A New Species of *Attalea* from the Bolivian Lowlands

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1. Palm stands in cattle pastures dominated by *Attalea princeps*, the *motacú* palm, on the alluvial plain of Bolivia.

Attalea pacensis **from the lowlands of Bolivia is described as new.**

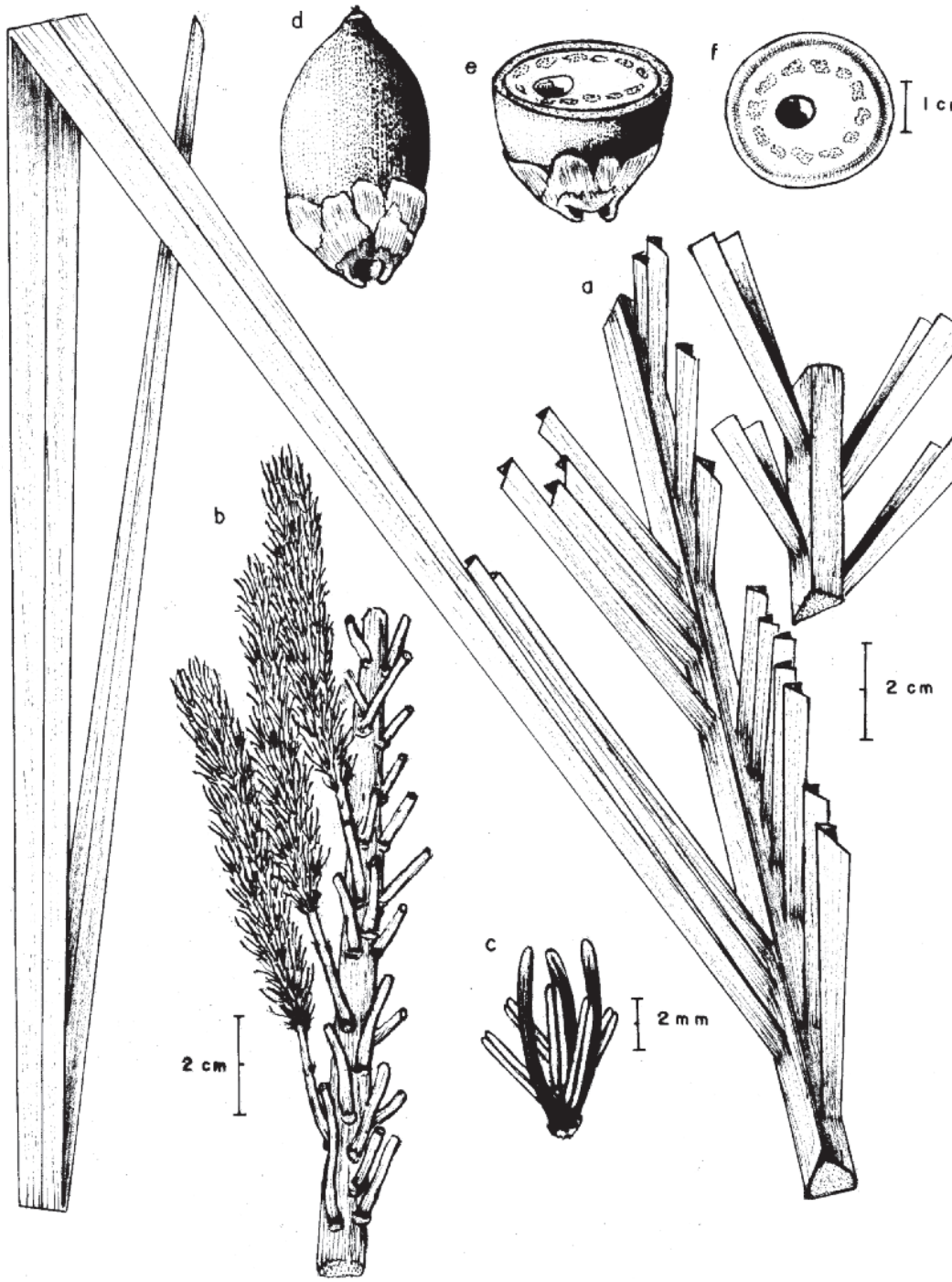
According to Pintaud (2008), the taxonomy of the genus *Attalea* has been poorly understood due to the conflicting generic and species concepts published in the last 20 years. Among the reasons that have affected and biased our taxonomic understanding of the genus are: few scientific collections (considering that these are species of large size),

2 (left). Palms whose identity was thought to be *Attalea princeps* and here are described as new, *A. pacensis*. 3 (right). *A. pacensis* with typical erect leaves and a cylindrical trunk. Both show habit of *A. pacensis.*

loss of many type specimens, and difficulties in interpreting hybrids (Pintaud 2008). Being a large palm, this new taxon was not formerly separated from the common *Attalea princeps,* because they share similar habitats. However, it is much less frequent in the northwestern plains of Bolivia. This new species occurs mixed with *A. princeps* in cattle pastures, where both are left to shade the cattle in a landscape free of other trees (Fig. 1).

In Bolivia, the *motacú* palm (*Attalea princeps*, which was formerly mistakenly identified as *A. phalerata*) is a common species, widely known to local people and occupying an important geographical area in the country. It is represented in more than five vegetation types of Bolivia, e.g. island forests in savannas, humid well-drained forests of both mountains and lowlands, riparian and flooded forests, and secondary forests (Moraes 2007, Moraes et al. 2014). Locally, people use the leaves temporarily to thatch their roofs (which last 3–6 years), and they also extract the edible fruit oil for hair cosmetics and medicinal purposes (Moraes et al. 1996). The dense groves of *A. princeps* might be considered a consequence of the reproductive success of this species and its heliophilous adaptation that allows it to colonize aggressively sites that are not used by other tree species. Such sites include the edges of forest islands or successional stages of riparian forests in the alluvial region of Bolivia. With livestock, this species is very successful in ensuring its dispersal and seedling establishment with a high density. Even though 81% of the endocarps are destroyed by the beetle *Pachymerus palmarum,* its impact depends on the number of seeds per fruit as part of the population control dynamics of this species (Rios & Loayza 2000, Rios & Pacheco 2006). We had thought that these palm stands in livestock pastures were monotypic and shaped by old adult individuals of *A. princeps*. Even though seedling establishment may be successful, livestock do not allow seedlings and small juveniles to grow because they browse them. So, if livestock are not excluded, no *in situ* regeneration will take place (pers. obs).

During fieldwork in western Amazon sites, especially in southeastern Peru and western Brazil over the last two years, we have taken photos of the habit of *Attalea* species that occur both in forest formations and also close to local homes. Among these images, we recorded certain palms with a different habit that



4. *Attalea pacensis*. **a**. Section of leaf, **b**. portion of staminate inflorescence, **c**. staminate flower, **d**. fruit, **e**. and **f**. views of cross-section of fruit.

showed stiff and erect leaves that were densely arranged in the crown (Figs. 2 & 3). First, we thought they were very old individuals with a cylindrical trunk densely covered by woody leaf bases. According to Pintaud et al. (2016), from a distance, the most distinctive character is its erect leaves. We thought the presence of erect leaves was more representative of Acre in western Brazil. Therefore, we first named it *Attalea* sp. "Acre" and compared its features with other species under the *A. phalerata* complex (Pintaud et al. 2016). However, during recent fieldwork and records gathered from 2014 to 2015 in northwestern Bolivia, it

5 (left). Leaf with irregularly arranged groups of 2–8 lanceolate pinnae. 6 (right) The fibrous sheath with a very short petiole less than 7 cm long.

became clear that this new species is rather more characteristic of the lowlands in the department of northeastern and northern La Paz at an elevation of 250–400 m.

Attalea pacensis *M. Moraes et J.-C. Pintaud*, **sp. nov.** Palm with erect leaves, petiole to 7 cm long, inflorescence interfoliar, mesocarp cream and fleshy, endocarp with loosely 13–18 grouped fibers. Type: Bolivia: Dept. La Paz, Prov. Abel Iturralde, San Buenaventura, 19.11.2015, *M. Moraes & T. Cartagena MMR2531* (Holotype LPB, isotype K).

Robust, solitary, unarmed, pleonanthic, monoecious, tree palm 8–10 m tall. *Stem* erect, to 5.5–7 m tall, 60–90 cm diam. at breast height, cylindric from base to crown, beige, densely covered by elongated leaf bases. *Leaves* 36–48 densely packed in crown, pinnate, straight, sheath open to 90 cm long and 60 cm wide at the base, thick fibrous along the margins; petiole very short up to 7 cm long; rachis 130–160 cm long, densely covered with a brown tomentum; leaflets 80–105 on each side of the rachis, irregularly arranged in groups of 2–8 pinnae, densely inserted in two planes, stiff and expanded (not folded), 69–74 × 1.7–2.1 cm at the base of the leaf, 55–70(100) × 3.1–4.6 cm in mid leaf, 3–12 × 0.5 cm at the tip, asymmetric at the tip, adaxially green, abaxially grayish, glabrous, with obscure transverse veinlets. *Inflorescences* solitary, interfoliar, branching to 1 order, only staminate inflorescences and infructescence seen; peduncle moderate, ca. 90 cm long, elliptical in cross-section; prophyll not seen, presumably inserted at the base of the peduncle; peduncular bract woody, to 1.2 cm thick, deeply sulcate, with a solid beak 19–25 cm long; initiating inflorescences (87–99 cm long) with a deltate shape in cross-section due to the compression of the inflorescence between the leaves in the crown; rachis ca. 50 cm long; rachillae 150–190, 10–12 cm long, 3–4 mm in diameter, glabrous, cream, with spiral insertion of staminate flowers, proximally with a bare portion 5–7 cm long and 2 mm wide, then bearing paired staminate flowers. *Staminate flowers* narrow elongate, 9–10 mm long; sepals to 1 mm long, joined basally, then free and imbricate, glabrous; petals to 9 mm long, coriaceous, free, glabrous; stamens 6; filaments to 1 mm, anthers elongate 2.5 mm long, erect; pistillode not seen. *Pistillate flowers* not seen, but perianths persistent and enlarging in fruit, 3–5 pistillate flowers per rachillae. *Fruit* 1–3-seeded, obovoid, 6–8 × 3–3.5 cm, with a triangular beak 5–7

7 (left). Pinnae inserted in two planes. 8 (right). Each leaflet has an asymetrically tip.

mm long, orange-yellow at maturity, smooth, surface glabrous; mesocarp cream, fibrous, 2 mm thick with longitudinal fibers, endocarp 8–15 mm thick, with 13–18 strongly clustered fiber bundles close to the outer surface. *Seed* elongate, 4 cm × 8 mm (Figs. 2–11).

SPECIMENS EXAMINED: BOLIVIA: Dept. La Paz, Prov. Abel Iturralde, San Isidro, on road from San Buenaventura to Alto Madidi, 14°23′41.93″S, 67°38′16.6″W, 400 m alt., 21–31.03.2005, *Balslev et al. HB6761* (AAU, LPB). San Buenaventura, 14°26′11.9″S, 67°32′20.2″W, humid tropical forest, 230 m alt, 19.11.2015, *M. Moraes R. & T. Cartagena MMR2531* (Holotype LPB, Isotype K). 7 km north from Buenaventura to Tumupasa, Casto Sosa ranch, 14°24′07.7′′S, 67°35′27.6″W, cattle field, 250 m alt, 19.11.2015, *M. Moraes R. & T. Cartagena MMR2532* (LPB). 3 km before Tumupasa, Mamuque river, tropical forest, 14°09′39.3″W, 67°51′31.7″W, 362 m alt, 19.11.2015, *M. Moraes R. & T. Cartagena MMR2533* (LPB). 2 km south of Ixiamas, Chumi, paddock, 13°47′16.8″S, 68°07′0.32″W, 278 m alt, 20.11.2015, *M. Moraes & T. Cartagena MMR2538* (LPB).

The character that separates this species from the *Attalea phalerata* complex is the presence of erect and stiff leaves, which is unique to *A. pacensis*. Since it shares a part of the whole geographical area of *A. princeps,* at first glance both seem the same. However, they differ in several characters, such as stem shape, the length of the pinnae and their texture and color, mesocarp taste and the number of fiber bundles in the endocarp (Table 1).

Attalea pacensis grows in the tropical forests of alluvial plains in the Andean foothills from Bolivia northwards to Acre (Brazil) and SE Peru. Thanks to a field trip made in 2014 to SE Peru (Puerto Maldonado) and near the border of Acre in Brazil, we made photographs of this species, although it was not possible to make botanical collections. In Bolivia, where the largest geographic area of its distribution is located, its distribution is similar to *A. princeps*; in fact, they are sympatric. This species might be favored by its coexistence with *A. princeps*. It seems to have adapted a mimicry in several respects, not only vegetatively, but reproductively. They share similarities, such as height, pistillate flower morphology, and type of fruits, although it is unknown to what extent they could also share pollinators and dispersers. However, definitely their population density is much lower than that of *A. princeps*; in one hectare the ratio is 10:1.

9 (upper left). Staminate inflorescence bud is dorsiventrally compressed with an elongated beak. 10 (upper right). The infructescence with obovoid fruits. 11 (bottom). A cross-section of endocarps that shows clustered fiber bundles.

Table 1. Distinctive morphological characters to compare *A. pacensis* and *A. princeps*.

Characters	*Attalea pacensis*	*Attalea princeps*
Stem shape towards crown	Cylindrical	Inverted cone
Petiole length	<7 cm	75-90 cm
Leaf rachis orientation	Straight	Arching
Medial pinnae length & width	55–70(100) × 3.1–4.6 cm, stiff	55-100 x 2.4-3 cm, pendulous
Pinnae fold to central nerve	Open, extended	Folded
Pinnae texture	Crisp	Flexible
Pinnae insertion	2 planes	3 planes
Pinnae color adaxially	Green	Green
Pinnae color abaxially	Grayish	Green
Inflorescence x-section	Dorsiventral	Circular
Mesocarp taste	Bitter, not edible	Sweet, edible
Mesocarp color and texture	Cream and fibrous	Orange and fleshy
Endocarp fiber bundles	13–18	7–9
Seed number per fruit	2–5	1–3

The description of this new species conforms to the proposed comparative table of species that make up the group *Attalea phalerata* and has been detailed in Pintaud et al. (2016). It is clearly distinguished from all other species of the genus *Attalea* by the straight orientation of its leaf rachis. However, it is necessary to highlight other characters between *A. princeps* and *A. pacensis* because their populations occur in the same types of rainforests in the NW of Bolivia, not only in the natural state, but also when they are transformed into pastures for livestock. The adults of both species are kept for the purposes of shade and livestock feed.

Finally, this paper is a contribution towards a better understanding of the species of this genus for Bolivia. Over 10 years ago, only five species were known (Moraes, 2004). Today that figure has risen to 11 through the increased support of photographic records and scientific collections (Moraes, 2015). Whereas many regions of the country are not under a high human pressure derived from urbanization, massive populations of palm trees can still be studied even with limited logistical conditions.

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