming a cross.

Vernacular names. – "Corokke" (Yuracaré), "Palla" (colonos).

Uses. – The Palla palm is utilized mostly for roofing (leaves) and oil (extracted from seeds). It has a number of minor uses. The mesocarp is edible but very fibrous. The Yuracaré use this species more frequently than colonial residents and other recent settlers. It was reported by the 80 % of Yuracaré people as the most used tree palm species (Montoya & Moraes, 2014).

Distribution and ecology. – *Attalea blepharopus* is found in alluvial rainforest and primary floodplain forest of Cochabamba and La Paz departments of Bolivia. It grows in forests where other distinctive palms are also found: *Astrocaryum gratum* F. Kahn & B. Millán (dominant), *Attalea princeps* Mart., *Iriartea deltoidea* Ruiz & Pav., *Oenocarpus bataua* Mart., *Socratea exorrhiza* (Mart.) H. Wendl., as well as with other species such as *Inga* sp. *(Fabaceae), Theobroma* sp. *(Malvaceae), Virola* sp. *(Myristicaceae),* and *Triplaris* sp. *(Polygonaceae)*. Mature fruits and flowers at anthesis were observed simultaneously present in April. The species growth in rocky alluvium deposits of the Rio Chapare and tributaries in the upper Amazon drainage. Populations are well represented in the region of western Amazonia in Bolivia. The presence of *Attalea blepharopus* was somehow ignored because it has been undercollected in previous field surveys. Nevertheless its prescence from eastern La Paz department was confirmed by photographic records and from Cochabamba by a previous collections in fruits *(Balslev 8235)*. The conservation status of this species is currently under evaluation and will be published in the upcoming "Red Book of Threatened Plants Bolivia - Volume II: Lowlands".

Notes. – *Attalea blepharopus* has remained a poorly known species since its description by Martius (1847). The original d'Orbigny type in Berlin was destroyed and a throughout search in various herbaria led to the conclusion that the only available material are the drawing cited in the protologue. Therefore we designate these as lectotype including a duplicated at P. A recent collection made by the authors with complete material of leaves, pistillate and staminate flowers, fruits and seedlings is here designated as epitype *(Moraes & Pintaud 2518)*. As we are in the process of better understanding the species diversity within the genus *Attalea* Kunth and have listed approximately 700 descriptors, we consider necessary to clearly fix the morphology of this species by designating an epitype that comes along with several observations and pictures in the field (Fig. 2).

Attalea species with regularly-arranged pinnae have been poorly studied in southwestern Amazonia, although Glassman (1999) recognized a high variation among species and mentioned a complex of species. In the lowlands of Bolivia the lack of study is not an exception. When assigning the name *Scheelea blepharopus,* Burret (1929) emphasized mostly the male inflorescence regardless of the original description of Martius and he did not take into account the combination of the features that were the basis for the species epithet "blepharopus".

Field observations allowed to note that the lower margins of the leaf rachis have several thick and long fibers on both sides giving the margins a ciliate aspect: "petiolo margine fibris longis strictis ciliato" (Fig. 2B), as stated by Martius (1847) in

Fig. 2. – *Attalea blepharopus* Mart. **A.** Growth habit; **B.** Infructescence at ripe stage; **C.** Fibrous margins of leaf base; **D.** Cross section of fruit showing two developing seeds; **E.** Staminodial ring adnate to corolla (removed from a fruit) appears densely ciliate in the margins. [Photos: M. Moraes]

the epithet "blepharopus". It was also noted the corolla staminodial ring in the fruit: "staminodial ring adnation free, platelike, irregularly split, looking densely ciliate for the emergence of abaxial indumentum". Important morphological characters that allow to separate *A. blepharopus* from related species, i.e. *Attalea peruviana* Zona, *A. bassleriana* (Burret) Zona, *A. moorei* (Glassman) Zona, that are typical of the NW Amazon, and mostly concentrated in northern Bolivia are: sessile leaves (petiole absent), glaucous leaf abaxially, orange and fleshy mesocarp, 1-6 pistillate flowers per rachillae, thick rachillae of staminate inflorescence with spirally inserted flowers, endocarp with scattered fibers, and peduncular bract relatively thin and shallowly sulcate.

Additional material examined. – **Bolivia. Cochabamba:** 1.5 km NE of San Benito village, next to the Isiboro river, 120 km NE of Cochabamba, 127 m, 16°31'53"S, 65°29'32"W, 23.III.2010, *Balslev 8235* (AAU, USZ).

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