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MORMODES BENELLIANA (CATASETINAE), A NEW SPECIES FROM MATO GROSSO, BRAZIL

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Abstract. In the present study, we describe and illustrate *Mormodes benelliana*, a new species found in the southwest region of the Brazilian state of Mato Grosso. This species occurs as an epiphyte in the transition between the Amazon and Cerrado domains. *Mormodes benelliana* is similar to *M. hoehnei,* but differs by having smaller pseudobulbs, inflorescences longer than the pseudobulbs, conspicuous peduncle, yellowish-brown and brown-vinous striped flowers, with a large-elliptic to ovate, glabrous lip.

Resumo. No presente estudo descrevemos e ilustramos *Mormodes benelliana*, uma nova espécie encontrada na região sudoeste do estado brasileiro de Mato Grosso, onde ocorre como epífita na transição entre os domínios Amazônia e Cerrado. *Mormodes benelliana* é semelhante a *M. hoehnei* mas difere pelos pseudobulbos menores, inflorescência mais longa que os pseudobulbos, pedúnculo conspícuo, flores listradas de castanho-amarelado e castanho-vinoso, labelo largo-elíptico a ovado, glabro.

Keywords / Palavras chave: Amazon, Amazônia, Cerrado, ecotone, ecótono, epífita, epiphyte, orchid, orquídea, taxonomia, taxonomy

Introduction. The Mato Grosso is the third largest state in Brazil, known for its floristic diversity. The diversity is largely due to its inclusion of the Amazon, Cerrado, and Pantanal domains, as well as their ecotonal areas. This reflects a significant richness of phytophysiognomies and species, with 6247 species of Angiosperms recorded today (BFG, 2015; 2018; 2022; Flora e Funga do Brasil, 2024; IBGE, 2012).

Among the Angiosperms, the Orchidaceae are represented in the state by 83 genera and 326 species (Flora e Funga do Brasil, 2024). Knowledge of this family in Mato Grosso has progressively expanded through the publication of new records, new species, and floristic studies (i.e., Benelli, 2012; Benelli & Pessoa, 2019; Benelli *et al*., 2015; Carpanedo *et al*., 2021; Engels & Ferneda Rocha, 2016; 2017a,b,c; Engels & Smidt, 2021; Engels *et al.*, 2017; 2019; Koch & Silva, 2012; Koch *et al.*, 2016; Pessoa *et al*., 2015), including representatives of Catasetinae such as *Catasetum* Rich. ex Kunth (i.e., Benelli & Grade, 2008; Benelli & Izzo, 2017; Benelli & Soares-Lopes, 2015; 2017; Engels *et al.* 2016;) and *Mormodes* Lindl. (Campacci & Carr 2015; Engels *et al.* 2020). However, much remains to be investigated, especially in regions with limited sampling (i.e., Zappi *et al.*, 2011; 2016; Zocal *et al*., 2023).

Mormodes comprises 87 species distributed from Mexico to Brazil (Cantuária *et al*., 2019; Chase *et al*., 2015; Malaspina *et al*., 2023; POWO, 2024; Salazar *et al*., 2016). They can be recognized from other genera of Catasetinae by their asymmetrical flowers with a twisted column and perianth (Salazar *et al*., 2016). In Brazil, 30 species are recorded, with seven occurring in Mato Grosso (Cantuária *et al*., 2019; Malaspina *et al*., 2023; Meneguzzo, 2024).

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The taxonomy of *Mormodes* is complex due to the few diagnostic characters and frequent overlapping of features among the species. Additionally, the rarity in nature results in limited representation in botanical collections and scant information on the morphological variation and autecology of most species (see Engels *et al.*, 2020; Salazar *et al.*, 2016).

During the study of Orchidaceae specimens from the UFMT and TANG herbaria (acronyms according to Thiers, 2024; cont. updated), an undescribed species of *Mormodes* was identified, increasing the number of species for Mato Grosso to eight. In the present study, we propose to describe this new species, providing a comprehensive morphological description, information on the distribution, taxonomy, ecology, and conservation, in addition to images of the new species.

Material and methods. Materials from UFMT and TANG were examined under a stereoscopic microscope, and dried flowers were rehydrated with warm water with the permission from the herbaria curators. Additionally, flowers preserved in spirit at UPCB were examined. Colour data were collected from the labels of specimens and photos of live material. Morphological terminology follows Gonçalves & Lorenzi (2011). Literature on *Mormodes* was consulted for taxonomic comparison (i.e. Castro Neto, 2006; Miranda & Lacerda, 1992; Pabst, 1978).

Taxonomic treatment

Mormodes benelliana Engels & A.K.Koch, ***sp. nov.*** (Fig. 1–3)

TYPE: BRAZIL. Mato Grosso: Reserva do Cabaçal, 16 June 2014 (fl.), *C.B. Freitas APB952* (holotype UFMT 41.445!, isotype UPCB! [spirit]).

Diagnosis: Similar to *Mormodes hoehnei* F.E.L.Miranda & K.G.Lacerda, but it differs with smaller pseudobulbs, inflorescences longer than the pseudobulbs, conspicuous peduncle, yellowish-brown and brown-vinous striped flowers, lip large-elliptic to ovate, glabrous.

Epiphytic *herb*, caespitose, *ca.* 13–14 cm tall. *Roots* 2–3 mm diam., terete, white. *Pseudobulbs ca.* 7.5 × 2.2 cm, heteroblastic, lanceoloid to ovoid, covered by persistent leaf sheaths. *Leaves* 5–8 per pseudobulb, petiolated, caducous during flowering; leaf sheaths tan; blades 19.0–24.8 × 1.0–2.2 cm, narrowly elliptical, base acute, margin entire and sinuate, apex acute, green, concolourous, glabrous. *Inflorescence* 10.4–17.6 cm long, raceme simple, axillary, 9–24-flowered, ascending, produced in the nodes above the base up to the middle of the mature pseudobulb; peduncle 5.3–9.6 × 0.2–0.35 – (0.6) cm, terete, green; *peduncle bracts* 6–7 × 8–10 mm, ovate, amplectives, apex obtuse, brown-greenish; rachis 4.0–10.5 × 0.1–0.2 - (0.6) cm, terete, green; *floral bracts* 3–5 × 1–2 mm, elliptic to elliptic-lanceolate, apex obtuse, brown-greenish. *Flowers* resupinate, glabrous; ovary and pedicel 1.4–2.1 × 0.1–0.2 cm, subterete, sulcate in the carpel welding, brown greenish; perianth brown yellowish with brown-vinous stripes. *Dorsal sepal* 1.7–2.0 × 0.4–0.6 cm, elliptic-lanceolate to lanceolate, base acute, margin entire, apex obtuse to rounded; *lateral sepals* 1.7–2.0 × 0.5–0.8 cm, elliptic-lanceolate to lanceolate, base rounded, margin entire, apex obtuse to sub-rounded with dorsal acute carinae. *Petals* 1.7–2.0 × 0.5–0.8 cm, lanceolate, base acute, margins entire, apex obtuse and apiculate. *Lip* 1.7–2.1 × 0.9–1.4 cm, unguiculate, fleshy, rigid, brown greenish with brown-vinous stripes; claw 4–6 × 2 mm; blade large-elliptic to ovate, entire, base slightly decurrent, margin entire, deflexed in natural position, apex rounded and apiculate, apicule *ca.* 1.0 mm length, acute, deflexed. *Column* 1.0–1.2 × 0.2–0.4 cm, twisted, brown whitish; stigmatic cavity 1.5–3 × 1.5–2.5 mm, elliptical to sub-quadrate. *Anther cap* 4 × 5 mm, transversely elliptic, apiculate, apex acute. *Pollinaria* with viscidium *ca.* 1.5 × 1.7 mm, sub-rounded; stipe *ca.* 5 × 3 mm, oblanceolate, obtuse; pollinia 2, *ca.* 2.0 × 1.25 mm, ellipsoid, cucculate, yellow. *Fruits* and *seeds* not seen.

Additional materials: BRAZIL. Mato Grosso: Tangará da Serra, 20 May 2011 (fl.), *J.Q. Moraes 57* (paratypes TANG 1075! [dried + spirit], UPCB! [spirit]); Reserva do Cabaçal, 16 June 2014 (fl.), *C.B. Freitas nº APB953* (paratype UFMT 41.444!).

Distribution and habitat: Known from the southwest region of Mato Grosso, in the Reserva do Cabaçal and Tangará da Serra municipalities. It occurs as an epiphyte in the ecotone region between the Amazon and Cerrado domains (Fig. 4).

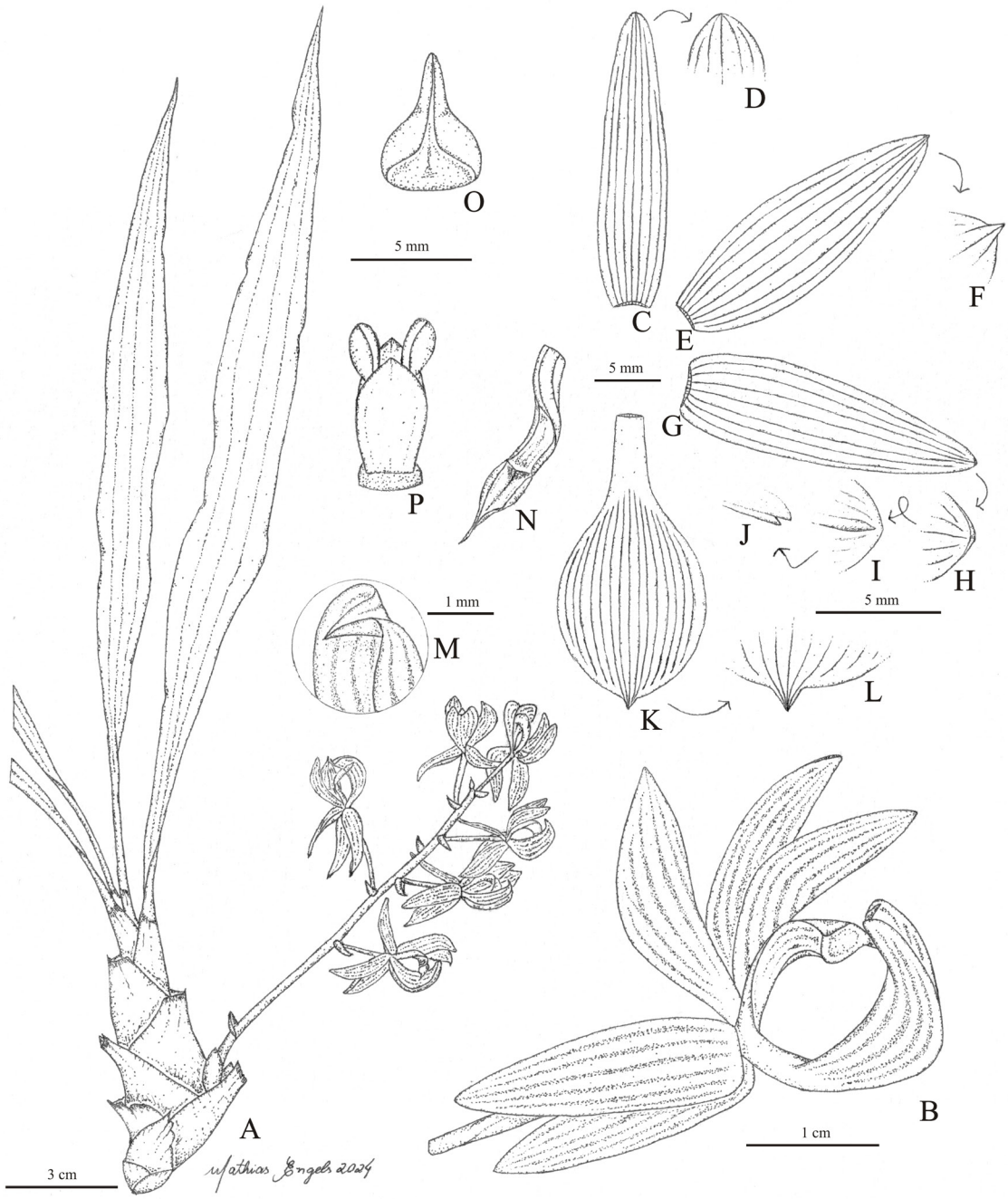

FIGURE 1. *Mormodes benelliana*. **A**. Habit. **B**. Flower in lateral view. **C–L**. Perianth flattened. **C** and **D**. Dorsal sepal. **D**. Detail of apex. **E** and **F**. Petal. **F**. Detail of apex. **G–J**. Lateral sepal. **H**. Detail of apex in adaxial view. **I**. Detail od apex in abaxial view. **J**. Detail os apex in lateral view. **K–M**. Lip. **L**. Detail of flatteded apex. **M**. Detaisl of apex in natural position. **N**. Column, twisted. **O**. Anther. **P**. Polinarium. **C–G, K–L**. Adaxial view. Drawn by M.E. Engels, based on the type material (**A, O–P**. *J.Q. Moraes 57* [paratype – TANG 1075]. **B–N**. *C.B. Freitas nº APB952* [holotype – UFMT 41.445]).

FIGURE 2. *Mormodes benelliana.* **A**. Habit. **B**. Inflorescences. **C**. Detail of flowers. **D**. Detail of lip adaxial surface at pickled material. Photos by Celice A. Silva (**A–C**) and Mathias Engels (**D**). **A–C** of *J.Q. Moraes 57* (TANG [dried + spirit]), **D** of *C.B. Freitas nº APB952* (UPCB [spirit]).

FIGURE 3. Holotype of *Mormodes benelliana* (*C.B. Freitas nº APB952* [UFMT 41.445]).

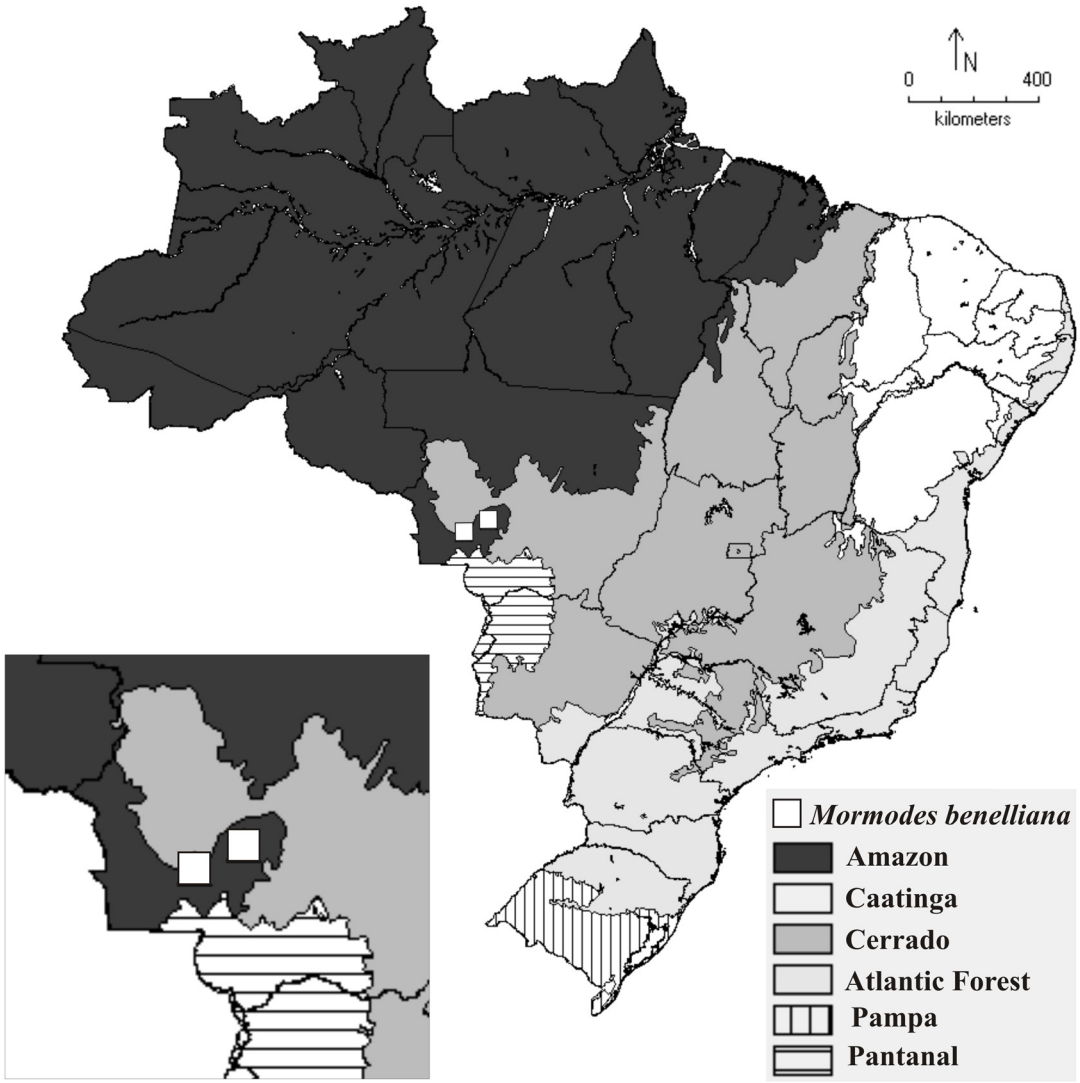

FIGURE 4. Map of Brazil indicating the distribution of *Mormode benelliana*.

ETYMOLOGY: The specific epithet honours Dra. Adarilda Petini Benelli, an orchidologist who has made significant contributions to the knowledge of the genus *Catasetum* (Catasetinae) in the state of Mato Grosso and Brazil (e.g., Benelli, 2024).

CONSERVATION STATUS: According to IUCN, *M. benelliana* falls into the Data Deficient (DD) category. The new species is known from three collections in two municipalities, the exact locations being unknown. With two municipal centroids, calculated at GeoCAT (Bachman *et al.*, 2011), its extent of occurrence (EOO) is 0 km^2 (not calculable with two points) and area of occupancy (AOO) is 8 km^2, being considered as Critically Endangered (CR). However, a more extensive sampling and specific studies on the genus may provide distribution, ecology and abundance data for a better understanding of the species and its threats, providing subsidies for an adequate framework for its conservation.

MORPHOLOGICAL AFFINITIES: *Mormodes benelliana* belongs to *Mormodes* sect. *Mormodes* due to flow-

ering occur after the complete development of the pseudobulbs, after the beginning or complete abscission of the leaves (see Salazar *et al.*, 2016). It is morphologically similar to *Mormodes hoehnei* due to the dimensions of the floral whorls (i.e., *ca.* 2 cm long), the striped flowers and the shape of the lip blade (i.e., entire). However, it is easily differentiated by its entirely glabrous lip (*vs.* densely pilose on the adaxial surface [as *hirsutissimo* or very hirsute]). Additionally, *M. benelliana* has smaller pseudobulbs (*ca.* 7.5 × 2.2 cm, lanceoloid to ovoid *vs.* 28 × 5 cm, eliptic-lanceoloid to fusiform); inflorescence longer than the pseudobulbs (10.4–17.6 cm long, *ca.* 1.5 times longer *vs*. *ca.* 12 cm long, half the length); conspicuous peduncle, 5.3–9.6 cm long *vs.* peduncle inconspicuous with flowers densely condensed from the base of inflorescence); +fewer flowers (9–24 *vs.* 35+); lip shape (large-elliptic to ovate *vs.* orbicular to transversally sub-elliptic); perianth flowers brown-yellowish with brown-vinous stripes (*vs.* pink to red-vinous flowers with dark red-vinous stripes). Additional characters are presented in Table 1. A detailed description, illustrations and images of *M. hoehnei* are provided in Miranda & Lacerda (1992) and Castro Neto (2006).

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Authors contribution. MEE: Contributed to data analysis, conceptualization and design of the study, preparation and review of the manuscript. ECS: Contributed to data analysis, conceptualization and design of the study and review of the manuscript. CAS: Contributed to data analysis, conceptualization and design of the study and review of the manuscript. AKK: Contributed to data analysis, conceptualization and design of the study and review of the manuscript.

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Conflict of interest. The authors declare no conflict of interest.

Literature cited

Bachman, S., Moat, J., Hill, A. W., De-La-Torre, J. & Scott, B. (2011). Supporting Red List threat assessments with GeoCAT: Geospatial conservation assessment tool. *ZooKeys*, 150, 117–126. https://doi.org/10.3897/zookeys.150.2109

Benelli, A. P. (2012). *Orquídeas de Mato Grosso - Genus Catasetum L.C. Rich ex Kunth.* Rio de Janeiro: PoD.

Benelli, A. P. (2024). *Catasetum.* In: *Flora e Funga do Brasil.* Jardim Botânico do Rio de Janeiro. Retrieved from https://floradobrasil.jbrj.gov.br/FB11312 [Accessed 08 May 2024].

Benelli, A. P. & Grade, A. (2008). A new species of *Catasetum* (Orchidaceae) for the state of Mato Grosso, Brazil. *Edinburgh Journal of Botany*, 65, 27–34. https://doi.org/10.1017/S0960428608004824

Benelli, A. P. & Izzo, T. J. (2017). *Catasetum brasilandense* (Orchidaceae), a new species from Mato Grosso, Brazil. *Richardiana*, 1, 51–62.

Benelli, A. P. & Pessoa, E. (2019). A new non-Andean South American *Chysis* (Bletiinae-Orchidaceae) with pale Flowers. *Phytotaxa*, 420, 84–88. https://doi.org/10.11646/phytotaxa.420.1.7

Benelli, A. P. & Soares-Lopes, C. R. S. (2015). A new species of *Catasetum* (Cymbidieae, Epidendroideae, Orchidaceae) from the Southern region of the Brazilian Amazon. *Phytotaxa*, 204, 75–79. https://doi.org/10.11646/phytotaxa.204.1.6

Benelli, A. P. & Soares-Lopes, C. R. A. (2017). New taxa of *Catasetum* (Orchidaceae, Catasetinae) from Mato Grosso, Brazil. *Richardiana*, 1, 31–43.

Benelli, A. P., Soares-Lopes, C. R. A., Silva, D. R. & Ribeiro, R. S. (2015). Novos registros de epífitas vasculares para o estado de Mato Grosso, Brasil. *Enciclopédia Biosfera*, 21, 2340–2351.

BFG. (2015). Growing knowledge: an overview of Seed Plant diversity in Brazil. *Rodriguésia*, 66, 1085–1113. https://doi.org/10.1590/2175-7860201566411

BFG. (2018). Brazilian Flora 2020: Innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). *Rodriguésia*, 69, 1513–1527. https://doi.org/10.1590/2175-7860201869402

TABLE 1. Morphological comparison between *Mormodes benelliana* and *Mormodes hoehnei*.

Characters	*Mormodes benelliana*	*Mormodes hoehnei*
Habit	epiphyte	epiphyte and rupiculous (dendricolous)
Pseudobulbs		
Size	*ca.* 7.5 × 2.2 cm	28 × 5 cm
Shape	lanceoloid to ovoid	eliptic-lanceoloid to fusiform
Leaves		
Number	5–8 per pseudobulb	12–15 per pseudobulb
Size	19.0–24.8 × 1.0–2.2 cm	*ca.* 25.0 × 5.5 cm
Shape	narrowly elliptical	oblong-lanceolate
Inflorescence		
Size	longer than the pseudobulb (*ca.* 1.5 times longer)	smaller than the pseudobulb (*ca.* half lenght)
Flowers number	9–24	more than 35
Lenght	10.4–17.6 cm	*ca.* 12 cm
Peduncle	conspicuous (5.3–9.6 cm long)	incospicuous (very short)
Flowers		
Position	Resupinate, laxa to agruped	Resupinate, densaly agrupeded
Color	brown-yellowish with brown-vinous stripes	pink to red-vinous flowers with dark red-vinous stripes
Ovary + pedicel		
Size	1.4–2.1 × 0.1–0.2 cm	2.1 × 0.15 cm
Shape	sub-terete	terete
Indument	glabrous	glabrous
Dorsal sepal		
Size	1.7–2.0 × 0.4–0.6 cm	2.2 × 0.4 cm
Shape	elliptic-lanceolate to lanceolate	lanceolate
Indument	glabrous	glabrous
Lateral sepals		
Size	1.7–2.0 × 0.5–0.8 cm	2.0 × 0.7 cm
Shape	elliptic-lanceolate to lanceolate	lanceolate
Indument	glabrous	glabrous
Lip		
Size	1.7–2.1 × 0.9–1.4 cm	2.2 × 1.4 cm
Blade size	1.3–1.6 × 0.9–1.4 cm	1.8 × 1.4 cm
Blade shape	large-elliptic to ovate	orbicular to transversally sub-elliptic
Apex	apicule ca 1.0 mm long	apicule *ca.* 3.0 mm long
Indument	glabrous	very hirsute
Column size	1.0–1.2 × 0.2–0.4 cm	1.5 × 0.15 cm
Anther cap		
Size	4 mm long	8 mm long
Shape	transversely elliptic, apiculate	subtriangular and long apiculate

Bachman, S., Moat, J., Hill, A. W., De-La-Torre, J. & Scott, B. (2011). Supporting Red List threat assessments with GeoCAT: Geospatial conservation assessment tool. *ZooKeys*, 150, 117–126. https://doi.org/10.3897/zookeys.150.2109

Benelli, A. P. (2012). *Orquídeas de Mato Grosso - Genus Catasetum L.C. Rich ex Kunth.* Rio de Janeiro: PoD.

Benelli, A. P. (2024). *Catasetum.* In: *Flora e Funga do Brasil.* Jardim Botânico do Rio de Janeiro. Retrieved from https://floradobrasil.jbrj.gov.br/FB11312 [Accessed 08 May 2024].

Benelli, A. P. & Grade, A. (2008). A new species of *Catasetum* (Orchidaceae) for the state of Mato Grosso, Brazil. *Edinburgh Journal of Botany*, 65, 27–34. https://doi.org/10.1017/S0960428608004824

Benelli, A. P. & Izzo, T. J. (2017). *Catasetum brasilandense* (Orchidaceae), a new species from Mato Grosso, Brazil. *Richardiana*, 1, 51–62.

Benelli, A. P. & Pessoa, E. (2019). A new non-Andean South American *Chysis* (Bletiinae-Orchidaceae) with pale Flowers. *Phytotaxa*, 420, 84–88. https://doi.org/10.11646/phytotaxa.420.1.7

Benelli, A. P. & Soares-Lopes, C. R. S. (2015). A new species of *Catasetum* (Cymbidieae, Epidendroideae, Orchidaceae) from the Southern region of the Brazilian Amazon. *Phytotaxa*, 204, 75–79. https://doi.org/10.11646/phytotaxa.204.1.6

Benelli, A. P. & Soares-Lopes, C. R. A. (2017). New taxa of *Catasetum* (Orchidaceae, Catasetinae) from Mato Grosso, Brazil. *Richardiana*, 1, 31–43.

Benelli, A. P., Soares-Lopes, C. R. A., Silva, D. R. & Ribeiro, R. S. (2015). Novos registros de epífitas vasculares para o estado de Mato Grosso, Brasil. *Enciclopédia Biosfera*, 21, 2340–2351.

BFG. (2015). Growing knowledge: an overview of Seed Plant diversity in Brazil. *Rodriguésia*, 66, 1085–1113. https://doi.org/10.1590/2175-7860201566411

BFG. (2018). Brazilian Flora 2020: Innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). *Rodriguésia*, 69, 1513–1527. https://doi.org/10.1590/2175-7860201869402

BFG. (2022). Brazilian Flora 2020: Leveraging the power of a collaborative scientific network. *Taxon*, 71, 178–198. https://doi.org/10.1002/tax.12640

Campacci, M. A. & Carr, G. F. (2015). *Mormodes mutunensis* Campacci & G.F.Carr. *sp nov. Coletânea de Orquídeas Brasileiras*, 11, 438–441.

Cantuária, P. C., Medeiros, T. D. S, Negrão, M. F., Silva, J. B. F., Silva, B. M. S. & Silva, R. B. L. (2019). Nova espécie de *Mormodes* Lindl. para a Amazônia Brasileira. *Biota Amazônia*, 9, 40–42. http://dx.doi.org/10.18561/2179-5746/biotaamazonia.v9n2p40-42

Castro Neto, V. P. (2006). *Icones Orchidacearum Brasilienses II*. São Bernardo do Campo: Vitorino Paiva Castro Neto.

Carpanedo, R. S., Guimarães, R. S., Cavalheiro, L., Miranda, R. M., Anjos, S. F. & Barbosa, F. R. (2021). Orquídeas da Estação Ecológica do Rio Ranuro. In: D. J. Rodrigues, F. R. Barbosa, J. C. Noronha, R. S. Carpanedo, A. L. M. Tourinho & L. D. Battirola (Org.). *Biodiversidade da Estação Ecológica do Rio Ranuro* (pp.154–164). Cuiabá: UNISELVA.

Chase, M. W., Cameron, K. M., Freudenstein, J. V., Pridgeon, A. M., Salazar, G., van den Berg, C. & Schuiteman, A. (2015). An updated classification of Orchidaceae. *Botanical Journal of the Linnean Society*, 177, 151–174. https://doi.org/10.1111/boj.12234

Engels, M. E. & Ferneda Rocha, L. C. (2016). *Maxillaria aureoglobula* (Orchidaceae, Maxillariinae): a new record from Brazil. *Lankesteriana*, 16, 119–122. https://doi.org/10.15517/lank.v16i2.25395

Engels, M. E. & Ferneda Rocha, L. C. (2017a). *Macroclinium chasei* (Orchidaceae, Oncidiinae): a new record for Brazil. *Lankesteriana*, 17, 369–373. https://doi.org/10.15517/lank.v17i3.30637

Engels, M. E. & Ferneda Rocha, L. C. (2017b). Dois novos registros de distribuição geográfica em *Epidendrum* (Orchidaceae) para o Centro-Oeste brasileiro. *Rodriguésia*, 68, 779–782. https://doi.org/10.1590/2175-7860201768228

Engels, M. E. & Ferneda Rochas, L. C. (2017c). Novos registros de distribuição geográfica em *Sobralia* (Orchidaceae: Epidendroideae) para a Região Centro-Oeste do Brasil. *Rodriguésia*, 68, 1483–1486. https://doi.org/10.1590/2175-7860201768427

Engels, M. E., Ferneda Rocha, L. C. & Benelli, A. P. (2016). A new species of *Catasetum* (Orchidaceae, Epidendroideae, Cymbidieae) from the Southern Brazilian Amazon. *Lankesteriana*, 16, 328–333. https://doi.org/10.15517/lank.v16i3.26976

Engels, M. E., Ferneda Rocha, L. C. & Pessoa, E. (2017). O gênero *Coryanthes* (Orchidaceae-Stanhopeinae) no estado do Mato Grosso, Brasil. *Rodriguésia*, 68, 489–501. https://doi.org/10.1590/2175-7860201768213

Engels, M. E., Ferneda Rocha, L. C. & Smidt, E. C. (2020). A new species of *Mormodes* (Orchidaceae: Catasetinae) from southern Amazon, Brazil. *Brazilian Journal of Botany*, 43, 555–561. https://doi.org/10.1007/s40415-020-00632-5

Engels, M. E. & Smidt, E. C. (2021). A new *Sarcoglottis* (Orchidaceae: Spiranthinae) from the southern Brazilian Amazon. *Phytotaxa*, 487, 171–176. https://doi.org/10.11646/phytotaxa.487.2.8

Engels, M. E., Salgado, T. L. D. & Batista, J. A. N. (2019). A spectacular new species of *Habenaria* (Orchidaceae) from Southern Brazilian Amazon. *Systematic Botany*, 44, 775–782. https://doi.org/10.1600/036364419X15710776741387

Flora e Funga do Brasil. (2024). Jardim Botânico do Rio de Janeiro. Retrieved from https://floradobrasil.jbrj.gov.br/FB128482 [Accessed 08 May 2024].

Gonçalves, E. G. & Lorenzi, H. (2011) *Morfologia vegetal: organografia e dicionário ilustrado de morfologia das plantas vasculares.* 2 ed. Nova Odessa: Instituto Plantarum de Estudos da Flora.

IBGE. (2012). *Manual técnico da vegetação Brasileira.* 2 ed. Rio de Janeiro: IBGE.

Koch, A. K. & Silva, C. A. (2012). *Orquídeas Nativa de Mato Grosso*. Cuiabá: Carlini & Caniato Editorial.

Koch, A. K., Hall, C. F., Smidt, E. C., Almeida, A. B. R., Bolson, M. & Silva, C.A. (2016). First record of the genus *Tropidia* Lindl. (Orchidaceae) for Brazil. *Hoehnea*, 43, 521–528. https://doi.org/10.1590/2236-8906-33/2016

Malaspina, T. K., Ferreira, U. L. C. & Araújo, L. C. (2023). *Mormodes goianensis* T.K.Malaspina, U.L.Ferreira & L. C.Araújo *sp. nov. Coletânea de Orquídeas Brasileiras*, 19, 790–793.

Meneguzzo, T. E. C. (2024). *Mormodes*. In *Flora e Funga do Brasil.* Jardim Botânico do Rio de Janeiro. Retrieved from https://floradobrasil.jbrj.gov.br/FB31958 [Accessed 08 May 2024].

Miranda, F. E. L. & Lacerda Jr., K. G. (1992). Estudos em Catasetinae (Orchidaceae) – 2. *Bradea*, 6, 122–132.

Pabst, G. F. J. (1978). An illustrated key to the species of the genus *Mormodes* Lindley (Orchidaceae). *Selbyana*, 2, 149–155.

Pessoa, E., Miranda, M. R. & Alves, M. (2015). *Campylocentrum benellii* and *C. paludosum spp. nov.* (Angraecinae–Orchidaceae): two new leafless species from Brazil. *Nordic Journal of Botany*, 34, 376–379. https://doi.org/10.1111/njb.00922

POWO. (2024). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Retrieved from http://www.plantsoftheworldonline.org [Accessed 31 July 2024].

Salazar, G. A., Cabrera, L. I., Gerlach, G., Hágsater, E. & Chase, M. W. (2016). Phylogenetic relationships in *Mormodes* (Orchidaceae, Cymbidieae, Catasetinae) inferred from nuclear and plastid DNA sequences and morphology. *Phytotaxa*, 263, 30–80. https://doi.org/10.11646/phytotaxa.263.1.2

Thiers, B. (2024 continuously updated). *Index Herbariorum. Part I: The herbaria of the world.* New York Botanical Garden. Retrieved from www.sweetgum.nybg.org/ih [Accessed 08 May 2024].

Zappi, D. C., Sasaki, D., Milliken, W., Piva, J., Henicka, G. S., Biggs, N. & Frisby, S. (2011). Plantas vasculares da região do Parque Estadual Cristalino, norte de Mato Grosso, Brasil. *Acta Amazonica*, 41, 29–38. https://doi.org/10.1590/S0044-59672011000100004

Zappi, D. C., Milliken, W., Soares Lopes, C. R. A., Lucas, E., Piva, J. H., Frisby, S., Biggs, N. & Forzza, R. C. (2016). Xingu State Park vascular plant survey: filling the gaps. *Brazilian Journal of Botany*, 39, 751–778. https://doi.org/10.1007/s40415-016-0262-2

Zocal, K. H., Alcantara, C. & Pessoa, E. (2023). Acanthaceae from Cuiabá lowlands, Mato Grosso, Brazil: a vegetational mosaic extending from Chapada dos Guimarães to Pantanal. *Rodriguésia*, 74, e00612022. http://dx.doi.org/10.1590/2175-7860202374013