

CATASETUM TAVARESII (CATASETINAE), A NEW SPECIES FROM THE CENTRAL BRAZILIAN AMAZON

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ABSTRACT. A new *Catasetum* species from Brazilian Amazon, more specifically from the “Floresta Nacional de Saracá-Taquera” (State of Pará), is proposed, described and illustrated. This new taxon belongs to the subgenus *Catasetum*, section *Isoceras*, subsection *Isoceras*, characterized by the symmetrical and parallel antennae. It is compared with *C. nhamundaense*, *C. garnettianum* and *C. barbatum*, all with the same antennae characteristics and belonging to the “*C. cristatum* alliance”. Among related species, *C. tavaresii* differs mainly in the lip structure. Additionally, we provide data on geographical distribution, habitat, phenology, flower visitors, and preliminary conservation status.

KEYWORDS / PALABRAS CLAVE: alianza *Catasetum cristatum*, biodiversidad, biodiversity, *Catasetum cristatum* alliance, epífita, epiphyte, Estado de Pará, Neotrópico, Neotropics, State of Pará, taxonomía, taxonomy

Introduction. *Catasetum* Rich. ex Kunth comprises 192 accepted species and 35 natural hybrids (Calderón Álvarez & Bonilla Morales 2023, Cantuária *et al.* 2021, Govaerts *et al.* 2023, Krahl *et al.* 2020, 2022a, 2023a,b,c,d). It draws attention due to its significant species richness compared to other genera within the subtribe Catasetinae (Romero & Carnevali 2009). The genus is restricted to the Neotropical region, where it is widely distributed, occurring from Mexico to Southern

Brazil and Northern Argentina (Romero & Carnevali 2009). The Amazonian biome is considered the center of diversity for the genus (Romero & Carnevali 2009) and the Brazilian Amazon is particularly noteworthy, hosting a total of 77 species (Krahl *et al.* 2021a,b, 2022a,b, 2023a,b,c,d, Petini-Benelli 2023, Petini-Benelli & Chiron 2020, Valsko *et al.* 2019), in addition to housing rare species of the genus (Krahl *et al.* 2023e).

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Received 20 July 2023; accepted for publication 25 November 2023. First published online: 22 December 2023.

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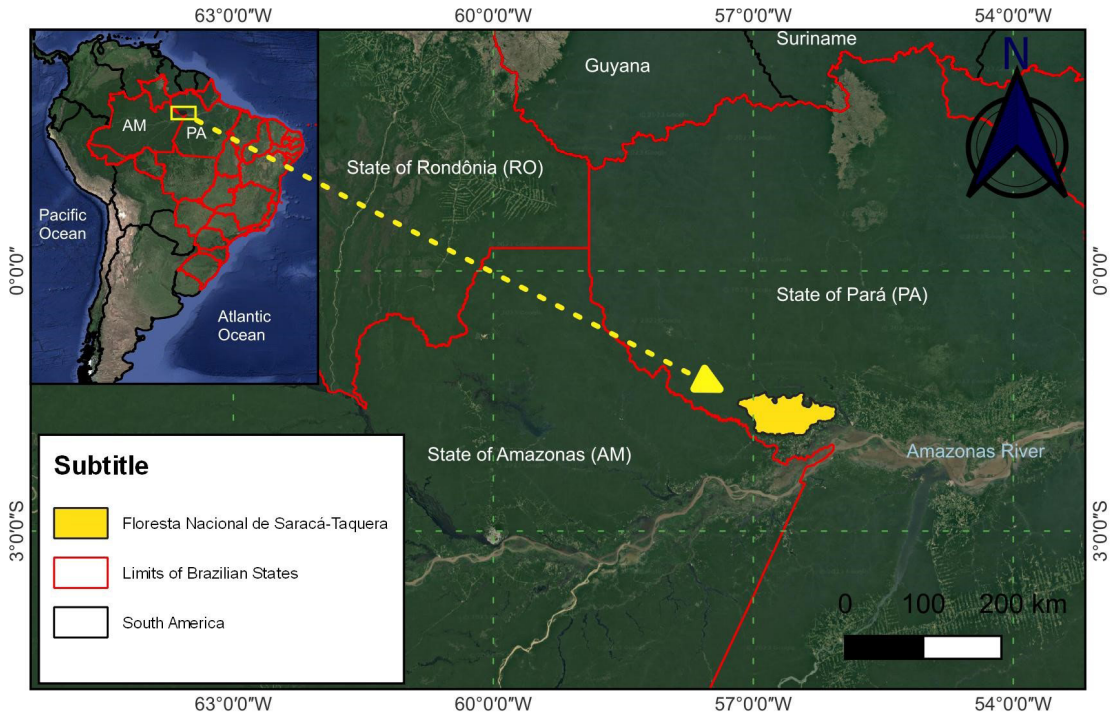


FIGURE 1. Geographical location of the Floresta Nacional de Saracá-Taquera, type locality of *C. tavaresii* in the Brazilian Amazon. Map by A.H. Krahl.

The genus is characterized among the others in the subtribe by fusiform, elliptical, ovate or conical pseudobulbs, leaves deciduous, plicate, usually elliptic or oblanceolate, leaf sheaths covering the entire pseudobulb; inflorescences lateral, racemose, with unisexual (female/pistillate or male/staminate) and/or rarely bisexual (hermaphrodite) flowers (Holst 1999). Nonetheless, the vegetative morphology, as well as the female/pistillate and hermaphrodite flowers, are not taxonomically useful due to their remarkable homogeneity, with very little variation between different taxa (Walker-Larsen & Harder 2000).

Male/staminate flowers show large variations in their morphology and are used to separate among taxa. These are usually organized into various subgenera, sections, and subsections, depending on the presence or absence of characters like staminodes (antennae) located in the column when present (Walker-Larsen & Harder 2000). However, recent phylogenies indicate that these groups are not monophyletic and, therefore, do not accurately reflect the evolutionary history of the genus. Instead, species

are better grouped based on their different biogeographical regions of occurrence, i.e., based on the sympatry of species (Mauad *et al.* 2022).

The state of Pará, the second largest Brazilian state entirely located in the Brazilian Amazon, houses a total of 32 *Catasetum* species, accounting for approximately 40% of the Amazonian and Brazilian species (Krahl *et al.* 2021a,b, 2022a,b, 2023a,d, Petini-Benelli 2023). Therefore, this work aims to increase the species richness of the state of Pará by describing a new taxon of *Catasetum* from the extreme west of the state. It is compared to other congeneric, sympatric, and morphologically similar species. Information relating to geographical distribution, habitat, phenology, flower visitors and preliminary conservation status is given.

Material and methods. The taxon described in the present work was collected between March and April 2019 during the survey and rescue of epiphytes of the “Floresta Nacional de Saracá-Taquera” (FLONA Saracá-Taquera), Porto Trombetas, Oriximiná, Pará, Brazil (Fig. 1) by the team and partners of the “Mineração

Rio do Norte” (MRN), which have been carrying out this kind of work for over a decade in the area. The material was processed according to the usual process described by Mori *et al.* (1989) and Petini-Benelli (2016) for later incorporation in the collections of the herbarium HAMAB (acronyms follow Thiers 2023). The description and illustrations have been based on living specimens. The morphological description follows the terminology adopted by Dressler (1993) and Harris & Harris (2001), and the names of Brazilian species were consulted in The Brazil Flora Group (BFG 2022). Notes related to habitat, phenology, and flower visitors were recorded *in situ*. For the comparison with related species, we used relevant protologues (Lindley 1836, Rolfe 1888, Krahl *et al.* 2022a) and we examined the types of *C. barbatum* (Lindl.) Lindl., *C. garnettianum* Rolfe, and *C. nhamundaense* D.R.P.Krahl, Krahl, Cantuária & J.B.F.Silva in HAMAB, INPA and K herbaria (acronyms follow Thiers 2023). The map of the type locality was created with the QGIS 2.28 Firenze software. Criteria used to estimate the conservation status are those presented in IUCN (2022).

TAXONOMIC TREATMENT

Catasetum tavaresii Cantuária, D.R.P.Krahl, Krahl & J.B.F.Silva, *sp. nov.* Fig. 2A–Q, 3A–G, 4A–E.

TYPE: Brazil. Pará: Oriximiná, Porto Trombetas, FLONA Saracá-Taquera, Platô Cipó, 01°40'45" S; 56°37'56" W, 50 m, fl. ♂, 17 March 2019, *J.B.F. da Silva 5014* (holotype, HAMAB19528).

DIAGNOSIS: *Cataseto tavaresii* et *C. nhamundaense similis*, sed aliquot characteribus florum, praecipue labelli, differt. Inflorescentia arcuata (vs. subpendula in *C. nhamundaense*), floribus majoribus labello subtriangulari 1.8 longo × 1 cm lato (vs. obtriangulari 1.5 longo × 0.4 cm lato) fimbriis densioribus munito (1 mm vs. 2 mm inter fimbrias), callo basali crassiore curvioraque, callo apicali acuto (vs. acuminato).

Plant epiphyte and caespitose. Rhizome short and inconspicuous. Pseudobulbs 3.5–7.9 × 2.0–2.5 cm, fusiform, erect, 5–6-leaved, covered by leaf sheaths. Leaves 5.5–21.2 × 2–3 cm, narrowly oblanceolate, plicate, 3–5-nerved, margin entire and slightly undulate, apex acute. Staminate inflorescence 13.1–27.1 cm long, lateral, racemose, 8–37-flowered, arched; peduncle and

rachis cylindrical, greenish; floral bract ca. 0.8 × 0.3 cm, lanceolate, concave, greenish, margin entire, apex acute. Staminate flowers with sepals and petals greenish and lip greenish cream, congested, resupinate, pedicellate; pedicel 1.5–2.5 cm long, cylindrical, erect, purplish; sepals ca. 2.7 × 1.1 cm, elliptic, symmetrical, concave, apex obtuse; petals ca. 2.4 × 0.9 cm, elliptic, symmetrical, margin entire and convex, apex acute; lip ca. 1.8 × 1.0 cm (fimbriae excluded), entire, subtriangular, with fimbriae on the margin, ca. 2.2 cm deep and rounded; fimbriae 0.7–0.9 cm long, filiform, thin, simple; basal callus 0.6–0.7 cm long, oblong, falcate, acute, claw-shaped, with small denticles on the margin; apical callus 0.6–0.7 cm long, oblong, slightly falcate, simple or forked; column ca. 1.9 × 0.5 cm, brownish green, contracted at base, rostrate at apex; antennae ca. 0.5 cm long, symmetrical and parallel; anther ca. 1.2 cm long, greenish, rostrate; viscidium ca. 1.5 × 1.5 mm, whitish, sticky; stipe ca. 2.5 × 1 mm, laminate, coiled; pollinia 2, ca. 3 × 1 mm, slightly obovate, thick, compressed, sulcate, yellowish. Only the staminate material was seen.

ADDITIONAL SPECIMENS EXAMINED (PARATYPES): Brazil. Pará: Oriximiná, Porto Trombetas, FLONA Saracá-Taquera, Platô Teófilo, 01°40'45" S; 56°37'56" W, 50 m, fl. ♂, 01 April 2019, *J.B.F. da Silva 5015* (HAMAB19529); *idem*, fl. ♂, *J.B.F. da Silva 5016* (HAMAB19530); *idem*, fl. ♂, *J.B.F. da Silva 5017* (HAMAB19531); *idem*, fl. ♂, *J.B.F. da Silva 5018* (HAMAB19532).

ETYMOLOGY: The specific epithet honors Dr. José Carlos Tavares Carvalho, a pharmacologist and specialist in pharmacology of natural products from the Federal University of Amapá (UNIFAP), who much encouraged the last author to study Orchidaceae.

DISTRIBUTION AND ECOLOGY: So far, *C. tavaresii* is known from a single population of about 50 individuals. These plants are epiphytic and grow in “Platô” areas (plain areas of the Central Brazilian Amazon that are relatively higher and more distant from the streams, with a height above sea level of 50 m) of the “terra firme” forest (non-flooding environment) which includes the Amazonian dense ombrophilous forest, (“Floresta Ombrófila Densa”). This population is found within the FLONA Saracá-Taquera, located at the far west of the state of Pará (PA).

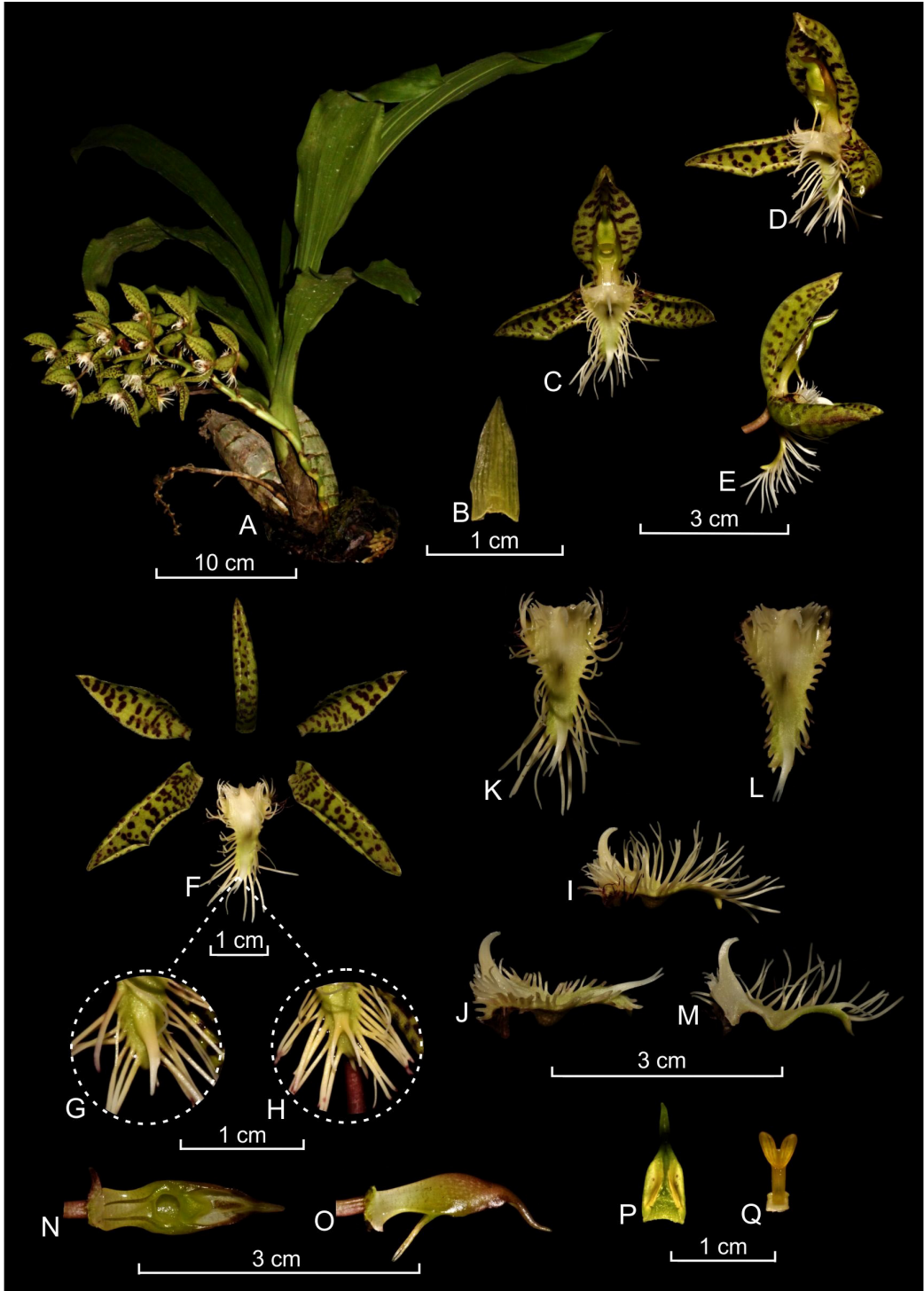


FIGURE 2. *Catasetum tavaresii* (with male inflorescence). A. Habit. B. Floral bract. C–E. Flower. F. Dissected perianth. G–H. Detail of the apical callus of the lip. I–M. Lip. N–O. Column. P. Anther cap. Q. Pollinarium. Photographs and plate by A.H. Krahl.

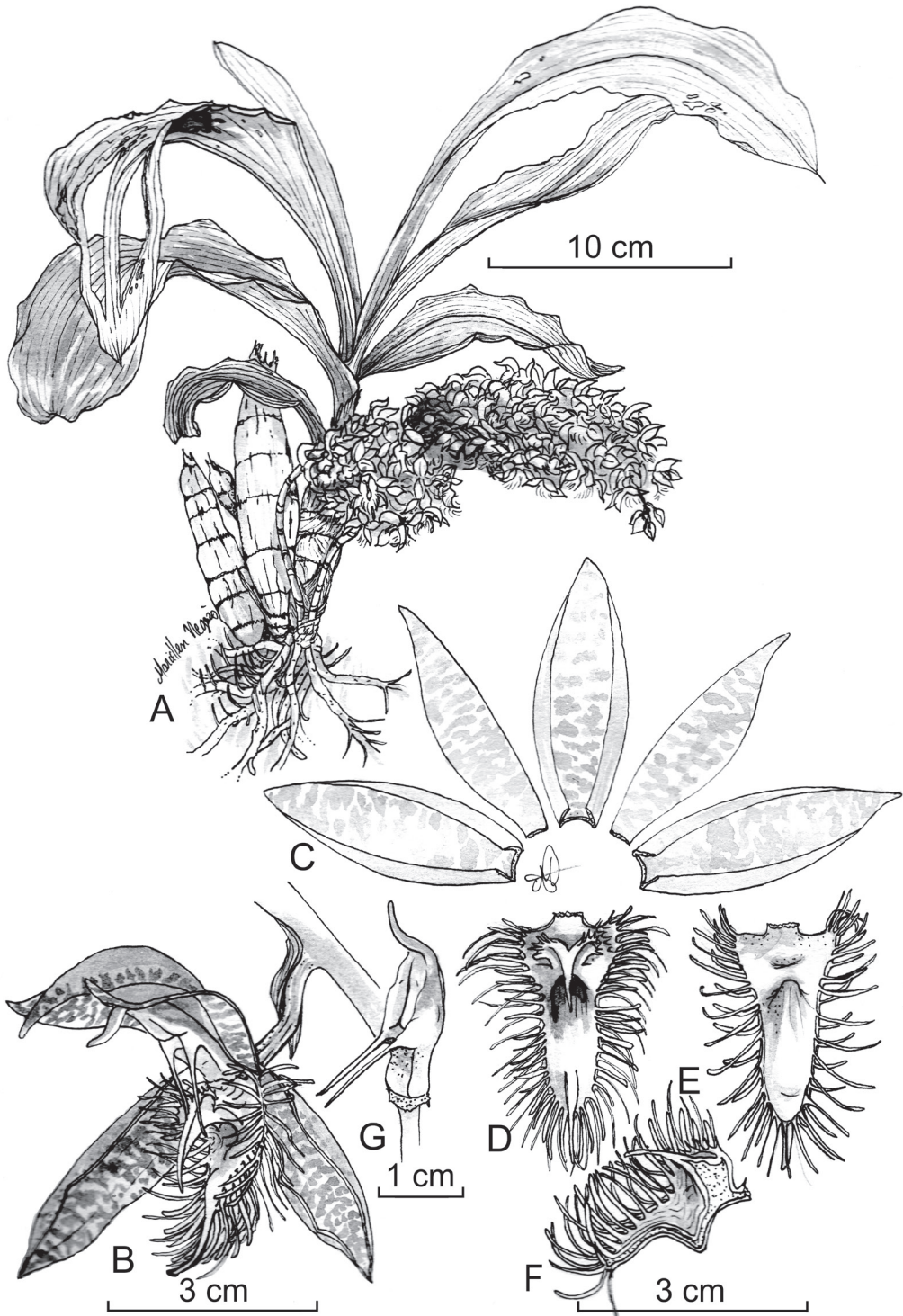


FIGURE 3. *Catasetum tavaresii* (with male inflorescence). **A**. Habit. **B**. Flower. **C**–**F**. Dissected perianth. **G**. Column. Drawing by M. Negrão.



FIGURE 4. Images of *Catasetum tavaresii* and visitors of its flowers (*Euglossa* spp. ♂). Photographs by J.B.F. da Silva; plate by A.H. Krahl.

PHENOLOGY AND FLORAL VISITORS: The plants were observed flowering in March and April 2019, during the rainy season in the region (Braga 1977). We observed several visits of male *Euglossa* spp. (Fig. 4E), trying to explore the lip to collect volatile compounds (perfume) according to the pattern already observed for the genus (see Milet-Pinheiro & Gerlach 2017).

CONSERVATION STATUS: *Catasetum tavaresii* is known only from the type population (ca. 50 specimens in a restricted area [ca. <1 km²]). Consequently, it was not possible to obtain a pertinent evaluation of its extent of occurrence (EOO) and area of occupancy (AOO). Therefore, according to the criteria established by IUCN (2022), *C. tavaresii* should be assessed as DD (Data Deficient) due to the absence of



FIGURE 5. Comparative illustrations of *C. tavaresii* and sympatric morphologically similar species. A–C. *C. tavaresii*. D–F. *C. nhamundaense*. G–I. *C. garnettianum*. J–L. *C. barbatum*. Photographs and plate by A.H. Krahl.

adequate information on its real abundance and distribution. However, the species grows within a Conservation Unit (Saracá-Taquera National Forest) and is partially protected, but we emphasize the need to preserve the only known population.

MORPHOLOGICAL AFFINITIES: The proposed new taxon is included in the subgenus *Catasetum*, section *Isoceras*, subsection *Isoceras*, because it presents symmetrical parallel antennae (Bicalho & Barros 1988, Senghas 1991). It is also placed in the “*Catasetum cristatum* alliance” (Bicalho & Barros 1988, Lacerda 1998), characterized mainly by resupinate flowers, membranous petals and sepals that are greenish and usually brown

spotted, a fleshy lip with fimbriae on the margin, with a cavity usually placed before the median portion and two bumps known as basal and apical calli, the latter being absent in some species (Franken *et al.* 2016).

Catasetum tavaresii (Fig. 5A–C) can be compared to three other species that are sympatric, present a similar morphology and belong to the same subsection *Isoceras*: *C. nhamundaense* (Fig. 5D–F), *C. garnettianum* (Fig. 5G–I) and *C. barbatum* (Fig. 5J–L). Compared to *C. nhamundaense*, the new species differs by the arched (*vs.* subpendent) inflorescence, a slightly bigger lip (1.8×1 *vs.* 1.5×0.4 cm; fimbriae excluded), subtriangular (*vs.* obtriangular) and more fimbriate (approximate spacing of 1 mm

between the fimbriae of the median portion of the labellum of *C. tavaresii* vs. 2 mm in *C. nhamundaense*). It also differs in the apical callus of the lip, oblong with an acute apex, simple or forked, whereas, in *C. nhamundaense*, it is acuminate, more tapered, and always apically simple (Fig. 5C and 5F) (see Krahl *et al.* 2022a).

Catasetum tavaresii can be distinguished from *C. garnettianum* by an inflorescence with more congested flowers (*vs.* more spaced), broader floral segments (sepals 1.1 *vs.* 0.4–0.5 cm; petals 0.9 *vs.* 0.4–0.5 cm; and lip 1 *vs.* 0.2–0.3 cm), a subtriangular lip (*vs.* oblong to obtriangular), more fimbriate with longer and more slender fimbriae. Moreover, unlike in *C. tavaresii*, the apical callus in *C. garnettianum* is oblong, straight, thickened, apically simple or variously denticulate (Fig. 5C and 5I) (see Rolfe 1888, Petini-Benelli 2023). On the other hand, we may exclude the possibility of *C. tavaresii* being a variation of *C. barbatum* as precisely defined after the analysis of holotypes related to it and deposited in the K herbarium that were analyzed by us (K000293764! [= *Myanthus spinosus* Hook.]; K000294039! [= *C. proboscideum* Lindl.]).

Compared to the latter the former presents a more congested inflorescence, a subtriangular lip (*vs.* oblong), a basal callus of the lip simple, claw-shaped and showing small denticles at the margin (*vs.* tripartite with the median segment more or less separated) and an apical callus oblong (*vs.* tooth-shaped) (Fig. 5C and 5L) (see Lindley 1836, Oliveira *et al.* 2021, Petini-Benelli 2023).

ACKNOWLEDGEMENTS. The authors thank the “Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior” (CAPES) for the doctoral scholarship offered to D.R.P. Krahl. We are also grateful to the “Mineração Rio do Norte” (MRN) for funding, support, and logistics provided to J.B.F. da Silva. To the “Programa de Pós-Graduação em Biodiversidade e Biotecnologia – Rede BIONORTE” (PPG-BIONORTE) and the “Universidade Federal do Amapá” (UNIFAP) for the support and logistics offered throughout the work. To Fundação Amazônia de Amparo a Estudos e Pesquisas (FAPESPA), through the project “Training of Human Resources for the Development of Science in the Amazon”, for the doctoral scholarship offered to M.S. Oliveira. To F. J. Nge for proofreading the English of the manuscript, M. Negrão for the illustration of the new taxon, and to the anonymous reviewers for their contributions.

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