

Reestablishment of *Euterpe longevaginata* as a species distinct from *E. precatoria* and their respective typifications

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- Arecaceae
- Martius
- neotropical biodiversity
- lectotype
- epitype

Palavras-chave:

- Arecaceae
- Martius
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Abstract

The Euterpeae tribe of palms (Arecaceae) is a key structural element in South American rainforests. In the most recent revisional study of the genus *Euterpe*, *Euterpe longevaginata* was treated as a variety of *E. precatoria*, even though the authors of that revision did not find the type specimen of the first binomial. Our survey of available records in virtual repositories indicated that both taxa are predominantly allopatric and occur in distinct environments. Additionally, there are recent data on population genetics and molecular phylogeny suggesting that *E. precatoria* var. *longevaginata* forms a lineage more closely related to two species other than *E. precatoria* var. *precatoria*. These findings support the recognition of *E. longevaginata* as a separate species from *E. precatoria*, as we propose herein. We clarified that a previously selected lectotype for *E. precatoria* fixes the application of this name. Since our search for the *E. longevaginata* type specimen (d'Orbigny 48, Bolivia, Cochabamba) in European herbaria was unsuccessful, we have designated one of the illustrations from the protologue as lectotype and proposed an epitype to fix the application of this name. This study shows that controversial taxonomic circumscriptions may be greatly improved through reassessment with new geographical, ecological, and molecular data.

Resumo

A tribo Euterpeae de palmeiras (Arecaceae) é um elemento estrutural chave das florestas tropicais sul-americanas. Na revisão mais recente do gênero *Euterpe*, *Euterpe longevaginata* foi tratada como uma variedade de *E. precatoria*, embora o espécime-tipo do primeiro binômio não tenha sido localizado pelos autores dessa revisão. Nossa análise dos registros disponíveis em repositórios virtuais indicou que ambos os táxons são majoritariamente alopatridos e ocorrem em ambientes distintos. Além disso, dados recentes de genética de populações e uma filogenia molecular sugerem que *E. precatoria* var. *longevaginata* forma uma linhagem mais proximamente relacionada a duas outras espécies do que à *E. precatoria* var. *precatoria*. Esses achados sustentam o reconhecimento de *E. longevaginata* como uma espécie distinta de *E. precatoria*, conforme propomos neste estudo. Nós esclarecemos que o lectótipo para *E. precatoria* foi previamente escolhido e isto fixa a aplicação deste nome. Devido a busca infrutífera pelo espécime-tipo de *E. longevaginata* (d'Orbigny 48, Bolívia, Cochabamba) nos herbários europeus, designamos aqui como lectótipo uma das ilustrações do protólogo, bem como um epítipo para ajudar na aplicação deste nome. Este estudo demonstra que delimitações taxonômicas controversas podem ser significativamente aprimoradas por meio de uma reavaliação com novos dados geográficos, ecológicos e moleculares.

Short Communications

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The palms (Arecaceae/Palmae) of the tribe Euterpeae are a significant structural component of South American tropical rainforests and a valuable economic resource for local populations (Henderson *et al.* 1995; Silva-Matos *et al.* 1999; ter Steege *et al.* 2013; Souza & Prevedello 2019). Some species, such as *Euterpe precatoria* Martius (1842: 10), *Euterpe oleracea* Martius (1824: 29), and *Oenocarpus bataua* Martius (1823: 23), which occur in the Amazon Forest, and *Euterpe edulis* Martius (1824: 33) from the Atlantic Forest, rank among the most abundant tree species in these neotropical forests (Galetti & Aleixo 1998; Silva-Matos *et al.* 1999; ter Steege *et al.* 2013; Souza & Prevedello 2019). *Euterpe* is distinguished from other genera in the family mainly by the presence of a prominent crownshaft and inflorescences densely covered with trichomes/scales (Henderson & Galeano 1996), and its seven species are “easily recognizable by their slender, grey stems [...] and narrow, pendulous leaflets” (Henderson *et al.* 1995). Some species are noteworthy for their economic importance, mainly in Brazil, such as “açaí” (*E. oleracea*) and “juçara” or “palmito” (*E. edulis*).

Most original species designations of *Euterpe* can be found in two major historical publications by Carl F. P. von Martius: “Historia naturalis palmarum: opus tripartitum” (Martius *et al.* 1823–1850), and the treatment of the palms in A. d’Orbigny’s “Voyage dans l’Amérique Méridionale” (Martius 1842–1847). In this latter work, the protologue of *E. precatoria* included the following description: “*Euterpe* with a tall (36 ft) and straight stem; open leaves with sheaths rolled into a cylindrical shape; the rachis three times shorter; pinnae closely spaced, loosely hanging, linear, and long-acuminate; spadices inserted below the sheaths, slightly tomentose with a ferruginous colour; flowers densely clustered and yellowish, with widely lanceolate and acute male flower petals; globose fruits with a uniform kernel.” The original cited gathering (*i.e.*, BOLIVIA. MOXOS: d’Orbigny 27) was carried out in the forests of the Amazon Basin, at a latitude around the 13th parallel south (Voyage dans l’Amérique Méridionale 7(3): 10–11, t. 8, f. 2, t. 18a. 1842–1847).

In contrast, *Euterpe longevaginata* Martius (1842: 11) was characterized in that same monograph as “*Euterpe* with a medium-height (15 ft) and straight stem; few open leaves (5–6) [...] The species is easily distinguished from its congeners by the extraordinary extension of the sheath’s cylindrical form and the size of the fruits [...] It grows among rocks, in an extremely rugged landscape with the most daunting precipices, occupying only a restricted zone around mid-elevation on the mountain slopes, at the beginning of the active growing season. It is an uncommon species” (Martius in A. d’Orbigny. Voyage dans l’Amérique Méridionale 7(3): 11–12, t. 12, f. 1, t. 17c. 1842–1847).

In the protologue, the subsequent gathering plus illustrations were cited as follows: “Palmier d’Altamachi, d’Orb., n. 48, cum icone.”

In a census of New World palms, Glassman (1972) did not mention a type when referring to *Euterpe precatoria* and expressed uncertainty regarding the locality of the original material: “d’Orbigny 27 - P?”. For *E. longevaginata*, the author mentioned the syntype “d’Orbigny 48 - P”. However, because he did not use the word type or an equivalent term, he did not typify the name according to Art. 7.11 (Prado *et al.* 2015; Turland *et al.* 2025). This original material is seemingly lost at P and, so far, no previous authors have been able to find a duplicate of it elsewhere.

In the taxonomic revision of *Euterpe*, Henderson & Galeano (1996) recognized *E. longevaginata* as a variety of *E. precatoria*. Additionally, they cited the gatherings previously mentioned by Martius (1842–1847) for *E. precatoria* and *E. longevaginata* as holotypes. The term holotype is inappropriate for referring to these specimens because Martius (1842–1847) cited one gathering plus at least one illustration in the original description for both taxa. The specimen and the illustration(s) for each name are, by definition, syntypes (Art. 9.6; Turland *et al.* 2025). As Martius did not designate a holotype for these names, one lectotype should now be designated to fix the application of *E. longevaginata* plus an epitype; for *E. precatoria*, Henderson & Galeano (1996) had already selected a lectotype, and during our search we found a duplicate of the lectotype at P. However, Henderson & Galeano (1996) mentioned that the nomenclatural type for *Euterpe precatoria* var. *longevaginata* (Mart.) Henderson (1995: 111) was not located at that time, highlighting that it was inaccessible within the collection of the Muséum National d’Histoire Naturelle, in Paris (France), and because of this, he stated: “This name is interpreted from the original description and more-recent collections from the type locality. The types of two other names, *Euterpe karsteniana* Engel (1865: 670) and *Euterpe leucospadix* H. Wendl. ex Hemsley (1885: 401) have also not been located. These, too, are interpreted from the original descriptions and more recent collections from the type localities.”

Despite these challenges related to nomenclatural types, current evidence from phylogeny and spatial and environmental factors consistently support the need for reevaluating the synonymization proposal. In this work, we made a survey of all records of those two taxa available in virtual repositories, in order to assemble geographical and ecological information, as well as advanced searches for their type specimens and current data on population genetics and phylogeny of the genus.

This review was based on the analysis of the two varieties of *Euterpe precatoria*, assembling all available data that specifies either the species or the infraspecific epithets, to achieve a more comprehensive approach. Other binomials historically reported as synonyms of *E. precatoria* or *E. longevaginata* will be examined in a future study. Initially, we conducted a thorough analysis of the literature, along with the geographic distribution of the taxa obtained from GBIF (<<https://www.gbif.org>>), the speciesLink network (<<https://specieslink.net>>), and the Herbário Virtual Reflora (<<https://reflora.jbrj.gov.br>>), focusing on South American data, due to the inconsistencies found in the identification of the local entities from Central America. The records surveyed for both varieties are presented in the Supplementary Material at <<https://doi.org/10.6084/m9.figshare.30535415.v1>>. We also carried out a careful search in virtual repositories for type specimens in European herbaria, as well as personal communications with their Arecaceae curators. The taxonomic reestablishment proposed here was delimited using an integrative approach based on available molecular, morphological, and biogeographic data,

following the Phylogenetic Species Concept (PSC), which defines species as “the smallest aggregation of (sexual) populations or (asexual) lineages diagnosable by a unique combination of character states” (Nixon & Wheeler 1990; Wheeler & Platnick 2000). The typification presented here was carried out under the rules and recommendations of the Madrid Code (Turland *et al.* 2025).

Firstly, our analysis of the geographic distribution of the available herbarium records from the two taxonomic entities focused on here (whether varieties or species) revealed that they are almost allopatric, with a very narrow area of sympatry (Fig. 1), mainly to the East of the Andes, and occasionally in Western Colombia. Furthermore, each is associated with markedly contrasting environmental conditions. *Euterpe longevaginata* generally occurs in cloud forests along the Andes, and when found in lowland areas, it is mainly associated with the moist forest formations located on the Western side of the Andes, such as the Chocó region, as previously described by Henderson & Galeano (1996). According to these authors, *E. precatoria* var. *precatoria* inhabits “lowland tropical forest, commonly along rivers in seasonally flooded areas, below 350 m, occasionally reaching 600 m in

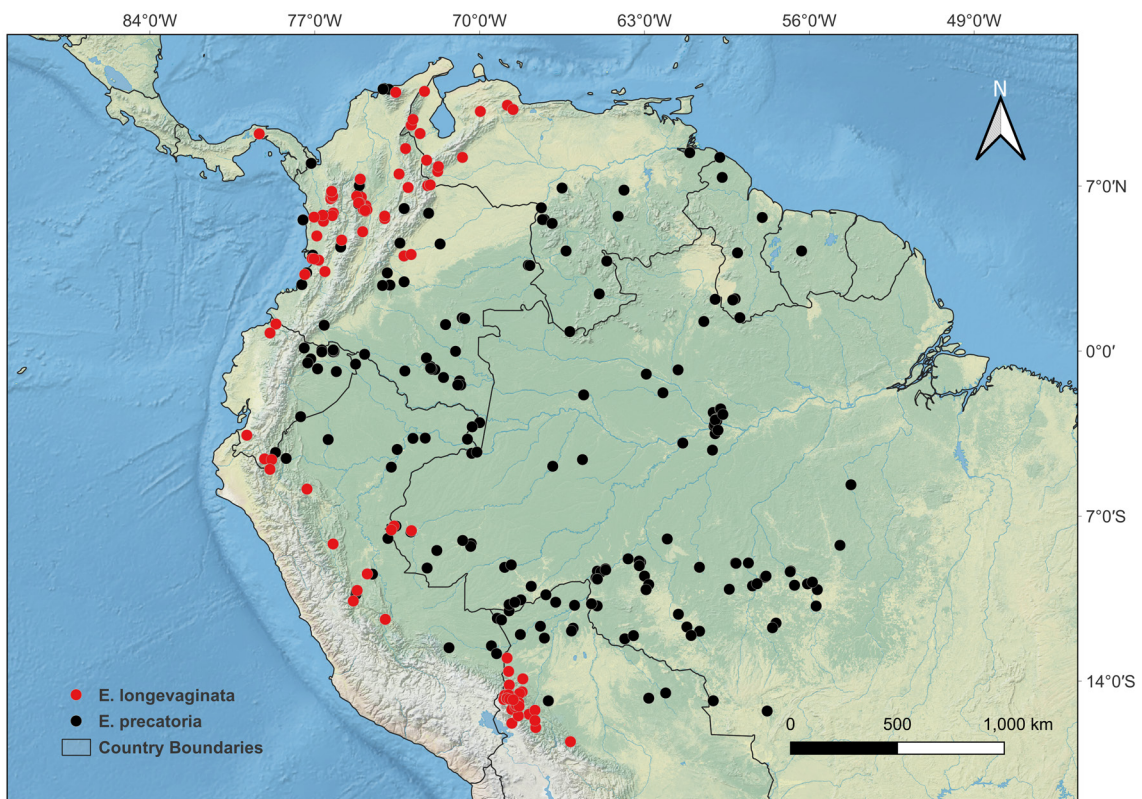


Figure 1 – Distribution of *Euterpe longevaginata* (red dots) and *E. precatoria* (black dots) mainly in South America, based on data available from the virtual repositories.

the Andes and the Guiana Shield,” while *E. precatoria* var. *longevaginata* occurs in “forested areas on slopes and mountain summits, or in lowland areas, from 0 to 2,000 m”.

Additionally, Barreiro Sánchez (2013) identified the formation of distinct genetic groups concerning the two varieties of *Euterpe precatoria*, based on data using nine microsatellite markers and obtained from approximately 200 specimens of both varieties across 58 locations in Bolivia, Colombia, Ecuador, and Peru. That study revealed that even in the few areas where plants from both varieties occur sympatrically, none of the sampled individuals exhibited mixed genotypes, indicating that effective barriers to gene flow are underway. A clearly distinct genetic group was formed exclusively by *E. precatoria* var. *longevaginata*, consistent with its largely segregated distribution, which was restricted to the Andes and the Chocó region, when compared to *E. precatoria* var. *precatoria*. These data strongly support the recognition of two distinct species.

The most striking recent evidence towards a better taxonomic treatment for these two entities comes from phylogenetic analyses. Pichardo-Marciano *et al.* (2019) reconstructed a phylogeny of the tribe Euterpeae using sequencing of four DNA regions (three nuclear and one from chloroplast: *trnD-trnT*, *CISP4*, *WRKY6*, *RPB2*) with sampling that included 82% of the tribe’s species. They obtained high support values (Bayesian probabilities > 0.95, Maximum Likelihood bootstrap values > 90%) for the relationships among five of the seven analysed *Euterpe* species, including both varieties of *Euterpe precatoria* recognized by Henderson & Galeano (1996) (Fig. 2). In the study, *Neonicholsonia* emerges as sister to *Euterpe*. The varieties of *E. precatoria* did not form a monophyletic group, since *E. precatoria* var. *longevaginata* emerged as sister to *Euterpe broadwayi* Becc. ex Broadway (1916: 174), a species from the Lesser Antilles and Trinidad and Tobago.

Furthermore, both species form a clade which is sister to *Euterpe catinga* Wallace (1843), a typical palm from the Amazonian highlands. Even more surprisingly, the typical variety of *E. precatoria* emerges as sister to *E. edulis*, the “juçara” palm of the Atlantic Forest, and is thus not closely phylogenetically related to *E. precatoria* var. *longevaginata*.

Hence, in light of all the data currently available from different sources of evidence, we propose the reestablishment of *Euterpe longevaginata* as a distinct species and not closely related to *E. precatoria*.

Nevertheless, our search for a type specimen of *Euterpe longevaginata* in the virtual repositories of European herbaria was unsuccessful. The Arecaceae curators were unable to trace it in P (Paris, France, Marc Jeanson, personal communication), as the supposed original repository of the syntypes; nor was it traced in BR (Meise, Belgium, Ann Bogaerts, personal communication), nor in G (Geneva, Switzerland, Fred Stauffer, personal communication), nor in M (Munich, Germany, Hans-Joachim Esser, personal communication), which are known to house Martius’s original collections and types of names he described based on collections by other botanists (Stafleu & Cowan 1981). Since the original syntype specimen of *E. longevaginata* is considered lost, we here designate as lectotype one of the original illustrations (under Art. 9.12 of the Madrid Code (Turland *et al.* 2025) from the protologue (Fig. 3), as follows:

Euterpe longevaginata Mart. in d’Orbigny, Voy. Amér. MÉR. 7(3): 11–12, t.12, fig.1, t.17C (1842). Syntypes: “Palmier d’Altamachi, d’Orb., n. 48, cum icone.”. Syntype: previously mentioned by Glasmann (1972: 120) at P, lost. Lectotype (here designated): Illustration in Martius, Voy Amér. MÉR. 7(3): t.17C! (1842). Epitype (here designated): Bolivia, La Paz, 6 Dec 1985, A.J. Henderson 522 (NY02324367, image!). Fig. 3.

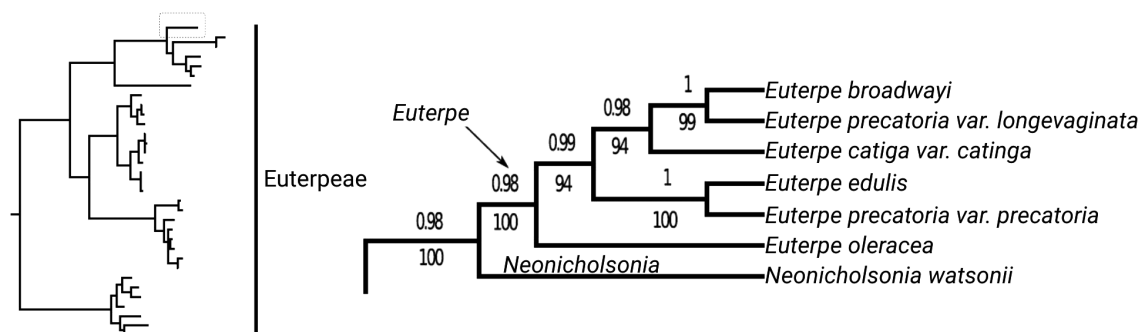


Figure 2 – Maximum clade credibility tree of the tribe Euterpeae with a highlight in the *Euterpe* clade, based on Bayesian inference derived from the combined analysis of three nuclear DNA markers and one chloroplast DNA marker. The values above the branches represent Bayesian posterior probabilities (pp > 0.8), and the values below the branches indicate Maximum Likelihood bootstrap support (BS > 60) (adapted from Pichardo-Marciano *et al.* 2019).

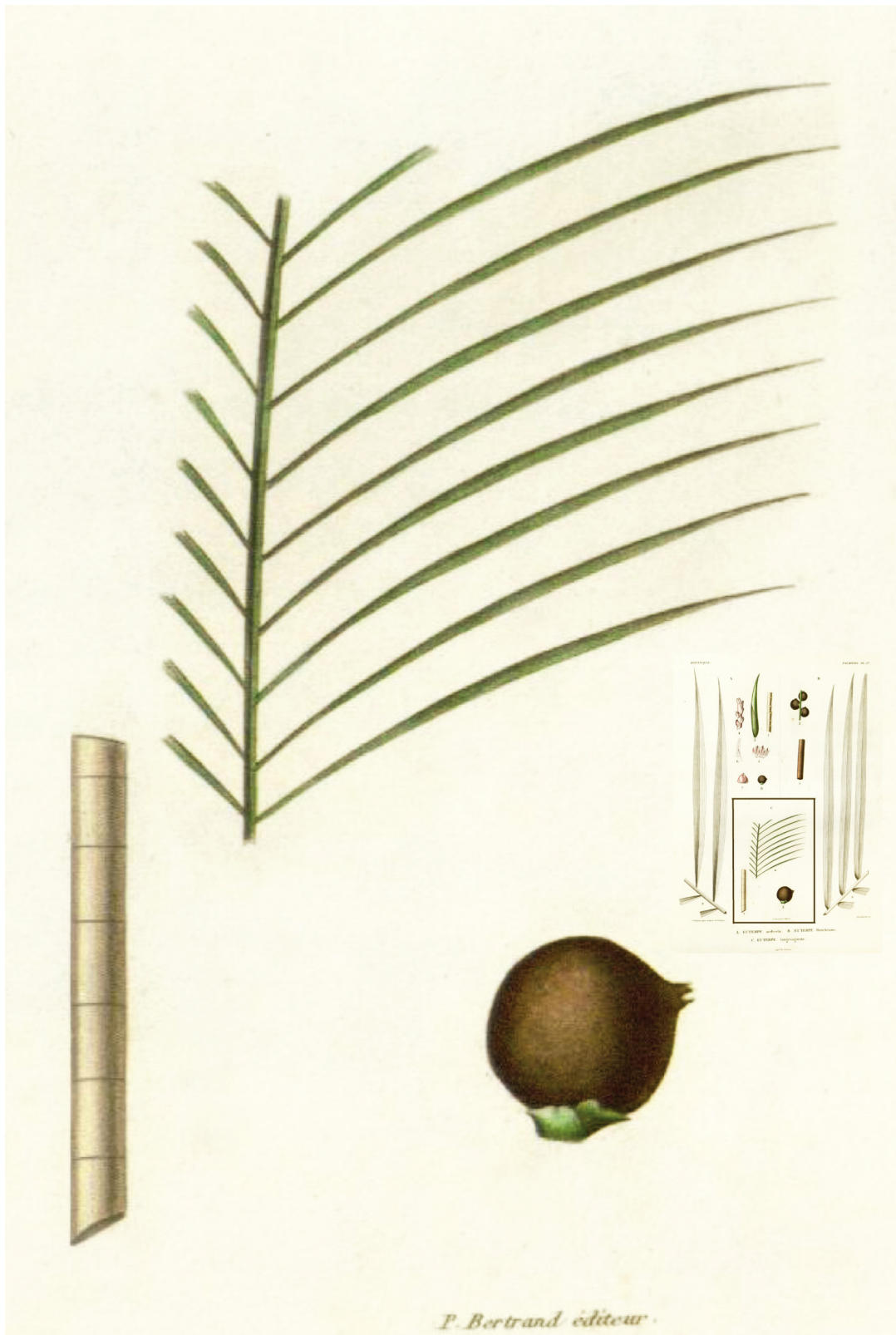


Figure 3 – Original illustration of *Euterpe longevaginata* by Martius in d'Orbigny, *Voyage dans l'Amérique Méridionale* 7(3): t. 17C. 1842, the lectotype designated herein.

The lectotype for *Euterpe precatoria* Mart. was previously selected by Henderson & Galeano (1996: 40) and should be cited as follows:

Euterpe precatoria Mart. in d'Orbigny, Voy. Amér. MÉR. 7(3): 10–11, t.8, fig.2, t.18A. (1842) Syntypes: “Palmier de Rosaire, d'Orb., n. 27, *cum icone*”. Type: (Lectotype designated by Henderson & Galeano 1996: 40): Bolivia, Moxos, s.d., A.D. d'Orbigny 27 (M0209248, image!; isolectotype, P00251000, image!).

Because Henderson & Galeano (1996) used the word “Type” and indicated the gathering d'Orbigny 27 at M, they definitely lectotypified the name *Euterpe precatoria*, and this lectotypification should be followed, according to the current rules of the Code (Art. 7.11; Turland *et al.* 2025).

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Data availability statement

In accordance with Open Science communication practices, the authors inform that there is no data sharing of this manuscript.

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