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The palm (Arecaceae) collections gathered by Bonpland and Humboldt in their American journey: origin and fate of the specimens and typifications

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Abstract

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The palm collections emanating from Humboldt and Bonpland's expedition to the Americas (1799-1804) are here studied to better ascertain the origin and taxonomic identity of the specimens gathered, the main botanists responsible for their taxonomic description, and the current repositories of these specimens. Moreover, we explore the relationship between specimens, the field notes contained in the "Journal Botanique", and the descriptions published in *Plantae Aequinoctiales* (1805-1817) and the multi-volume *Nova genera* (1816-1825). In the frame of their American journey, Bonpland and Humboldt collected 25 palm specimens, representing 22 species, 19 genera and 4 palm subfamilies; several hypotheses are advanced in order to explain the fate of the six missing specimens. Most of the palms were gathered in present-day Colombia and Venezuela, whereas only few palms were gathered in Cuba and Mexico. The entry describing the royal Cuban palm (*Oreodoxa regia* Kunth) in the "Journal Botanique" is used as a case study to highlight the need to reevaluate the attribution of the authorities associated with the names proposed in the *Nova genera.* Misunderstanding of the different herbaria arising from the expedition has in some cases led to inaccurate typification of original material. Our study sheds light on specific cases and proposes neotypes for six taxa (*Aiphanes praga* Kunth, *Cocos crispa* Kunth, *Corypha pumos* Kunth, *Mauritia aculeata* Kunth, *Oreodoxa frigida* Kunth, *Oreodoxa sancona* Kunth), and lectotypes for four taxa (*Ceroxylon andicolum* Bonpl., *Corypha maritima* Kunth, *Corypha tectorum* Kunth, *Martinezia caryotifolia* Kunth). Arguably, the earliest checklist of Americans palms was noted down in the "Journal Botanique" by Humboldt and Bonpland, and is presented for the first time in this contribution.

Keywords

ARECACEAE – PALMAE – Bonpland – Humboldt – Botanical history – Neotropics

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Introduction

From 1799 to 1804 the Prussian naturalist Alexander von Humboldt (1769-1859) and the French botanist Aimé Bonpland (1773-1858) carried out one of the most important scientific expeditions to the New World. The two explorers undertook a 15,000 km long journey, visiting Spanish territories of what are now the independent countries of Venezuela, Cuba, Colombia, Ecuador, Peru and Mexico. Indeed, Humboldt and Bonpland explored many regions of the American tropics never before seen by European naturalists, and gathered an impressive number of plant specimens that included also new or incompletely known palms. The Saxonian botanist Karl Sigismund Kunth (1788-1850) played a major role describing most of them in the first volume of *Nova genera* (Humboldt et al., 1816-1825). Several studies have focused on the botanical collections gathered by Bonpland and Humboldt (Lack, 2003, 2009), the field notes associated with these collections (Lack, 2004a, 2004b), and the illustrations of the plants they collected. Studies of particular taxonomic groups such as *Amaryllidaceae* (Arroyo-Leuenberger & Leuenberger, 1996; Leuenberger & Arroyo-Leuenberger, 2006), *Rubiaceae* (Delprete, 2001) and *Solanaceae* (Granados Tochoy et al., 2007; Knapp, 2007) have addressed in different ways the complexities of understanding, from a taxonomic perspective, the Bonpland and Humboldt collections and have underscored the continuing importance of these collections for Neotropical taxonomy. More recently, Stauffer et al. (2012) inventoried the monocotyledon specimens collected by the two explorers in Venezuela, characterized the current distribution of the different sets of specimens assembled by the expedition, and analyzed these collections through the study of the botanical field notes known as the "Journal Botanique". During our study of the monocotyledon collections issued from the expedition we were particularly intrigued by the great interest that the palm family evoked in the two explorers. Humboldt was particularly attached to this tropical plant family (see details in Romero-González, 2001) and in his milestone publication "Ansichten der Natur" (Humboldt, 1849), he claimed that the palms were "the highest and most noble of all plant organisms, to which the prize of beauty has been awarded by all nations on earth". Our study preliminarily showed that the two explorers not only provided extremely complete field descriptions for the palms observed throughout their travel, but also gathered critical data on their phytogeography, ecology, local uses and common names, as well as their cultivation. Our research also revealed that the contribution of these explorers to Neotropical palm studies remained underappreciated by modern palm experts. We were also perplexed by the fact that although these palm collections were intensively studied and apparently taxonomically well-understood by early and modern neotropical palm experts, we were unable to locate material of at least one third of the palm species described from the expedition, most of these corresponding to benchmark neotropical palms. Moreover, the designation of type material proposed in some treatments dealing with Neotropical palms is at times inaccurate, mostly because of the lack of real knowledge of the origin or fate of the specimens issued from the expedition.

Our current analysis of the palms gathered by the two explorers aims to bring some light to these areas, in particular towards a better understanding of: 1) the origin and taxonomic identity of the palm specimens gathered; 2) the main botanists responsible for their taxonomic description; and 3) the current repositories of these specimens and possible fate of the missing material. Furthermore, we analyze information provided for some palm entries in the original field notes of the expedition ("Journal Botanique") and discuss the implications of the attribution of the authorities associated with the names proposed. A comprehensive analysis of this historical collection points to a need to propose some neotypes and lectotypes.

Material and methods

We studied original specimens deposited at P (P and P-Bonpl.) and B (B and B-W). Additional duplicate specimens were identified in G, F, FI and M. The search for palm specimens was also extended to HAC, HAL and LR (acronyms following Index Herbariorum, 2016). The original field notes of Bonpland and Humboldt, known also as the "Journal Botanique", were examined in the Bibliothèque Centrale (MNHN, Paris). The publications containing the description of palm novelties issued from the expedition, in particular the *Nova genera* (Humboldt et al., 1816-1825) and the *Plantae Aequinoctiales* (Humboldt & Bonpland, 1805-1817) were consulted in the G library.

Results

Origin and diversity of the palm collections

We identified 25 palm specimens collected by Bonpland and Humboldt in the frame of their American journey (Appendix 1). These specimens represent 22 species, 19 genera and 4 palm subfamilies *(Arecoideae, Calamoideae, Ceroxyloideae, Coryphoideae),* implying that the two explorers collected palms from all subfamilies currently recognized in the Neotropics. The palm collections are represented by one or several sheets and contain in most cases vegetative and reproductive organs. Most palm specimens were gathered in present-day Colombia (11 specimens) and Venezuela (6 specimens), whereas only few palms were gathered in Cuba and Mexico (four specimens each) (Fig. 1A-D, 2A-D). It remains unclear for us why the two explorers did not collect palm material in Ecuador and Peru; however, as will be explained later, the fact that no material is currently available does not necessarily mean that

Fig. 1. – Representative palm specimens collected by Bonpland and Humboldt deposited in P-Bonpl. **A.** *Bactris gasipaes* Kunth; **B.** *Ceroxylon andicolum* Bonpl.; **C.** *Corypha miraguama* Kunth; **D.** *Oreodoxa regia* Kunth.
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Fig. 2. – Representative palm specimens collected by Bonpland and Humboldt deposited in P. **A.** *Ceroxylon andicolum* Bonpl.; **B.** *Corypha maritima* Kunth; **C.** *Corypha tectorum* Kunth; **D.** *Martinezia caryotifolia* Kunth.
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the specimens were not collected. The two explorers gathered palms displaying different growth habits and leaf morphologies. Although there is a large dominance of palm species with pinnate leaves, they apparently were also fascinated by palmate and costa-palmate leaf patterns. Indeed, Bonpland and Humboldt collected many palms displaying this type of leaf blade morphology in the *Coryphoideae* (*Brahea* Mart. ex Endl., *Copernicia* Mart. ex Endl., *Coccothrinax* Sarg., *Cryosophila* Blume, *Sabal* Adans.) and the *Calamoideae* (*Mauritia* L. f., *Mauritiella* Burret).

Current repositories of the palm specimens and the possible fate of missing material

The first palm specimens issued from the expedition were sent to Carl Ludwig Willdenow (1756-1812) and are now deposited in B-W in Berlin, whereas a much larger number of specimens was divided in Paris in two, more-or-less equal parts shortly after the two explorers returned to Europe (see details in Lack, 2009). As will be explained later, this had strong implications for the interpretation of the specimens and the designation of the type collections. The specimens associated with Humboldt's largest part of the herbarium were studied by Kunth and therefore formed the main basis for the preparation of *Nova genera*; these specimens are now stored in P-Bonpl. (Fig. 1A-D), today completely available through Sonnerat (2016). The specimens associated with Bonpland's part, also known as Bonpland's private herbarium, were always kept by him and transferred to South America when he moved to Argentina in 1816. These collections came back to France in two installments, the first in 1833 and the second after Bonpland's death, being integrated in the P general herbarium and not the herbarium used for the publication of *Nova genera* (Fig. 2A-D). According to Lack (pers. comm.) for this publication Kunth had not only access to all the specimens now associated to the herbarium P-Bonpl., but also an additional amount of specimens still retained privately by Humboldt. The latter were subsequently donated to Kunth, transferred by him to Berlin and acquired after his death by the Königliches Herbarium. This set of collections was integrated into the general herbarium B and almost completely destroyed in 1943.

Only few palm specimens, attributed to *Bactris minor* Jacq. and *Mauritia flexuosa* L. f., were sent to Willdenow in Berlin (Fig. 3A). Some duplicate specimens from both sets are now present in other herbaria, and the reasons are not always clear. For example, the specimen of *Ceroxylon alpinum* (Fig. 3B) deposited in FI was originally part of the herbarium of the French explorer and botanist Jacques Julien Houttou de Labillardiere (1775-1834), the latter having been acquired by the British Naturalist Philip Barker Webb (1793-1854) and now part of the palm collection at FI (Cuccuini & Nepi, 2006). In the case of the G herbarium, the two specimens found (attributed to *Alfonsia oleifera* Kunth and *Corypha dulcis* Kunth, Fig. 3C) can be associated with the original herbarium of the Benjamin Delessert (1773-1847), who accumulated one of the most important private herbaria in Paris, at a time when specimens from the expedition where being intensively studied by Kunth at the Natural History Museum of Paris. It remains unclear for us why some original material arrived to M (*Chamaerops mocinoi* Kunth, Fig. 3D), though the presence there of the celebrated palm expert Carl Friedrich Philipp von Martius (1794-1868) may at least partially explain this fact. In some letters Humboldt suggests that some botanical specimens were left in Cuba; however, according to Regalado and Herrera (pers. comm.) no specimens associated with the expedition have ever been identified in the herbarium of the *Academia de Ciencias* of Havana. The presence of significant numbers of specimens from the expedition in HAL has been documented by Stauffer et al. (2012); no palm specimens collected by the two explorers however could be identified in this collection. No specimens associated with the expedition were found in LR, though evidence had led some authors to hypothesize that some specimens from the expedition could be present there (see discussion in Stauffer et al., 2012).

In our investigation of the historical Bonpland herbarium (P-Bonpl.), where we expected to find most of the collections gathered by the two explorers, we were unable to locate 14 of the 24 palm species described by Kunth in *Nova genera* (Humboldt et al., 1816-1825). Our research shows that some of the missing specimens did not completely disappear, but in fact pertained to Bonpland's private herbarium which was split from the Humboldt Herbarium in 1804 and completely transferred after Bonpland's death to France, where it was deposited in the general collections in Paris (P). We cannot rule out that additional specimens had been present in B, some or all of them destroyed during the WWII bombing. Alternatively, it is possible that some original collections, and not just duplicates or fragments, were acquired by other European herbaria and have not yet been properly identified. Another possibility, already suggested by Lack (2004a), is that Bonpland had not numbered all the original herbarium specimens, and a complete set corresponding to the entries in the "Journal Botanique" may never have existed. Palm experts widely agree that a proper palm collection can be extremely time consuming, often requiring special measures and yielding bulky specimens. As noted by B. Leuenberger in Lack (2004a), it seems reasonable that herbarium specimens of succulent or bulky plants, in particular palms, might not have been prepared by the two explorers, as these plants presented unusual challenges for an already logistically difficult journey. One interesting hypothesis is that some of the palms were not collected but only drawn on the spot, the drawings together with the original field notes being used by Bonpland and Kunth to describe some of the new

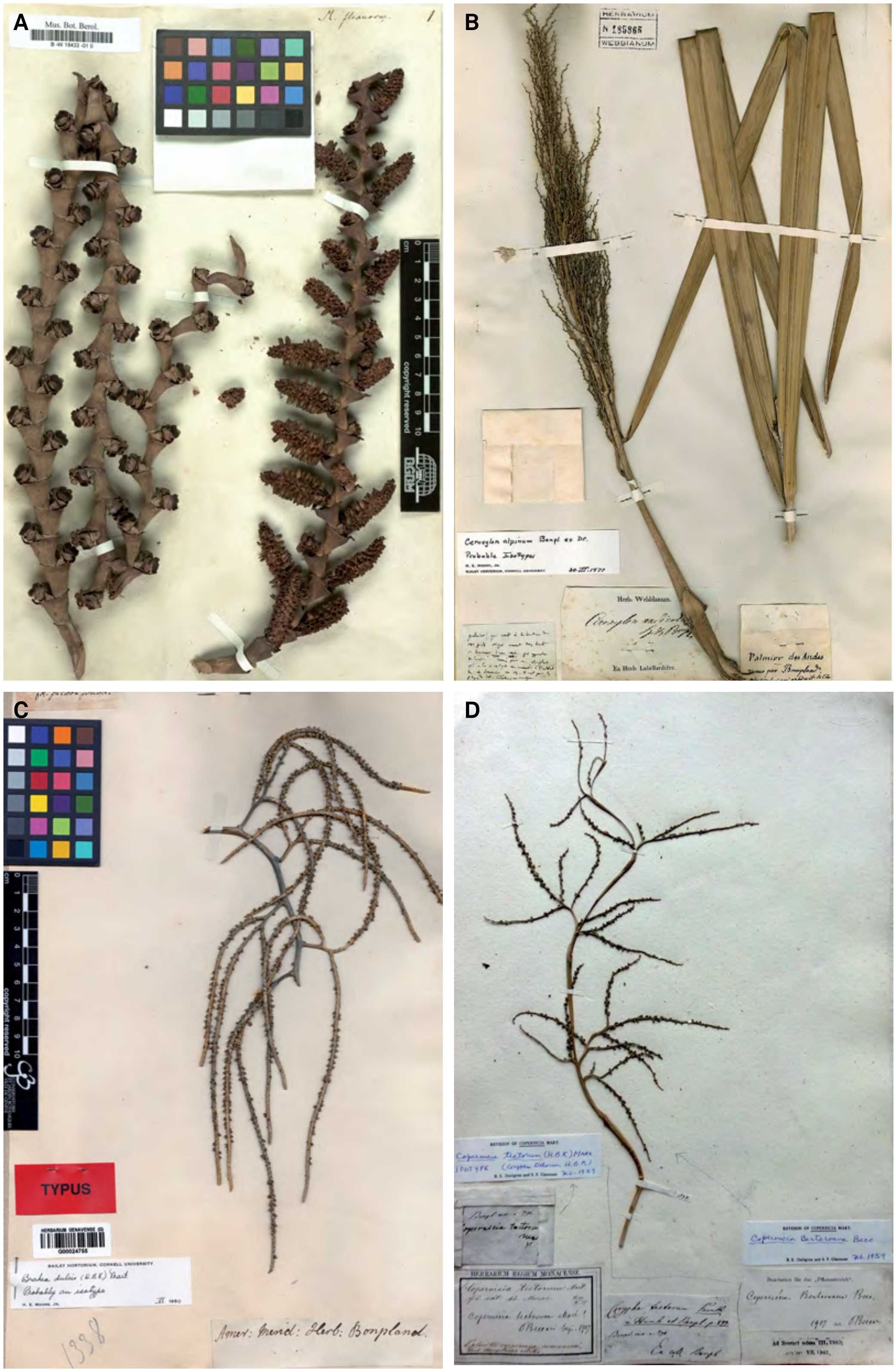


Fig. 3. – Representative palm specimens collected by Bonpland and Humboldt deposited in European herbaria. **A.** *Mauritia flexuosa* L. f. deposited at B; **B.** *Ceroxylon andicolum* Bonpl. deposited at FI; **C.** *Corypha dulcis* Kunth deposited at G; **D.** *Corypha tectorum* Kunth. deposited at M.
[**A:** © Botanischer Garten und Botanisches Museum Berlin-Dahlem; **B:** © Natural History Museum of Florence; **D:** © Botanische Staatssammlung München]

palm species. According to Lack (2009), Humboldt indeed recalled in 1851 that more than 400 drawings, in graphite pencil or pen, were completed by him in the field, and the note "h. pinx" (drawn by Humboldt) accompanying some of the entries of the "Journal Botanique" may be the confirmation. In the description of the wax palm *Ceroxylon andicola* Bonpl. ex DC., Bonpland states that the palm was drawn by Humboldt on site. This extremely accurate field sketch was redrawn by Turpin and clearly highlights the main morphological characters that distinguish the species (Fig. 4A-B). The magnificent illustration of the inflorescence and peduncular bract of *Attalea amygdalina* Kunth, redrawn by Turpin for *Nova genera*, may be another example of an extremely accurate field sketch drawn by Humboldt on site and used for the original description of the species (Fig. 4C-D). Lack (2009) already pointed out that these original sketches unfortunately have never been found and most probably disappeared during the WWII bombing of Berlin, as Kunth apparently brought them to this city in 1829 when he was appointed assistant-director of the Botanical Garden.

The palm entries in the "Journal Botanique" – the case of the Royal Cuban Palm

Bonpland was clearly in charge of compiling most of the information contained in the *Journal Botanique*, but complete descriptions or side comments, in particular for palms, bromeliads and orchids, were occasionally added by Humboldt. Indeed, palm and orchid entries rank among the most complete and comprehensive descriptions in the "Journal Botanique". An extensive description of the Cuban Royal Palm, *Oreodoxa regia* Kunth (= *Roystonea regia* (Kunth) O.F. Cook) is presented in the third volume (MS 1334), which covers collection numbers 1216-1591 and includes the last collections made in Venezuela (i.e., Cumaná, Bordones) and the earliest collections made during Humboldt and Bonpland's first visit to Cuba in 1800. This palm was collected under the collection number 1276 near Havana (Fig. 5, Appendix 1), and its description helps us understanding the extent to which representatives of the palm family were important for the two explorers. The handwriting indicates that this entry can be unequivocally attributed to Humboldt, whereas the name for the species proposed in a side note (*Oreodoxa regia* Kunth) corresponds to Bonpland's handwriting (Fig. 5). The year when this name was added to the description remains unclear; however, it was certainly not proposed when the collection was made, as the genus *Oreodoxa* was only described by Willdenow six years later, when the two explorers were already back to Europe. The entry in the "Journal Botanique" is written in Latin, with specific comments in French on the species' morphology local uses, and cultivation. Humboldt's apparent misinterpretation of the presence of hermaphrodite flowers in this species is clearly due to the fact that although the genus *Roystonea*, as with all other taxa in *Arecoideae*, has unisexual flowers, the male flowers nonetheless present a well-developed pistillode. Humboldt interpreted this well-developed pistillode as a fertile gynoecium and wrongly inferred the presence of hermaphrodite flowers in the species.

Humboldt states in this description that Bonpland found wild populations of the palm in the locality of Curiepe, east of Caracas, in the coastal region currently known as Barlovento (Miranda state), reached from the capital by land. Indeed, the two explorers travelled together by boat from Cumaná to Caracas; however, we know that they separated for part of the journey. Humboldt sailed from Cumaná to the port of La Guaira and reached Caracas by the main road, whereas Bonpland, who did not like sailing (Sandwith, 1925), left their vessel well to the east of Caracas. This region is known to host one of the few truly wild stands of the now severely threatened palm *Roystonea oleracea* (Jacq.) O.F. Cook, whereas *R. regia* (Kunth) O.F. Cook has never been reported in Venezuela (Zona, 1996; Stauffer, 1999). We believe that the two explorers did probably misidentify *R. oleracea* with *R. regia*, although some vegetative characters (e.g. regularly arranged vs. irregularly inserted pinnae) make them clearly distinguishable even for a non-specialist. The text is followed by an extensive description of the growth form, vegetative and reproductive morphology and the comment that "pigs feed on the fruits of this palm". The very complete description observed in the case of *R. regia* was repeated for other palms collected by the two explorers and was certainly very useful for Kunth when proposing most of the new species described in the *Nova genera*. The rather fragmentary specimens associated with *R. regia* studied by us are in clear concordance with the difficulties in collecting informative material that Humboldt (1849) attributed to the family. Humboldt described how the large size of the Royal Cuban Palms made it very difficult to find villagers of Regla and Guanabacoa willing to climb them, a problem which modern palm collectors still face today, although climbing techniques have improved and made the problem less acute compared to what confronted nineteenth-century botanists.

The earliest checklist of Neotropical palms?

Humboldt (1849) noted that, as a result of his travels in the Neotropics, 20 species of palms were described and approximately the same number could be recognized but were unfortunately not collected during the journey. In the first pages of the first volume of the "Journal Botanique" (MS 1332), we found what may arguably be one of the earliest accounts on Neotropical palms (Fig. 6). One list in Bonpland's hand and another by Humboldt's hand list the palms that the two explorers observed during their Venezuelan journey. In particular the list elaborated by Bonpland presents 23 palm common names, from which 12 can be easily attributed to

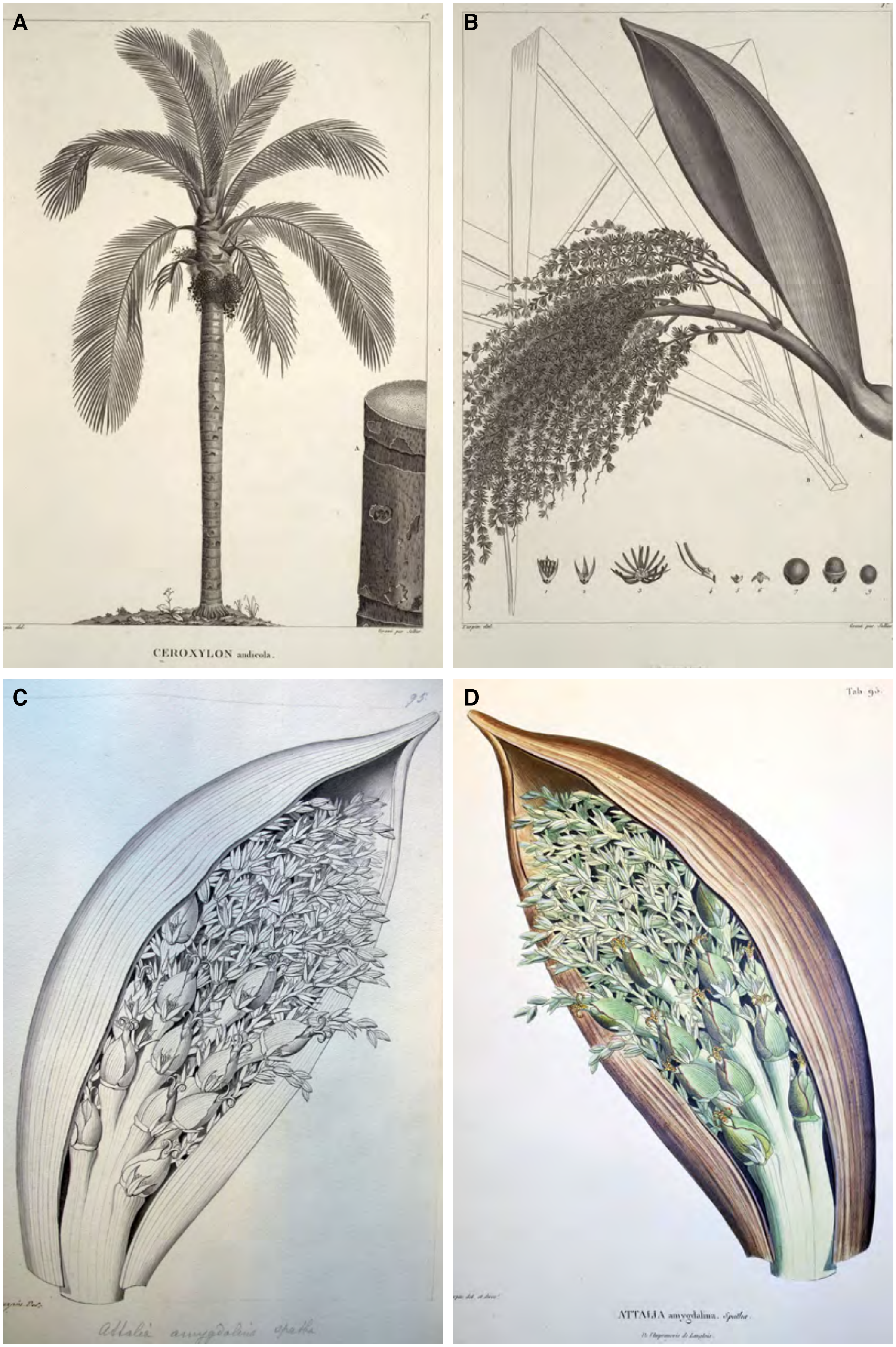
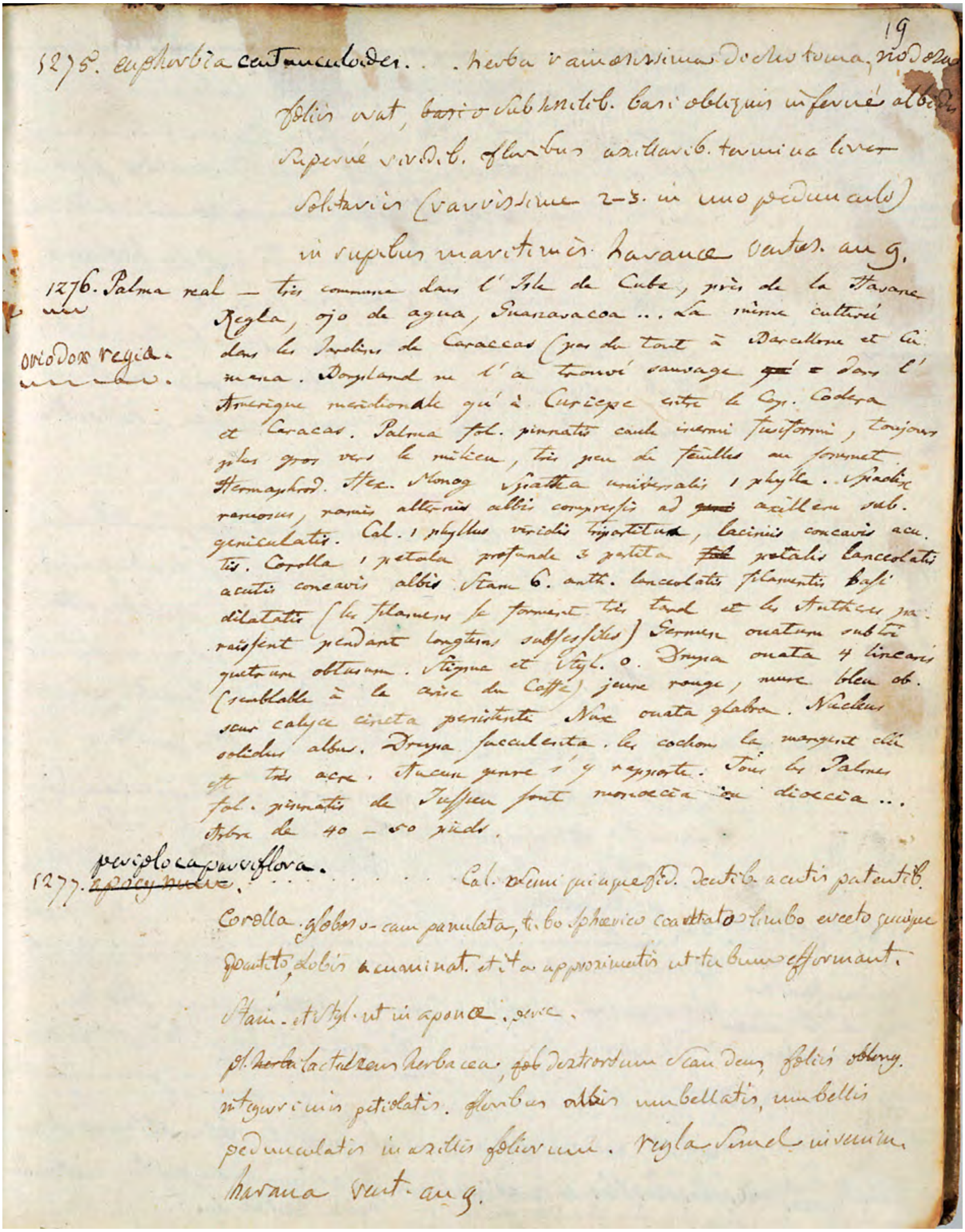


Fig. 4. – Illustrations associated to the palms collected by Bonpland and Humboldt. **A-B.** Copper engravings produced by Turpin of the growth habit (**A**) and the male inflorescence (**B**) of *Ceroxylon andicolum* Bonpl. (*Plantae Aequinoctiales* 1: 1. 1805) based on original sketches drawn by Humboldt on site; **C-D.** Illustrations of *Attalea amygdalina* Kunth; grisaille deposited at P-Bonpl. (**C**) and coloured plate (**D**) published in the *Nova genera* 1: 319. 1816. [**C**: © Muséum national d'Histoire naturelle, Paris]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1275. euphorbia centunculoides ...

1276. Palma real — très commune dans l'Isle de Cube, près de la Havane Regla, ojo de agua, Guanavacoa ... La même cultivée dans les Jardins de Caraccas (pas du tout à Barcellone et Cumana. Bonpland ne l'a trouvé sauvage dans l'Amerique meridionale qu'à Curiepe entre le Cap. Codera et Caracas. Palma fol. pinnatis caule inermi fusiformi, toujours plus gros vers le milieu, très peu de feuilles au sommet. Hermaphrod. Hex. Monog. Spatha universalis 1 phylla.. Spadix ramosus, ramis alternis albis compressis ad axillam sub. geniculatis. Cal. 1 phyllus viridis tripartitus, laciniis concavis acutis. Corolla 1 petala profunde 3 partita petalis lanceolatis acutis concavis albis. Stam 6. anth. lanceolatis filamentis basi dilatatis (les filamens se forment très tard et les Anthères paraissent pendant longtems subsessiles) Germen ovatum subtriquetrum obtusum. Stigma et Styl. 0. Drupa ovata 4 linearis (semblable à la caise du Caffé) jaune rouge, mure bleu obscur calyce cincta persistente. Nux ovata glabra. Nucleus solidus albus. Drupa succulenta, les cochons la mangent elle est très acre. Aucun genre n'y rapporte. Tous les Palmes fol. pinnatis de Jussieu sont monoecia ou dioecia.. Arbre de 40 – 50 pieds.

Oreodoxa regia.

1277. periploca parviflora. ...

Fig. 5. – Page of the "Journal Botanique" (MS 1332) of Bonpland and Humboldt compiled during their journey in Venezuela. The entry 1276 was written by Humboldt and corresponds to the collection of the royal Cuban palm *Oreodoxa regia* Humboldt & Bonpland ex Kunth (= *Roystonea regia* (Humboldt & Bonpland ex Kunth) O.F. Cook).
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species level as recorded by Stauffer (2000) in the Venezuelan Amazon, and only two, with ethnic name spellings, for which we were unable to attribute any accurate identification. According to Romero-Gonzáles (2001), Humboldt listed at least 20 additional palms that Bonpland and him could not describe for lack of flowering or fruiting material and the palms presented in the list (Fig. 6) may include some of them.

The common name "tirite" may be attributed to *Ischnosiphon arouma* (Aubl.) Körn. *(Marantaceae),* a plant that the Baniwa, in Brazil not far from the border with Venezuela, classify with the palms in their system of folk-classification. In any case it is clear that the two explorers were able to identify some of the benchmark palm genera from the Venezuelan Llanos (*Copernicia*, *Mauritia*) and from the Amazon Basin (i.e. *Astrocaryum*, *Bactris*, *Desmoncus*, *Leopoldinia, Oenocarpus*), most of these only formally recognized more than 20 years later by the celebrated palm expert Martius. Humboldt's list (Fig. 6) adds to this account two species, *Chamaerops humilis* L. and *Phoenix dactylifera* L., without doubt observed by the two explorers during their stay in the Canary Islands on their way to South America. The first volume of the "Journal Botanique" confirms that Humboldt and Bonpland collected at least 16 plants in the Canary Islands, some of them from cultivation in the botanical garden of Orotava.

The description of taxonomic palm novelties and the attribution of authorities

Twenty palms collected by Bonpland and Humboldt in the Neotropics were described as new to science. Bonpland described two palms in *Plantae Aequinoctiales* (Humboldt et al., 1805-1817), whereas Kunth undertook the major effort and described 18 new palms in *Nova genera.* The two explorers only brought five species that were already known at that time, among these the coconut (*Cocos nucifera* L.), the buriti or moriche palm (*Mauritia flexuosa* L. f) and the piritu palm (*Bactris guineensis* (L.) H.E. Moore). Whereas there is a general consensus to attribute to Bonpland all the names published in *Plantae Aequinoctiales* (Humboldt & Bonpland, 1805-1817), the ones published by Kunth in *Nova genera* (Humboldt et al., 1816-1825) have been the subject of some controversy. This is true also for the palm family, and the case of the name of the Royal Cuban palm *Oreodoxa regia* Kunth may be exemplary and suggests that this matter deserves further analyses. The attribution to Kunth as the authority for this palm, following conventional wisdom, is supported by several authors (i.e. Barnhart, 1902; Stafleu & Cowan, 1979; Hind & Jeffrey, 2001) and was more recently also proposed in the official palm checklist of Govaerts et al. (2016). According to M. Nee (cited by Mori et al., 2002) however, the right authority of the new taxa issued from the expedition and published as novelties in *Nova genera*, should correspond to Humboldt, Bonpland & Kunth.

In order to accurately evaluate the respective contributions of the two explorers and Kunth, as author of the publication, on the proposal of names, we took the example of the Royal Cuban Palm. We made a thorough comparison of the original notes noted down in the "Journal Botanique" (Vol. I, entry 1276) with the text proposed by Kunth in *Nova genera* (Vol. I, p. 304) (Fig. 7A-B). According to our current knowledge, this is the first time that such a procedure had been undertaken in order to elucidate the authority of taxa published by Kunth. Our analysis clearly shows that the information proposed by Kunth in the publication corresponds in its entirety to the original data presented by Humboldt in the field notes. The description proposed in entry 1276 (Fig. 7A) can be divided into 3 main parts: 1) locality, common name and phenology, 2) morphological description of the vegetative and reproductive organs, and 3) notes on observations of this palm apparently made by Bonpland in the Curiepe Valley (Venezuela). Following contemporary publication practices, Kunth translated the text into Latin, but the content itself reproduces almost all the original information (Fig 7B). Hence, we believe that at least for this name, a more appropriate authority should be *Oreodoxa regia* Humboldt & Bonpland ex Kunth.

Palm specimens collected by Bonpland and Humboldt

1. *Aiphanes praga* Kunth, Nov. Gen. Sp. 1 (ed. 4): 303. 1816.

= ***Prestoea acuminata*** (Willd.) H.E. Moore in Gentes Herb. 9: 286. 1963.

Typus: Venezuela. "Crescit locis montanis, temperatis Provinciae Novae Andalusiae propre coenobium Caripense" (a la Fuente), s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here): **Venezuela. Dist. Acosta:** Serranía del Turimiquire, Fila La Montaña, 10°02'N 63°52'W, 1600 m, 12.V.1982, *Huber et al. 6313* (VEN!; isoneo-: NY [02324666]!).

Vernacular names. – "Praga", "Palmito" (Kunth, 1816).

Notes. – The collection of *Huber et al. 6313* has been chosen as neotype as it was gathered in the Serranía del Turimiquire, a mountain chain belonging to the same massif where the type collection was originally sampled. The specimens contain mid-length and apical portions of leaves, longitudinal sections of stems, fragments of rachillae and fruits.

2. *Alfonsia oleifera* Kunth, Nov. Gen. Sp. 1 (ed. 4): 307. 1816.

≡ ***Elaeis oleifera*** (Kunth) Cortés, Fl. Columb. 1: 203. 1897.

Typus: Colombia: "Crescit locis calidis regni Novogranatensis ad hostia fluminis Sinu, juxta El Zapote, Santero et in Monte San Nicolas", s.d., *Bonpland & Humboldt 1380* (holo-: P-Bonpl [P00669610]!; iso-: G [G00005837]!, P [P00731480, P00731481]!).

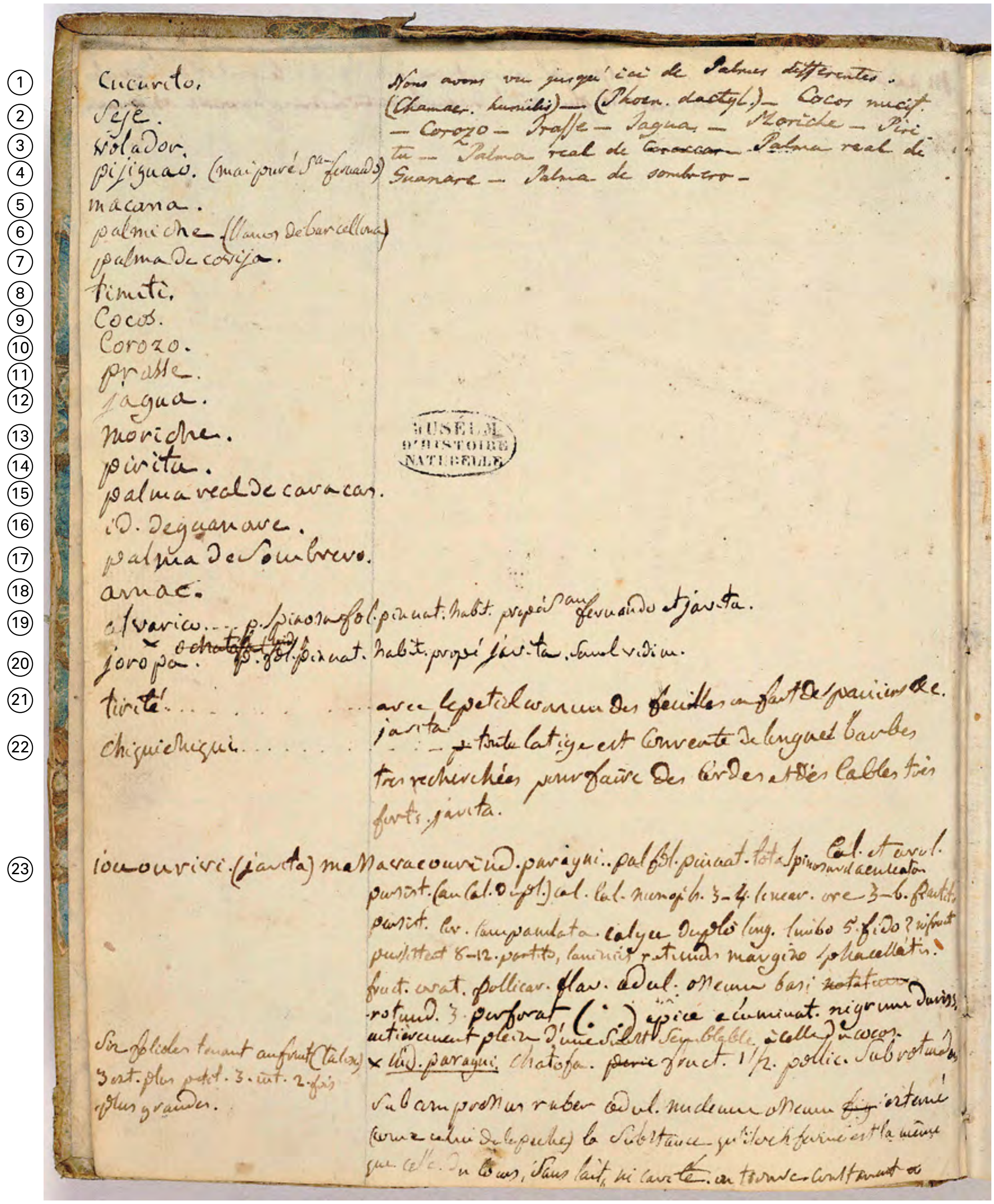

Fig. 6. – List of palm common names written by Bonpland in the first page of the "Journal Botanique" (MS 1332). 1) "Cucurito" (*Attalea maripa* (Aubl.) Mart.); 2) "Seje" (*Oenocarpus* sp.); 3) "Volador" (*Desmoncus* sp.); 4) "Pijiguao" (*Bactris gasipaes* Kunth); 5) "Macana" (*Euterpe* sp.); 6) "Palmiche" (*Copernicia tectorum* Kunth); 7) "Palma de Cobija" (*Copernicia tectorum* Kunth); 8) "Timiti" (*Manicaria saccifera* Gaertn.); 9) "Cocos" (*Cocos nucifera* L.); 10) "Corozo" (*Acrocomia aculeata* (Jacq.) Lodd. ex Mart.); 11) "Prasse" (unknown Palmae); 12) "Jagua" (*Attalea butyracea* (Mutis ex L. f.) Wess. Boer; 13) "Moriche" (*Mauritia flexuosa* L.f.); 14) Piritu (*Bactris guineensis* (L.) H.E. Moore); 15) "Palma Real de Caracas" (*Roystonea oleracea* (Jacq.) O.F.Cook; 16) "Id. de Guanare" (prob. *Roystonea* sp.); 17) "Palma de Sombrero" (*Sabal mauritiiformis* (H. Karst.) Griseb. & H. Wendl.); 18) "Amac." (unknown Palmae); 19) "Alvarico" (*Bactris* sp); 20) "Joropa" (Palmae); 21) Tirite (*Ischnosiphon arouma* (Aubl.) Körn. *Marantaceae*); 22) "Chiquichiqui" (*Leopoldinia piassaba* Wallace); 23) "Iounouriri" (*Attalea* sp.).
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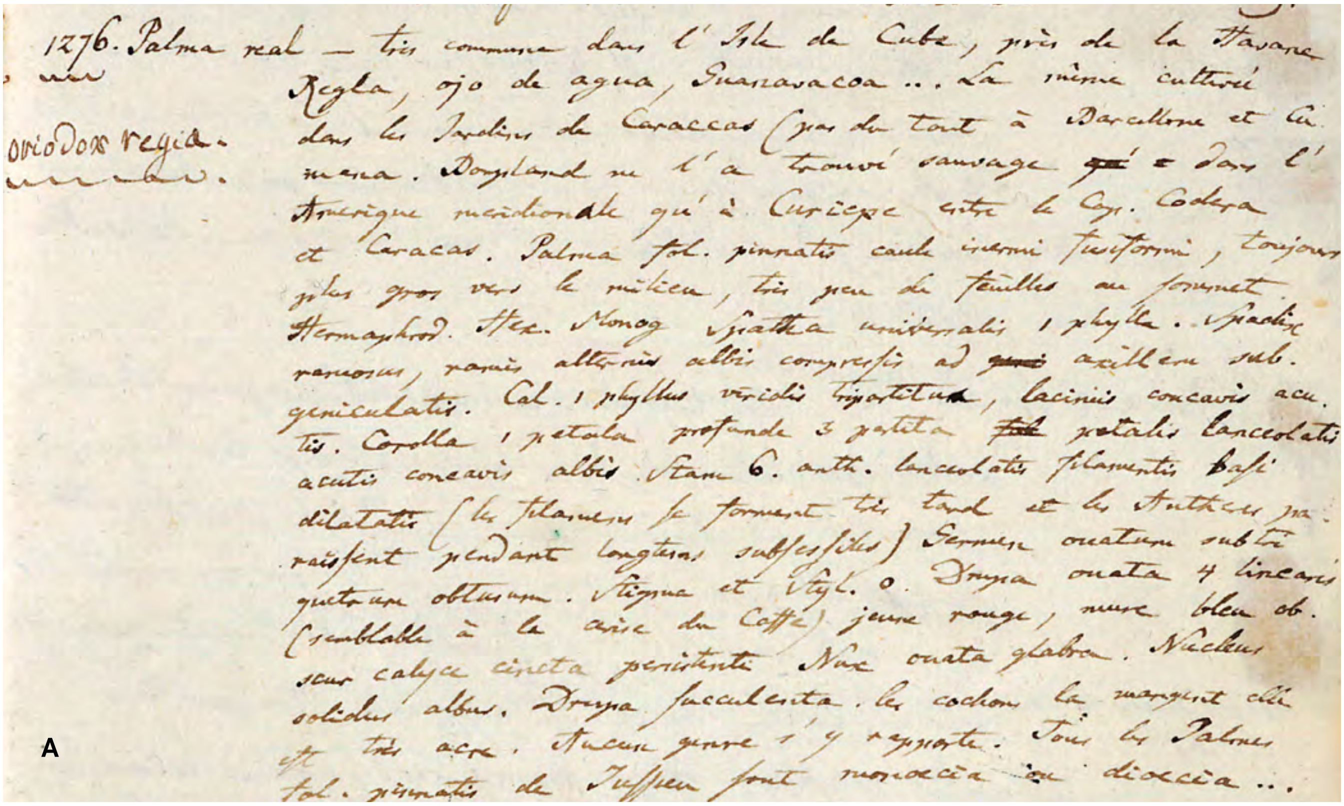
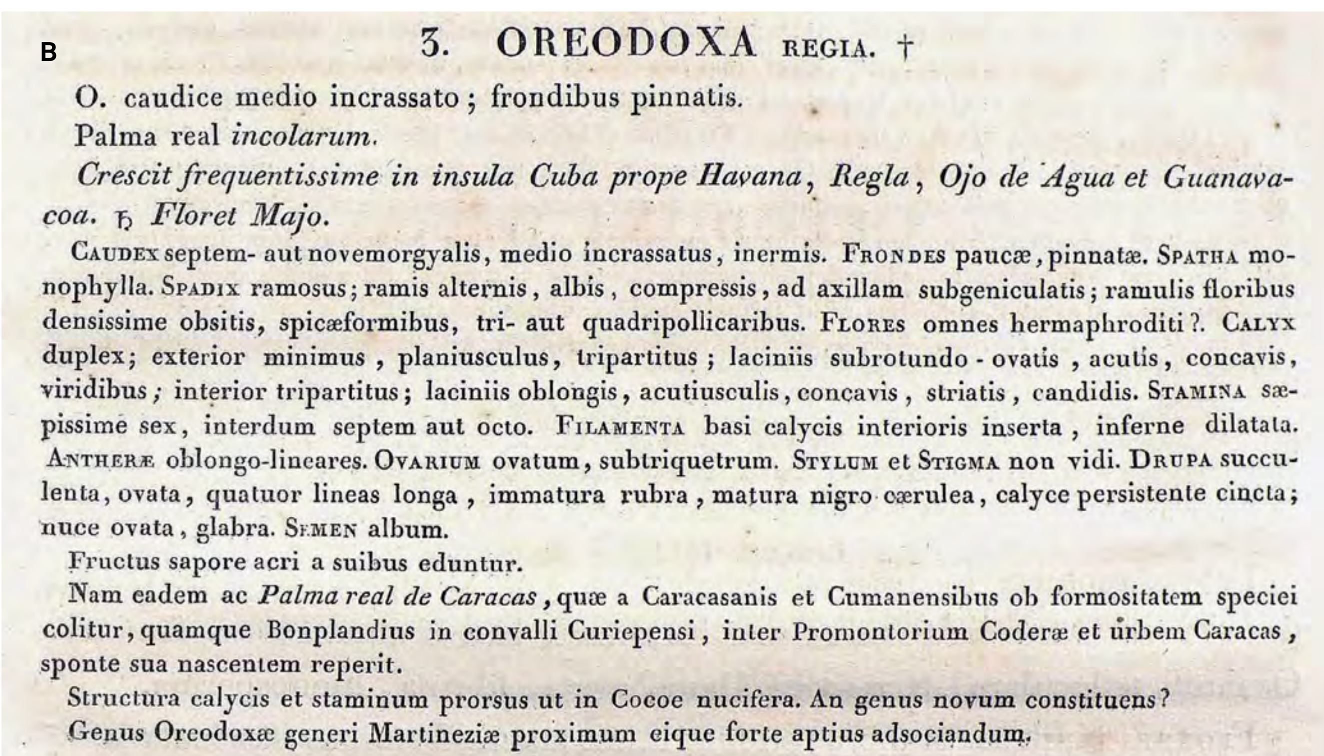

A

Oreodoxa regia.

1276. Palma real — très commune dans l'Isle de Cube, près de la Havane Regla, ojo de agua, Guanavacoa... La même cultivé dans les Jardins de Caraccas (pas du tout à Barcellone et Cumana. Bonpland ne l'a trouvé sauvage dans l'Amerique meridionale qu'à Curiepe entre le Cap. Codera et Caracas. Palma fol. pinnatis caule inermi fusiformi, toujours plus gros vers le milieu, très peu de feuilles au sommet. Hermaphrod. Hex. Monog. Spatha universalis 1 phylla. Spadix ramosus, ramis alternis albis compressis ad axillam sub. geniculatis. Cal. 1 phyllus viridis tripartitus, laciniis concavis acutis. Corolla 1 petala profunde 3 partita petalis lanceolatis acutis concavis albis. Stam. 6. anth. lanceolatis filamentis basi dilatatis (les filamens se forment très tard et les Anthères paraissent pendant longtems subsessiles) Germen ovatum subtriquetrum obtusum. Stigma et styl. 0. Drupa ovata 4 linearis (semblable à la cerise du Caffé) jeune rouge, mure bleu obseur calyce cincta persistente Nux ovata glabra. Nucleus solidus albus. Drupa succulenta. les cochons la mangent elle est très acre. Aucun genre n'y rapporte. Tous les Palmes fol. pinnatis de Jussieu sont monoecia ou dioecia..


B

3. OREODOXA REGIA. †

O. caudice medio incrassato; frondibus pinnatis.

Palma real *incolarum.*

Crescit frequentissime in insula Cuba prope Havana, Regla, Ojo de Agua et Guanavacoa. ♄ *Floret Majo.*

CAUDEX septem- aut novemorgyalis, medio incrassatus, inermis. FRONDES paucæ, pinnatæ. SPATHA monophylla. SPADIX ramosus; ramis alternis, albis, compressis, ad axillam subgeniculatis; ramulis floribus densissime obsitis, spicæformibus, tri- aut quadripollicaribus. FLORES omnes hermaphroditi?. CALYX duplex; exterior minimus, planiusculus, tripartitus; laciniis subrotundo-ovatis, acutis, concavis, viridibus; interior tripartitus; laciniis oblongis, acutiusculis, concavis, striatis, candidis. STAMINA sæpissime sex, interdum septem aut octo. FILAMENTA basi calycis interioris inserta, inferne dilatata. ANTHERÆ oblongo-lineares. OVARIUM ovatum, subtriquetrum. STYLUM et STIGMA non vidi. DRUPA succulenta, ovata, quatuor lineas longa, immatura rubra, matura nigro-cærulea, calyce persistente cincta; nuce ovata, glabra. SEMEN album.

Fructus sapore acri a suibus eduntur.

Nam eadem ac *Palma real de Caracas*, quæ a Caracasanis et Cumanensibus ob formositatem speciei colitur, quamque Bonplandius in convalli Curiepensi, inter Promontorium Coderæ et urbem Caracas, sponte sua nascentem reperit.

Structura calycis et staminum prorsus ut in Cocoe nucifera. An genus novum constituens?

Genus Oreodoxæ generi Martineziæ proximum eique forte aptius adsociandum.

Fig. 7. – Original descriptions of the royal Cuban Palm (*Oreodoxa regia* Humboldt & Bonpland ex Kunth). **A.** Entry 1276 in the "Journal Botanique" (MS 1332); **B.** Description of the species in *Nova genera* 1: 305. 1816.

Vernacular names. – “Palma de Corozo”, “Palma Real” (*Bonpland & Humboldt 1380* [P00669610]).

Notes. – According to O. Durbin (det. 2010) this taxon was probably based on two syntypes [*Bonpland & Humboldt 1380* (P-Bonpl) and *Bonpland & Humboldt 1379* (P)]; however, Kunth had only access to the collection *Bonpland & Humboldt 1380* deposited at P-Bonpl. [P00669610] for the description of the species and therefore the latter should be regarded as the holotype. The specimens associated to the collection n°1379 deposited at P [P00731480, P00731481] were permanently in the hands of Bonpland and never available to Kunth for the description of the new species; the latter should therefore not be regarded as type material.

3. ***Attalea amygdalina*** Kunth, Nov. Gen. Sp. 1 (ed. 4): 319. 1816.

Lectotypus (designated by Glassman, 1999: 36): **Colombia:** “Crescit in Provincia Chocoensis prope Zitara. Colitur in hortis prope Carthago et Guaduas”, s.d., *Bonpland & Humboldt s.n.* (P [P00752039]!; isolecto-: P-Bonpl. [grisaille]!).

Vernacular name. – “Palma Almendron” *(Bonpland & Humboldt s.n.).*

Notes. – Glassman (1999: 36) considered the specimen [P00752039] deposited at P as holotype of the species. However, as this collection was not available to Kunth for the description of the new species it cannot be considered as such; it can be nevertheless considered as an implicit lectotypification. A copper engraving of the inflorescence of this species is stored at P-Bonpl.

4. ***Bactris gasipaes*** Kunth, Nov. Gen. Sp. 1 (ed. 4): 302. 1816.

Typus: Colombia: “Crescit juxta urbem Ibague Novogranatensium”, s.d., *Bonpland & Humboldt s.n.* (holo-: P-Bonpl. [P00669607]!; iso-: P [P00731482]!).

Vernacular name. – “Gachipaes” *(Bonpland & Humboldt s.n.).*

Note. – A cupper engraving by Turpin is associated with the holotype in P-Bonpl.

5. *Bactris minor* Jacq., Select. Stirp. Amer. Hist. (ed. 2): 134. 1781.

= ***Bactris guineensis*** (L.) H.E. Moore in Gentes Herb. 9: 251. 1963.

Collection. – **Venezuela:** “Caripe”, s.d., *Bonpland & Humboldt 343* (B-W [BW17539020]!).

Notes. – No material associated to this palm was found in P-Bonpl. and P.

6. ***Ceroxylon alpinum*** Bonpl. ex DC. in Bull. Sci. Soc. Philom. Paris 3: 239. 1804.

– *Ceroxylon andicolum* Bonpl., Pl. Aequinoct. 1: 1. 1805 [nom. inval.].

Lectotypus (designated here): **Colombia:** “Crescit in montis Quindiuensis; Quindio”, s.d., *Bonpland & Humboldt 1844* (P [P00725216]!; isolecto-: FI!, P [P00725214, P00725215]!; P-Bonpl. [P00320011]!).

Vernacular name. – “Palma de Cera” *(Bonpland & Humboldt 1844).*

Notes. – The original publication does not provide any collection number for the type material but the original label bears the collection number *Bonpland & Humboldt 1844*. Sanin et al. (2011) pointed out that the holotype of the species was deposited at P, without designating any specific specimen. It cannot be accepted as an implicit lectotypification. Here we designate the specimen deposited at P [P00725216], with informative vegetative and reproductive structures and a complete original label, as the lectotype of the species and the remaining specimens at P, P-Bonpl. and FI considered as isolectotypes.

7. *Chamaerops mocinoi* Kunth, Nov. Gen. Sp. 1 (ed. 4): 300. 1816 [as *mocini*].

= ***Cryosophila nana*** (Kunth) Blume in Rumphia 2: 53. 1838.

Typus: Mexico: “Crescit in littore Mexicano Oceani Pacifici juxta portum Acapulci; Prope Acapulco”, s.d., *Bonpland & Humboldt s.n.* (holo-: M [M0208113]!).

Notes. – As indicated by Evans (1995) no original material associated to this species can be found in P and P-Bonpl., and therefore the specimen at M should be regarded as the holotype. It remains unclear for us the reason why this original material arrived to M, although the presence in this institution of the celebrated palm expert Martius may be associated to this fact.

8. *Cocos butyracea* Mutis ex L.f., Suppl. Pl. 454. 1782.

≡ ***Attalea butyracea*** (Mutis ex L.f.) Wess. Boer in Pittieria 17: 312. 1988.

Collection. – **Colombia:** “Crescit locis calidis et temperatis regni Novogranatensis ad ostia fluminis Sinu; item in convalle fluminis Magdalenae juxta Melgar, mesa de Cuello, Contreras et Ibague in radicibus Andium Quinduensium; in convalle Caucae prope Carthaginem”, s.d., *Bonpland & Humboldt 1380* (P [P01743347, P01743348, P01743349]).

Vernacular names. – "Palma real", "Palma dulce (Rio Sinu)", "Palma de Cuesco", "Palma de vino", "Corozo de los Marano (Convallis Caucae)" *(Bonpland & Humboldt 1380).*

Note. – No specimen was found at P-Bonpl.

9. *Cocos crispa* Kunth, Nov. Gen. Sp. 1 (ed. 4): 302. 1816.

≡ ***Acrocomia crispa*** (Kunth) C.F.Baker ex Becc. in Pomona Coll. J. Econ. Bot. 2: 364. 1912.

Typus: Cuba: "Crescit in insula Cubae inter Havanam et Regla", s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here): **Cuba:** Santa Clara, Serpentine hill "La Lanza", west of Manajanabo, 3.VIII.1915, fr., *León & Bro. Gustave 5292* (NY [NY1662973]!).

Vernacular name. – "Palma Barrigona" (Kunth, 1816).

Note. – The specimen of *León & Bro. Gustave 5292* (NY) from Cuba has been chosen as lectotype as it contains informative fragments of leaves (apical and mid-length portions) and entire inflorescence rachillae.

10. ***Cocos nucifera*** L., Sp. Pl. 2: 1188. 1753.

Collection. – **Venezuela:** "Crescit fere ubique locis maritimis; colitur rarius cum Phoenice locis calidis quae a littore distant, ideoque incolis sylvarum Guainiae, Cassiquiares et Atabapi fere ignota, Cumana", s.d., *Bonpland & Humboldt 558* (P [P01908493]).

Notes. – The treatment of this palm in the *Nova genera* does not provide any collection number but the label bears the collection number *Bonpland & Humboldt 558*. No specimen found at P-Bonpl.

11. *Corypha dulcis* Kunth, Nov. Gen. Sp. 1 (ed. 4): 300. 1816.

≡ ***Brahea dulcis*** (Kunth) Mart., Hist. Nat. Palm. 3: 244. 1838.

Typus: Mexico: "Crescit in temperatis Novae Hispaniae propre la Moxonera et Alto de las Caxas; item juxta Chilpantzingo et Masatlan", s.d., *Bonpland & Humboldt s.n.*, (holo-: P-Bonpl. [P00669606]!; iso-: F [F0075046]!, G [G00024755]!, M [M0208275]!, P [P00725562, P00725563, P00725564, P00725565, P00725566, P00725567]!, US [US00016174] image seen).

Vernacular name. – "Palma dulce" *(Bonpland & Humboldt s.n.).*

Notes. – The data on the label reads *Bonpland & Humboldt 3938*. The duplicate at F is a fragment from the P herbarium, whereas those at M and US are fragment from P-Bonpl. The duplicate at G is attributed to the Delessert original herbarium.

12. *Corypha maritima* Kunth, Nov. Gen. Sp. 1 (ed. 4): 298. 1816.

≡ ***Sabal maritima*** (Kunth) Burret in Repert. Spec. Nov. Regni Veg. 32: 101. 1933.

Lectotypus (designated here): **Cuba:** "Crescit in littore australi Insulae Cubae prope pagum Batabano", s.d., *Bonpland & Humboldt s.n.* (P [P00725626]!).

Notes. – The original publication does not provide any collection number for the type material but the original label of the specimen stored at P bears the collection number *Bonpland & Humboldt 1355*. Dahlgren (1959) pointed out that the holotype of the species was deposited at P-Bonpl. and this was corroborated by Zona (1995). We could not find any original material associated to this palm at P-Bonpl. and the only specimen associated to this taxon is currently stored in the P general collection. This material was never available to Kunth and his description of the palm in *Nova genera* was most probably based on the original field notes noted down in the "Journal Botanique". Therefore, the latter cannot be considered as the holotype of the species and is designated by us as the lectotype.

13. *Corypha miraguama* Kunth, Nov. Gen. Sp. 1 (ed. 4): 298. 1816.

≡ ***Coccothrinax miraguama*** (Kunth) Becc. in Webbia 2: 295. 1908.

Typus: Cuba: "Crescit in maritimis Insulae Cubae inter urbem la Trinidad, Puerto Casilda et ostia fluminis Guaurabo", s.d., *Bonpland & Humboldt 1356* (holo-: P-Bonpl. [P00669605]!; iso-: P [P00725687]!).

Vernacular name. – "Miraguama" *(Bonpland & Humboldt 1356).*

Notes. – The holotype was determined by O. Durbin in 2010. The original publication does not provide any collection number for the type material but the original label bears the collection number *Bonpland & Humboldt 1356*.

14. *Corypha nana* Kunth, Nov. Gen. Sp. 1 (ed. 4): 299. 1816.

≡ ***Cryosophila nana*** (Kunth) Blume in Rumphia 2: 53. 1838.

Typus: Mexico: "Crescit in calidissimis regni Mexicani, in summo monte Cuesta de los Pozuelos, inter Acapulpo et Masatlan", s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated by Evans, 1995: 53): **Mexico. State Jalisco:** along Mexico Hwy. 200 (Manzanillo-Puerto Vallarta), km 187.7 (0.6 km S of bridge over Río El Tuito), 20°7'00"N 105°17'30"W, 7.XII.1991, *Evans 239* (neo-: MICH; isoneo-: BH, CHAP, MO).

Vernacular name. – "Palmillo" (Kunth, 1816).

Note. – A neotype for this species *(Evans 239)* was designated by Evans (1995: 53).

15. *Corypha pumos* Kunth, Nov. Gen. Sp. 1 (ed. 4): 298-299. 1816.

≡ ***Sabal pumos*** (Kunth) Burret in Repert. Spec. Nov. Regni Veg. 32: 101. 1933.

Typus: Mexico: "Crescit in racidibus montis ignivomi Mexicani Jorullo et in alta planitie prope villam Agua Sarco", s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here): **Mexico. State Michoacan:** La Huacana and La Playa, near Rancho La Agua Blanca, *Zona 251* (RSA!).

Vernacular name. – "Pumos" (Kunth, 1816).

Notes. – As no original material was found in P-Bonpl. and P the specialist of this group, Scott Zona (FIU), has proposed as neotype for this taxon a fully informative specimen clearly corresponding to this taxon and collected by him near the region where the original material was sampled.

16. *Corypha tectorum* Kunth, Nov. Gen. Sp. 1 (ed. 4): 299. 1816.

≡ ***Copernicia tectorum*** (Kunth) Mart., Hist. Nat. Palm. 3: 243. 1838.

Lectotypus (designated here): **Venezuela:** "Crescit in vasta planitie Caracasano-Cumanensi, inter El Caiman, Tisnao, Calabozo, Uritucu, Guajaval, Villa del Pao, Cari et fluvios Apures et Orinoci", s.d., *Bonpland & Humboldt 796* (P [P00725627]!; isolecto-: FI!).

Vernacular names. – "Palma de cobija", "Palma redonda", "Palma de Sombrero" (Kunth, 1816).

Notes. – The original publication does not provide any collection number for the type material but the original label bears the collection number *Bonpland & Humboldt 796*. No original material was found in P-Bonpl. and the only specimen associated to this palm is stored at P. This material was never available to Kunth and his description of the palm in *Nova genera* was most probably based on the original field notes noted down in the "Journal Botanique". We designate the specimen stored at P as lectotype of the species with a fragment at FI (Cuccuini & Nepi, 2006).

17. *Jubaea spectabilis* Kunth, Nov. Gen. Sp. 1 (ed. 4): 308. 1816.

= ***Jubaea chilensis*** (Molina) Baill., Hist. Pl. 13: 397. 1895.

Collection. – **Colombia:** "Crescit in regno Chilense; colitur in hortibus juxta urbem Popayan", s.d., *Bonpland & Humboldt s.n.* (P-Bonpl. [P00669611]!).

Vernacular name. – "Coquito de Chile" *(Bonpland & Humboldt 2036)*.

Notes. – The original publication does not provide any collection number for this palm but the original label of the specimen stored under the name *Jubaea spectabilis* Kunth at P-Bonpl. bears the collection number *Bonpland & Humboldt 2036*. This specimen does not correspond to the genus *Jubaea*, as already noted by Max Burret (s.d.), who identified the material as *Bactris gasipaes* Kunth. Therefore, the specimen at P-Bonpl. cannot be regarded as the type of *Jubaea spectabilis* Kunth. The plate 96 of *Nova genera* was chosen by Glassman (1987: 120) as lectotype of the species.

18. *Kunthia montana* Bonpl., Pl. Aequinoct. 2: 128. 1813.

= ***Chamaedorea linearis*** (Ruiz & Pav.) Mart., Hist. Nat. Palm. 2: 5. 1823.

Typus: Colombia: "Crescit locis montosis, temperatis regni Novae Granatae", s.d., *Bonpland & Humboldt s.n.* (holo-: P [P0072535]!; iso-: P-Bonpl. [P00669608]!).

Vernacular name. – "Canha de la víbora" *(Bonpland & Humboldt s.n.)*.

Note. – The material stored at P should be regarded as the holotype as this was the only material available to Bonpland when he proposed the new species.

19. *Martinezia caryotifolia* Kunth, Nov. Gen. Sp. 1 (ed. 4): 305. 1816 [as *caryotaefolia*].

Lectotypus (first step designated by Borchsenius & Bernal, 1996: 46; second step designated here): **Colombia:** "Crescit locis calidis et temperatis in monte Quindiu, ad ripas Orinoci, Casiquiares et Atabapi: colitur in hortis prope Ibague et Carthago Popayanensium Quindio, Nouvelle Grenade", s.d., *Bonpland & Humboldt 1888* (P [P00726007]!; isolecto-: P [P00726006, P00726008]!, P-Bonpl [grisaille]!).

= ***Aiphanes horrida*** (Jacq.) Burret in Notizbl. Bot. Gart. Berlin-Dahlem 11: 575. 1932.

Vernacular name. – "Palma corozo" *(Bonpland & Humboldt 1888).*

Notes. – The original publication does not provide any collection number for the type material but the original label bears the locality and collection number: Nouvelle Grenade, *Bonpland & Humboldt 1888*. The grisaille present at P-Bonpl. presents corrections that most probably hindered its publication in *Nova genera*. Borchsenius & Bernal (1996) designated *Bonpland & Humboldt 1888* at P as lectotype. A second-step lectotypification is required as three specimens exist at P. The lectotype is the most complete specimen and bears a middle pinna and informative inflorescence rachillae fragments.

20. *Mauritia aculeata* Kunth, Nov. Gen. Sp. 1 (ed. 4): 311. 1816

≡ ***Mauritiella aculeata*** (Kunth) Burret in Notizbl. Bot. Gart. Berlin-Dahlem 12: 609. 1935.

Typus: Venezuela: "Crescit in ripa fluminis Atabapo", s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here): **Venezuela. Edo. Amazonas:** Mpio. Autana, entre el Río Orinoco (boca del Río Sipapo) y Piedra Chamí, 120 m, 15.IV.1997, *Stauffer & Castillo 342* (VEN!; isoneo-: G [G00305453]!).

Notes. – The specimen of *Stauffer & Castillo 342* with informative vegetative and reproductive organs, was collected in the region where the original material was gathered and therefore chosen as good replacement of the type material.

21. ***Mauritia flexuosa*** L. f., Suppl. Pl. 454. 1782.

Collection. – **Venezuela:** "Crescit locis humidis planis Prov. Cumanensis et Caracasanae, ad hostia Orinoci et prope montem Duida, Angostura (Orinoco)", s.d., *Bonpland & Humboldt 1068* (B-W [BW18433010], P-Bonpl. [P00669612]).

Vernacular names. – "Murichi", "Moriche", "Arbol de vida de los Guaraunos" (Kunth, 1816).

Notes. – The treatment of this species in *Nova genera* does not provide any collection number for the material but the label bears the collection number *Bonpland & Humboldt 1068*.

22. *Oreodoxa frigida* Kunth, Nov. Gen. Sp. 1 (ed. 4): 304. 1816.

= ***Prestoea acuminata*** (Willd.) H.E. Moore in Gentes Herb. 9: 286. 1963.

Typus: Colombia: "Crescit locis scopulosis, montanis Andium Quindiuensium inter El Azufral et Los Galiegos", s.d. *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here): **Colombia. Dto. de Caldas:** entre Circasia y Pereira, cerca del Alto de El Roble, 2200 m, 16.VII.1941, *Dugand 2984* (COL!).

Vernacular name. – "Palmito" (Kunth, 1816).

Notes. – Henderson & Galeano (1996) pointed out that the type specimen of this taxon was deposited at P; however, no specimen associated with this palm could be found in the frame of our study. We propose here as neotype the specimen *A. Dugand 2984* (COL) as it was collected in a region that is relatively close to the area where the type specimen was gathered.

23. *Oreodoxa regia* Humboldt & Bonpland ex Kunth, Nov. Gen. Sp. 1 (ed. 4): 305. 1816.

≡ ***Roystonea regia*** (Humboldt & Bonpland ex Kunth) O.F. Cook in Science ser. 2, 12: 479. 1900.

Typus: Cuba: "Crescit frequentissime in insula Cuba prope Havana, Regla, Ojo de Agua et Guanavacoa" [data in the publication], s.d., *Bonpland & Humboldt 1276* (holo-: P-Bonpl. [P00669609]!; iso-: P [P0072518]!).

Vernacular name. – "Palma real" *(Bonpland & Humboldt 1276).*

Notes. – The type specimen in P has been identified by Moore in 1977 and confirmed by Zona in 1993 and Espejo & Lopez in 1997.

24. *Oreodoxa sancona* Kunth, Nov. Gen. Sp. 1 (ed. 4): 304. 1816.

Typus: Colombia: "Crescit rarius in convalle fluminis Caucae, juxta pagum Roldanilla, inter urbem Carthagenis et villam El Naranjo", s.d., *Bonpland & Humboldt s.n.* (P & P-Bonpl., not found).

Neotypus (designated here) : **Colombia. Dto. Cundinamarca :** Guaduas (Bogotá), s.d., *Karsten s.n.* (LE!).

= ***Syagrus sancona*** H. Karst. in Linnaea 28 : 247. 1856.

Vernacular name. – "Palma sancona" (Kunth, 1816).

Notes. – The combination *Syagrus sancona* (Kunth) H. Karst. proposed by Govaerts et al. (2016) should be considered as invalid given that Karsten (1856) stated that the species that he described had not to be mistaken with the *Oreodoxa sancona* Kunth. Recent studies on Colombian palms (i.e. Galeano & Bernal, 2010 ; pers. obs.) allow to confirm that the palms collected by Bonpland and Humboldt and later by Karsten in the Cauca Valley of Colombia, should be regarded as the same taxon. In order to maintain the link between these names we propose as neotype of *Oreodoxa sancona* Kunth the specimen that Glassman (1987 : 70) designated as lectotype of *Syagrus sancona* Karst.

25. *Phytelephas macrocarpa* Ruiz & Pav., Syst. Veg. Fl. Peruv. Chil. 1 : 301. 1798.

= ***Phytelephas macrocarpa*** subsp. ***schottii*** (H. Wendl.) Barfod in Opera Bot. 109 : 60. 1991.

Collection. – **Peru and Chili :** "Peruv et Chil.", s.d., *Bonpland & Humboldt 1596* (P [P01797373], P-Bonpl. [P00669613]).

Vernacular name. – "Cabeza de Negro" *(Bonpland & Humboldt 1596).*

Discussion

The very first efforts towards the inventory and description of Neotropical palms started during the late XVIII century and can be attributed to Nicolaus Joseph von Jacquin (3 spp.), Carl von Linnaeus (1 sp.) and Ruiz and Pavon (13 species). The important collecting efforts undertaken by Humboldt and Bonpland between 1799 and 1804 added 20 new species to the inventory and first highlighted the amazing taxonomic and morphologic diversity of American palms. Humboldt (1817) encouraged "… future travellers and explorers to better document palms"; it is clear that the collection efforts accomplished by the two explorers largely inspired the massive accumulation of collections and taxonomical knowledge that followed decades later by botanists such as Martius, d'Orbigny, Trail, Wallace, Spruce and Poeppig, among others. In spite of its critical importance for our understanding of the taxonomy and nomenclature of Neotropical palms, efforts towards the typification of the names associated with the palms issued from the expedition have been fragmentary and associated with specific palm groups, for example Glassman (1987, *Syagrus*) ; Borchsenius & Bernal (1996, *Aiphanes*), Evans (1995, *Chryosophilla*), and Sanin & Galeano (2011, *Ceroxylon*). Our broad study of the collection proposes six neotypes and four lectotypes, clarifies the taxonomic status for the remaining palm taxa, and aims to bring additional awareness to the importance of an accurate interpretation of the Bonpland and Humboldt specimens in their various repositories.

Our analysis of the Royal Cuban Palm shows that the study of original documents associated with the expedition may offer new ways to interpret the authorities attributed to the palm names and certainly may be useful for the interpretation of names in other plant families. It is clear that, without undertaking the same comparison for the other 19 palm names, we cannot generalize whether our proposal on the authority of the palm names can be extrapolated to the other taxa. Conventional wisdom points out that Kunth holds the overall responsibility for the names published in *Nova genera* ; however, further studies of the original field notes in the "Journal Botanique" may shed some light toward a more accurate definition of the authorities associated with the names issued from the expedition. Indeed, the analysis of the massive data contained in these notes, fundamental for our interpretation of the associated type specimens, will only be possible once the 7 volumes have been digitized and made available online.

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References

Arroyo-Leuenberger, S. & B.E. Leuenberger (1996). Type specimens of names in American Amaryllidaceae at the Berlin-Dahlem herbarium (B and B-W). *Willdenowia* 25 : 693-702.

Barnhart, J.H. (1902). Dates of the "Nova Genera" of Humboldt, Bonpland and Kunth. *Bull. Torrey Bot. Club* 29 : 585-598.

Borchsenius, F. & R. Bernal (1996). Aiphanes (Palmae). *Fl. Neotrop. Monogr.* 70.

Cuccuini, P. & C. Nepi (2006). The Palms of Odoardo Beccari. *Quad. Bot. Amb. Appl.* 17.

Dahlgren, B.E. (1959). Index of American Palms. *Field. Mus. Nat. Hist., Bot. Ser.* 14.

Delprete, P.G. (2001). The Neotropical Rubiaceae collected by Humboldt and Bonpland and described by Bonpland, Kunth, and Roemer and Schultes. *In:* Aymard, G. (ed.), Alexander von Humboldt: homenaje al bicentenario de su llegada a tierras venezolanas. *BioLlania* 7 : 22-51.

Evans, R.J. (1995). Systematics of Cryosophila (Palmae). *Syst. Bot. Monogr.* 46.

Glassman, S.F. (1987). Revisions of the palm genus Syagrus Mart. and other selected genera in the Cocos alliance. *Illinois Biol. Monogr.* 56.

Glassman, S.F. (1999). A taxonomic treatment of the palm subtribe Attaleinae (tribe Cocoeae). *Illinois Biol. Monogr.* 59.

Govaerts, R., J. Dransfield, S.F. Zona, D.R. Hodel & A. Henderson (2016). *World Checklist of Arecaceae.* Facilitated by the Royal Botanic Gardens, Kew [http ://apps.kew.org/wcsp].

Granados Tochoy, J.C., S. Knapp & C.I. Orozco (2007). Solanum humboldtianum (Solanaceae): an endangered new species from Colombia rediscovered 200 years after its first collection. *Syst. Bot.* 32 : 200-207.

Henderson, A. & G. Galeano (1996). Euterpe, Prestoea and Neonicholsonia (Palmae). *Fl. Neotrop. Monogr.* 72.

Hind, D.J.N. & C. Jeffrey (2001). A checklist of the Compositae of vol. IV of Humboldt, Bonpland & Kunth´s Nova Genera et Species Plantarum. *Compositae Newslett.* 37 : 1-84.

Humboldt, F.W.H.A. von & A.J. Bonpland (1805-1817). *Plantæ æquinoctiales*. 2 vol. Tübingen.

Humboldt, F.W.H.A. von, A.J. Bonpland & C.S. Kunth (1816-1825). *Nova Genera et Species Plantarum*. 7 vol. Paris.

Humboldt, F.W.H.A. von (1849). *Ansichten der Natur mit wissenschaftlichen Erläuterungen*. Vol. 2. Stuttgart & Tübingen.

Index Herbariorum (2016). *A global directory of public herbaria and associated staff.* New York Botanical Garden's Virtual Herbarium [http ://sweetgum.nybg.org/ih/].

Knapp, S. (2007). The description of Solanum and other Solanaceae collected by Humboldt and Bonpland: a case study of collaboration versus competition in 19th century taxonomy. *Bot. Jahrb. Syst.* 127 : 117-132.

Lack, H.W. (2003). Alexander von Humboldt und die botanischen Sammlungen in Berlin. *Algorismus* 41 : 107-132.

Lack, H.W. (2004a). The botanical field notes prepared by Humboldt and Bonpland in tropical America. *Taxon* 53 : 501-510.

Lack, H.W. (2004b). Botanische Feldarbeit: Humboldt und Bonpland im tropischen Amerika (1799–1804). *Ann. Naturhist. Mus. Wien*. 105 : 493-514.

Lack, H.W. (2009). *Alexander von Humboldt and the botanical exploration of the Americas*. Prestel Verlag.

Leuenberger, B.E. & S. Arroyo-Leuenberger (2006). Humboldt, Bonpland, Kunth and the type specimen of Rauhia multiflora (Amaryllidaceae) from Peru. *Willdenowia* 36 : 601-609.

Mori, S.A., C. Gracie, M. Hoff & T. Kirchgessner (2002). *Checklist of the gymnosperms and flowering plants of central French Guiana*. New York Botanical Garden and Muséum national d'Histoire naturelle de Paris.

Romero-González, G. (2001). Alexander von Humboldt's legacy in Venezuela. *N. E. Naturalist* 8 (Special Issue 1): 33-42.

Sandwith, N.Y. (1925). Humboldt and Bonpland's itinerary in Venezuela. *Bull. Misc. Inform. Kew.* 1925 : 295-319.

Sanín, M.J. & G. Galeano (2011). A revision of the Andean wax palms, Ceroxylon (Arecaceae). *Phytotaxa* 34 : 1-64.

Stafleu, F.A. & R.S. Cowan (1979). Taxonomic literature, ed. 2 : 2. *Regnum Veg.* 98.

Stauffer, F.W. (1999). Datos preliminares a la actualización de la flora de palmas (Arecaceae) de Venezuela. *Acta Bot. Venez.* 22 : 77-107.

Stauffer, F.W. (2000). Contribución al estudio de las palmas (Arecaceae) del Estado Amazonas, Venezuela. *Sci. Guayanae* 10.

Stauffer, F.W., J. Stauffer & L.J. Dorr (2012). Bonpland and Humboldt specimens, field notes, and herbaria; new insights from a study of the monocotyledons collected in Venezuela. *Candollea* 67 : 75-130.

Zona, S. (1996). Roystonea (Arecaceae, Arecoideae). *Fl. Neotrop. Monogr.* 71.