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Artigo Original

A new species of *Catasetum* (Orchidaceae) for the Amazon biome in Brazil and taxonomic notes for the genus

Uma nova espécie de *Catasetum* (Orchidaceae) para bioma amazônico no Brasil e notas taxonômicas para o gênero

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ABSTRACT *Catasetum* is the largest in number of species among the eight genera that compose the subtribe Catasetinae. Its center of diversity is the Amazon biome and has a large concentration of species in northern Brazil, especially in the states of Amazonas and Pará. Therefore, we propose here the description of a new species from these two states mentioned above. It has been described, illustrated and compared with related species. In addition, aspects related to habitat, phenology, floral visitors and conservation status were addressed. It differs mainly by lip architecture, is visited by *Euglossa spp.* male and falls under the "Vulnerable" (VU) criterion for presenting only three populations, an estimate of ≤250 mature individuals and a population reduction of 10% in any 10-year period. Additionally, we present taxonomic notes for 14 species of the genus.

KEYWORDS: Amazonas, biodiversidade, "terra firme" forest, Pará, taxonomy.

RESUMO *Catasetum* é o maior em número de espécies entre os oito gêneros que compõe a subtribo Catasetinae. Tem como centro de diversidade o bioma amazônico e tem uma grande concentração de espécies no norte do Brasil, em especial, nos Estados do Amazonas e Pará. Assim sendo, propomos aqui a descrição de uma nova espécie oriunda destes dois Estados supracitados. Ele foi descrito, ilustrado e comparado com as espécies relacionadas. Além disso, aspectos relacionados ao habitat, fenologia, visitantes florais e status de conservação foram abordados. Se diferencia principalmente pela arquitetura do labelo, é visitada por macho de *Euglossa spp*. e se enquadra no critério "Vulnerável" (VU) por apresentar apenas três populações, uma estimativa de ≤250 indivíduos maduros e uma redução populacional de 10% em qualquer período de 10 anos. Adicionalmente apresentamos notas taxonômicas para 14 espécies do gênero.

PALAVRAS-CHAVE: Amazonas, biodiversdiade, floresta de terra firme, Pará, taxonomia.

INTRODUCTION

O the genus *Catasetum* Rich. Kunth is morphologically characterized by presenting fusiform, elliptical, ovoid, or conical pseudobulbs. The leaves are deciduous, plicated, usually elliptical and provided with a sheath that completely cover the pseudobulb. The inflorescence is lateral, in raceme that may present unisexual flowers (female or male) and/or rarely bisexual (hermaphrodite)

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flowers (Holst, 1999). In this sense, only the morphology of male flowers (staminate) is used in the process of distinguishing species of the genus, since the vegetative morphology and the characteristics of the female flowers (pistilated) and hermaphrodites (staminate and pistilated) are insufficient because they are homogeneous and with little variation between the different taxa (Walker-Larsen; Harder, 2000).

In addition, the staminate flowers have two staminodes called antennae that are located in the gynostemium (column) (Romero, 1992; Gerlach, 2007; Walker-Larsen & Harder, 2000). Thus, the characteristics of these antennas are used to define the different subgenres, sections and subsections in *Catasteum* (Bicalho; Barros, 1988; Senghas, 1990; Senghas, 1991) and as much as these divisions are widely used they are not phylogenetically sustained (Mauad et al., 2022).

The genus stands out for being the largest among all the others that make up the subtribe Catasetinae (Romero; Jenny, 1993; Romero; Carnevali, 2009) and is widely distributed throughout the Neotropical region, occurring from Mexico to southern Brazil and northern Argentina (Romero; Carnevali, 2009). Its center of diversity and richness is the Amazon biome, in which many species are endemic and develop in different plant physiognomies (Romero; Carnevali, 2009). In general, it has a total of 193 described and accepted species (Petini-Benelli; Chiron, 2020; Krahl *et al*., 2021a,b; Damián *et al*., 2021; Krahl *et al*. 2022a,b; Krahl *et al.,* 2025a; POWO, 2025) and a total of 46 described natural hybrids (Cantuária *et al.,* 2021; Krahl *et al.,* 2023a; Krahl *et al.,* 2024a; Krahl *et al.,* 2025b,c,d).

Regarding this representativeness of species, the Brazilian Amazon is very prominent, as it is home to close to 76% (81 spp.) of the total present in the Brazilian territory of a total of 126 species (Petini-Benelli; Chiron, 2020; Krahl *et al*., 2021a,b; Krahl *et al*., 2022a,b; Cantuária *et al.,* 2021; Krahl *et al.,* 2023b,c,d,e,f; Krahl *et al.,* 2024b,c; Petini-Benelli, 2025). Of this total, 38 occur in the State of Amazonas (Krahl *et al.*, 2021a; Krahl et al., 2023c,d; Krahl et al., 2024b,c; Petini-Benelli, 2025.) and 36 in the State of Pará (Krahl *et al.*, 2021a,b; Cantuária *et al.,* 2021; Krahl *et al*. , 2022a,b; Petini-Benelli, 2022), not counting the occurrence of natural hybrids (Krahl *et al.,* 2020; Cantuária *et al.,* 2021; Krahl *et al.,* 2023a; Krahl *et al.*, 2024a; Krahl *et al.,* 2025a,b,c,d; Petini-Benelli, 2025). Thus, this work aims to propose a new species from the Brazilian Amazon, more specifically from the states of Amazonas and Pará, both states of the Northern region of Brazil. In addition, it is compared with the species intimately more related and photographically illustrated.

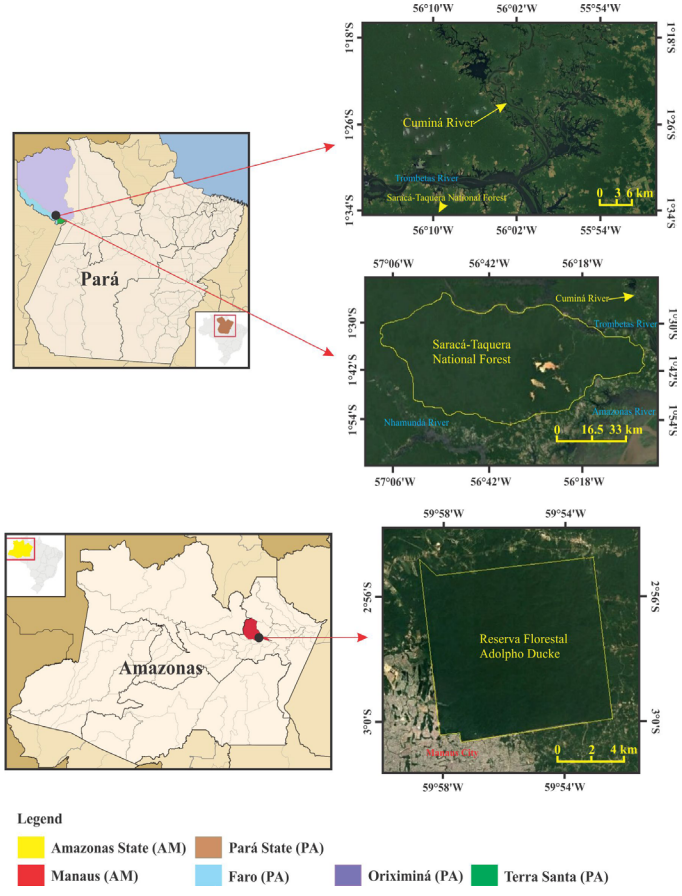
MATERIAL AND METHODS

The new species was found during expeditions to three different localities of the central Amazonia in Brazil. It was found during random field visits of the Rescue and Reintroduction Project of Epiphytes of Mineração Rio do Norte (MRN), which were conducted by J.B.F. da Silva (one of the authors of the present study) in the Cuminá River basin (1°21’46.47’’S; 56°04’43.10’’W) in the municipality of Oriximiná in the State of Pará. It was also collected in the Saracá-Taquera National Forest (1°42’41.89’’S; 56°34’51.26’’W) also located in the municipality of Oriximiná (PA) and its collection was also performed during the rescue of epiphyte realized by MRN and during collections for the survey of Orchidaceae of the conservation unit. Finally, it was also found in the Adolpho Ducke Forest Reserve (Manaus-AM) (2°59’45.53”S; 59°56’33.59”W) during collections for the survey of Orchidaceae of the conservation unit and for the long-term project entitled “Flora of the Amazonas: Orchidaceae” (Figure 1).

The testimony material was herborized according to the common procedures described in Mori *et al.* (1989) for later incorporation into the herbaria HAMAB and INPA (acronym according to Thiers, 2025). The description follows the terminology adopted by Dressler (1993) and Harris & Harris (2001) and was compared with C. *barbatum* (Lindl.) Lindl. (Lindley, 1844; Petini-Benelli, 2025) and with *C. saracataquerens*e Krahl, Cantuária & J.B.F.Silva (Krahl *et al.*, 2021a).

To formulate the conservation status, the Extent of Occurrence (EOO) and the Area of Occupancy (AOO) were calculated using the online platform Geospatial Conservation Assessment Tool (GeoCAT - http://geocat.

Figure 1. Location of *Catasetum printesii* type localities in the states of Amazonas and Pará (Cuminá River (PA); Saracá-Taquera National Forest (PA); and Adolpho Ducke Forest Reserve (AM)..



kew.org/). The AOO calculation was based on a defined 2 km grid as recommended by the International Union for Conservation of Nature (IUCN) (Bachman *et al.*, 2011; IUCN, 2012). The conservation status of the species was evaluated according to the criteria of the IUCN (IUCN, 2012).

RESULTS AND DISCUSSION

Catasetum printesii Cantuária, D.R.P.Krahl, Krahl & J.B.F.Silva, sp. nov. Types: BRASIL: PARÁ: Oriximiná, Porto Trombetas, Rio Cuminá, blackwater--flooded forest or igapó, 1°21'46.47''S; 56°04'43.10''W, 13.V.2019, J.B.F. da *Silva 4229* (holotype HAMAB!); ibidem, Saracá-Taquera National Forest, Platô Monte Branco, 07.II.2018, *J.B.F. da Silva 5241* (paratype HAMAB!); *ibid*., Plateau Bela Cruz, 19.III.2019, *J.B.F. da Silva 5345* (paratype HAMAB!); *ibid*., Plateau Aramã, 14.VI.2019, *J.B.F. da Silva 4231* (paratype HAMAB!); AMAZONAS: Manaus, Adolpho Ducke Forest Reserve, near the "Igarapé do Bolívia", *shallow*, 2°59'45.53"S; 59°56'33.59"W, 01.III.2022, *A.H. Krahl & D.R.P. Krahl 1648* (paratype INPA!) (Figure 2 and 3).

Diagnosis: Similar *to Catasetum barbatum* (Lindl.) Lindl. however, differ in some aspects related to the flower. *Catasetum printesii* has narrowly elliptical sepals (vs. elliptical) and has a triangular lip bordered by relatively thickened fimbriae and little concentrated at the apex (vs. lip oblong to obtriangular bordered and covered by relatively thin fimbriae and with a callus at the apex of the lip that can be simple or forked).

Description: Epiphyte plant, cespitose. Rhizome, Inconspicuous, short. Pseudobulb 4.1–6.7 × 1.1–1.9 cm, fusiform, 7-8-folilate, covered by leaf hems. Leaves 9.1–28.2 × 3.2–3.8 cm, green, narrow-elliptical to narrow--oblanceolate, membranate, plicate, with 5–7 prominent ribs, whole margin and slightly wavy, acute apex; leaf sheaths covering the pseudobulb, green. Male inflorescence 18.9 cm long, lateral, racemose, arched to pendant due to the weight of the flowers, congested, multiflowered, 6–50–flora; cylindrical and purplish peduncle; floral

bracts ca. 1.3 × 0.4 cm, greenish, lanceolate, full margin, acute apex. Male flowers grouped in the distal half, resupinated, pedicelled; pedicel 2.4–2.7 cm long, purplish, cylindrical, upright; Sepals 3–3.5 × 0.9–1.1 cm, greenish with brown spots, elliptical-lanceolate, symmetrical, concave, whole margin, acute apex; petals ca. 2.6–2.7 × 0.8–1 cm, greenish with brown spots, narrowly elliptical, symmetrical, entire margin and slightly reflective, acute apex; Lip ca. 1.7–2.1 × 0.9–1 cm (excluding fimbriae), pale yellow and slightly greenish, whole, triangular, with a callosity at the base, inner glabra surface, bordered by relatively thickened fimbriae, simple and little concentrated at the apex (fringed in about 2 rows); fimbriae 0.5–0.9 cm long, pale yellow, filiform; rounded bag ca. 0.2–0.3 cm depth, near the base; tripartite basal callosity, the central ca. 0.6–0.7 cm long, claw-shaped, oblong, acuminate apex, the sides ca. 0.2–0.3 cm, acute; column ca. 2–2.2 cm long, brownish and greenish, contracted at the base in dorsal view, fleshy, rostrate; antennae ca. 0.7 cm compr., symmetrical, parallel, projected towards the basal callus of the lip; pollinating cover ca. 1.1–1.2 × 0.2-0.3 cm, ros-

Figure 2. *Catasetum printesii.* A – habit; B-C – flowers; D – sepals and petals; E-G – lip; and H – column. Illustration by Mariellen Furtado Negrão.

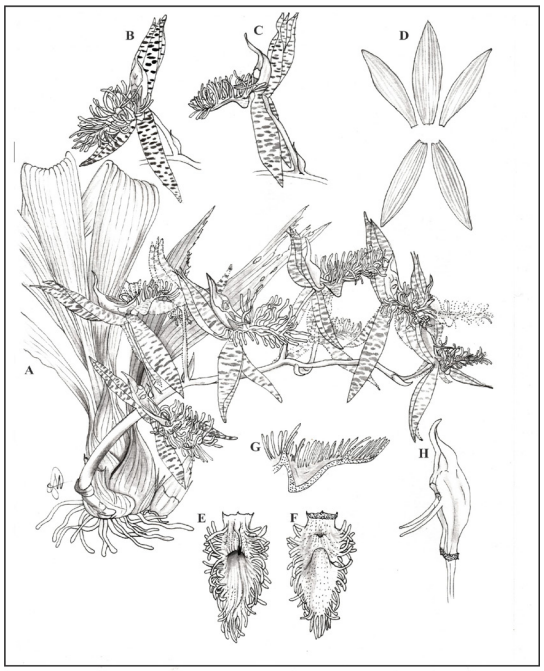
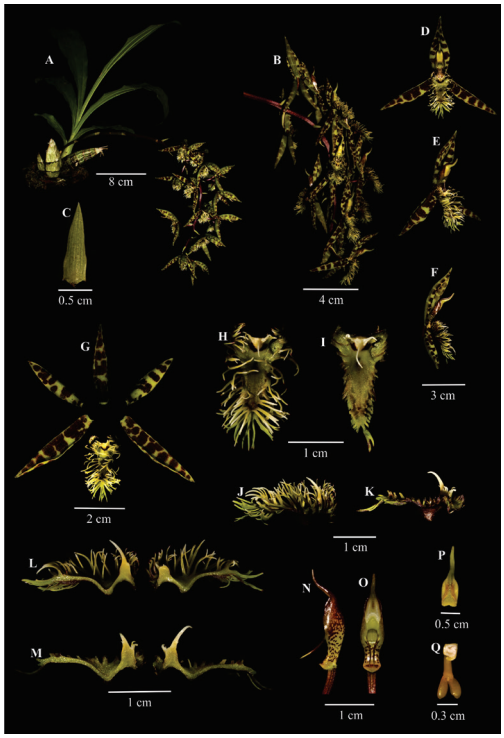


Figure 3. *Catasetum printesii.* A – habit; B – inflorescence; C – floral bracts; D-F – flowers; G – floral pieces; H-M – lip; N-O – column; P – pollinarium cap; and Q – pollinarium. Photos by A.H. Krahl.



trate at the apex; viscidium ca. 0.2 × 0.2 cm, subsquared to rounded, sticky, whitish; stipe ca. 0.3–0.4 × 0.1 cm, laminar, rolled inward, yellowish; polylines 2, ca. 0.3 × 0.1 cm, yellowish, oblong to oboves, hard, compressed, grooved. Unobserved female and hermaphrodite inflorescences. Fruit not observed. (Figure 2 and 3).

Etymology: The specific epithet is in honor of the orchid lover Sílvio Printes who made numerous contributions in the field of the study of Amazonian orchids.

Figure 4. Visits of *Euglossa* spp. to the flowers of *C. printesii.*

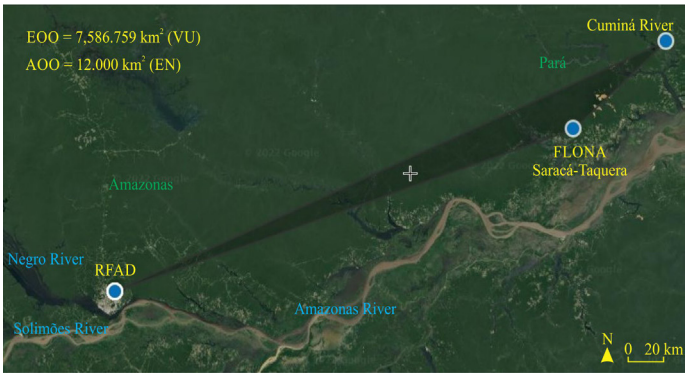


Phenology and floral visitors: Blooms in the first half of the year, as well as countless other similar species and this period comprises the wettest months in the region (Luizão, 1995). From casual observations the main visitors of *C. printesii* are males of *Euglossa* spp. who explore the lip in search of volatile compounds (perfume) (Figure 4).

Habitat: It is observed in Dense Ombrophilous Forest in environments of "terra firme" forest (non-flooded environment), usually in plateau areas (relatively higher areas) and eventually in shallow areas (low areas referring to watercourses).

Conservation status: According to the GeoCAT program (Bachman *et al.*, 2011) *Catasetum printesii* is classified as "Vulnerable" (VU) according to EOO (B1a) and "In Danger" according to AOO (B2a) (Figure 5). However, according to the IUCN (2012) criteria, other factors should be evaluated. The species, because it is found in two Conservation Units (UC), could be classified as "Less Worrisome" (LC) if it was not classified as EN or VU in any other criterion, a fact that is not observed from the calculations of OOE and AOO. In addition, one of these areas, the Adolpho Ducke Forest Reserve, because it is on the city limits of Manaus suffers strongly from undue urban expansion (B2bii). We must also consider that the Amazon biome continuously suffers a strong deforestation (personal and general observations) and, on the other side, orchids are strongly collected by orchid lovers (personal observations). Thus, we estimate that the total population of *C. printesii* should be ≤ 250 mature individuals and project a reduction of 10% in any 10-year period, which allows us to frame once again as VU (C1). Thus, because the species meets the B2a+B2bii+C1 criteria, we understand that it should be classified as VU.

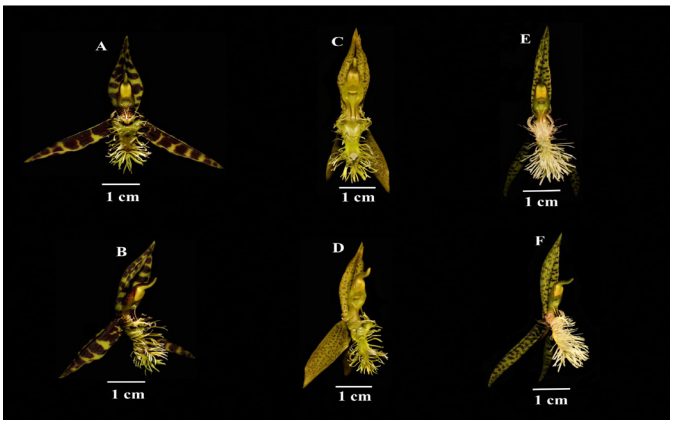
Figure 5. Distribution of *Catasetum printesii* with the Extension of Occurrence and the Area of Occupation from the online platform Geospatial Conservation Assessment Tool (GeoCAT).



Taxonomic comments: Catasetum printesii is related to species of the subgenus *Catasetum*, *Isoceras* section, *Isoceras* subsection, in which we observe species whose antennae are symmetrical and parallel to each other (Bicalho; Barros, 1988; Senghas, 1991) and falls under the Alliance *Catasetum cristatum* formally proposed by Bicalho & Barros (1988).

It is comparable with *C. barbatum*, however it differs by presenting narrowly elliptical sepals (*vs.* largely elliptical) and has a triangular lip bordered by relatively thickened fimbriae and little concentrated at the apex (vs. oblong lip to obtriangular bordered and covered by relatively thin fimbriae and with a callus at the apex of the lip that can be simple or forked) (Lindley, 1844; Petini-Benelli, 2025) (Figure 6). It is also comparable with *C. saracataquerense,* however it differs by presenting narrowly elliptical and symmetrical sepals (vs. elliptical and slightly asymmetric), triangular lip with partially glabra

Figure 6. Comparison between *Catasetum printesii* and related species. A-B – *Catasetum printesii*; C-D – *Catasetum barbatum*; and E-F – *Catasetum saracataquerense.*



surface (*vs.* oblong lip with densely fimbriated surface) (Krahl *et al*., 2021a) (Figure 6).

Additional material examined (*C. barbatum)*: BRAZIL: CEARÁ: s.l., s.d., *Gardner s/n* (K000294039!); MARANHÃO: Caxias, in babassu palm, 20.VI.1990, *J.B.F. da Silva* & *M.F.F. da Silva s/n* (MG 138982!); ibid., 01.X.2022, *A.H. Krahl & J.B.F. da Silva 1666* (HAMAB!).

Additional material examined (*C. saracataquerense*): BRAZIL: AMAZONAS: Iranduba, RIO Negro RDS, 20. I. 2019, *D.R.P. Krahl & A.H. Krahl 314 (INPA!); Ibid., 29.*V. 2019, *A.H. Krahl & D.R.P. Krahl 1250* (INPA!); PARÁ: Oriximiná, Porto Trombetas, FLONA Saracá-Taquera, 05. III. 2011, *J.B.F. da Silva 3524* (HAMAB!); *ibid*., 09. II. 2013, *J.B.F. da Silva 5384* (INPA!); *ibid*., 27.II.2015, *J.B.F. da Silva 5478* (INPA!); *ibid.*, 16. III. 2015, *J.B.F. da Silva 5382* (HUAM!); *ibid.,* 11. I. 2018, *J.B.F. da Silva 5259* (HUAM!); *ibid.*, 07. I-I 2018, *J.B.F. da Silva 5240* (EAFM!); *ibid.*, 26. III. 2018, *J.B.F. da Silva 5288* (EAFM).

Taxonomic notes for the genus: the following officially presents the proposal of synonymousization of some taxa of *Catasetum*. We emphasize that some authors already follow this proposal (Petini-Benelli, 2025) – on which we agree and base ourselves – while other authors consider them as distinct species (POWO, 2025).

1. *Catasetum albovirens* Barb. Rodr., Genera et Species Orchidearum Novarum 1: 129. 1877.
=*Catasetum lemosii* Rolfe, Bulletin of Miscellaneous Information, Royal Gardens, Kew 1894(5): 393–394. 1894. **Syn. nov.**

2. *Catasetum atratum* Lindl., Edwards's Botanical Register 24: Misc. 64. 1838.
=*Catasetum mentosum* Lem., Jardin Fleuriste 3: Misc. 65. 1852. **Syn. nov.**

3. *Catasetum barbatum* (Lindl.) Lindl., Edwards's Botanical Register 30: Misc. 28, n. 36. 1844.
=*Catasetum crinitum* Linden, L'Illustration Horticole 28: 80. 1881. **Syn. nov.**
=*Catasetum rionegrense* Campacci & G.M. Carr, Coletânea de Orquídeas Brasileiras 6: 186. 2008. **Syn. nov.**

4. *Catasetum bicallosum* Cogn., Flora Brasiliensis 3(5): 427. 1902.
=*Catasetum stenoglossum* Pabst, Arquivos de Botânica do Estado de São Paulo 3: 130. 1955. **Syn. nov.**

5. *Catasetum blackii* Pabst, Anais do 1° Congresso da Sociedade de Botânica do Brasil 14: 21. 1964.
=*Catasetum caatingense* Marçal & Chiron, Richardiana, Nouvelle Série 1: 11–14. F. 1A–I, 2, 3. 2017. **Syn. nov.**

6. *Catasetum cernum* Rchhb. f., Annales Botanices Systematicae 6: 570. 1861[1863].
=*Catasetum regnellii* Barb. Rodr., Genera et Species Orchidearum Novarum 2: 219. 1881. **Syn. nov.**

7. *Catasetum discolor* (Lindl.) Lindl., Edwards's Botanical Register 20: t. 1735. 1834.
=*Catasetum cassideum* Linden & Rchb. f., Xenia Orchidacea 2: 171. 1873. **Syn. nov.**

8. *Catasetum macrocarpum* Rich. ex Kunth, Synopsis Plantarum 1: 331. 1822.
=*Catasetum costatum* Rchb. f., The Gardeners' Chronicle, ser. 3, 1: 72: 1887. **Syn. nov.**
=*Catasetum linguiferum* Schltr., Beihefte zum Botanischen Centralblatt 42: 120. 1925. **Syn. nov.**

9. *Catasetum matogrossense* Bicalho, Loefgrenia 17: 1. 1964.
=*Catasetum tucuruiense* A.T. Oliveira & J.B.F. Silva, Bo-

letim do Museu Paraense Emílio Goeldi, Série Botânica 14: 112. 1999. **Syn. nov.**

10. *Catasetum pulchrum* N.E. Br., Lindenia 3: 51, t. 120. 1887.
=*Catasetum cirrhaeoides* Hoehne, Commissão de Linhas Telegraphicas, Botânica 5: 52, t. 98. 1915. **Syn. nov**.
=*Catasetum hoehnei* Mansf., Repertorium Specierum Novarum Regni Vegetabilis 28: 96. 1930. Syn. nov.

11. *Catasetum saccatum* Lindl., Edwards's Botanical Register 26: Misc. 76. 1840.
=Catasetum colossus Schltr., Botanisches Centralblatt 42: 118. 1925. **Syn. nov.**
=*Catasetum japurense* Mansf., Repertorium Specierum Novarum Regni Vegetabilis 28: 85. 1930. Syn. nov.

12. *Catasetum semicirculatum* F.E.L. Miranda, Lindleyana 1: 156. 1986.
=*Catasetum* × *riotianum* V.P. Castro, Icones Orchidacearum Brasiliensis 3: t. 229. 2012. **Syn. nov.**

13. *Catasetum socco* (Vell.) Hoehne, Arquivos de Botânica do Estado de São Paulo 2: 146. 1952.
=*Catasetum catarinense* G.F. Carr & V.P. Castro, Richardiana 8: 181. 2008. **Syn. nov.**

14. *Catasetum tigrinum* Rchb. f., The Gardeners'Chronicle & Agricultural Gazette 1: 40. 1881.
=*Catasetum georgii* Mansf., Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem 10: 478. 1928. **Syn. nov.**

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