

## ***Catasetum dianneae* (Orchidaceae, Catasetinae): a new species of the *C. barbatum* complex for the Brazilian Amazon**

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### **Abstract**

In the present study a new *Catasetum* species is proposed. It belongs to the *Catasetum barbatum* group and was found in the *campina* vegetation of the *Reserva Biológica de Campina* located in the north of Manaus, Amazonas state, Central Brazilian Amazon. A detailed description of the taxon is given as well as a photograph plate and comments on habitat, distribution and phenology. The new species is compared to congeneric species occurring in the Brazilian Amazon. It mainly differs by lip characters. A key to the species occurring in the *Reserva Biológica de Campina* is proposed.

## Résumé

Nous proposons dans cet article un nouveau taxon de *Catasetum* appartenant au complexe *Catasetum barbatum*. Il a été trouvé dans la végétation de *campina* de la *Reserva Biológica de Campina* située au nord de Manaus, Amazonas, Amazonie centrale brésilienne. La description détaillée de la nouvelle espèce est accompagnée d'une planche de photographies ainsi que de commentaires relatifs à l'habitat, à la distribution et à la phénologie. Le taxon est comparé aux espèces congénères présentes en Amazonie brésilienne. Il se distingue notamment par les caractères du labelle. Une clé d'identification des espèces de *Catasetum* présentes dans la *Reserva Biológica de Campina* est également proposée.

## Resumo

Este estudo propõe um novo táxon de *Catasetum* pertencente ao complexo do grupo de *C. barbatum*. Foi encontrado na vegetação de *campina* da Reserva Biológica de Campina localizada ao norte de Manaus, estado do Amazonas, Amazônia Brasileira Central. É fornecida uma descrição detalhada da nova espécie, bem como uma prancha fotográfica, além de comentários referentes ao habitat, distribuição e fenologia. É feita também uma comparação com congêneres ocorrentes na Amazônia Brasileira e se distingue principalmente pelas características apresentada pelo labelo. Uma chave de identificação para as espécies de *Catasetum* ocorrentes na Reserva Biológica de Campina é apresentada.

**Key words:** Amazonas, Amazon basin, biodiversity, *campina*, orchids, taxonomy.

**Mots clés :** Amazonas, Bassin amazonien, biodiversité, *campina*, orchidées, taxinomie.

**Palavras-chave:** Bacia amazônica, biodiversidade, “*campina*”, Estado do Amazonas, orquídea, taxonomia.

## Introduction

Regarding tradition as well as history, *Catasetum* Richard ex Kunth (1822: 330) has been classified based on a generic inference that considers the characteristics of

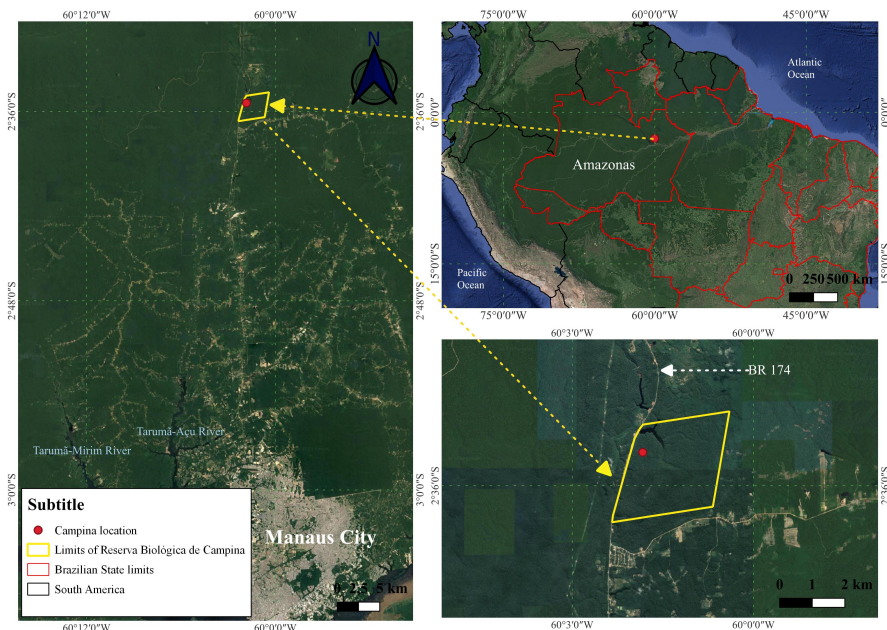
the antennae (staminodes) present in the column (gynostemium), both structures located in the flowers of the members of the genus (Bicalho & Barros, 1988; Senghas, 1990; 1991). However according to the current phylogeny of the genus, this traditional classification is not supported because the corresponding groups are not monophyletic (see Mauad *et al.*, 2022). The genus evolution could instead be explained by the biogeography of the species, in other words the species are better grouped based on the sympatry (Mauad *et al.*, 2022).

The Amazonian biome is considered as the diversity center of the genus (Romero & Carnevali, 2009) and the Brazilian Amazon deserves attention as it is comprised of a total of 75 species, i.e. 74.26% of the species occurring on the Brazilian territory (Silva & Silva, 1998; Petini-Benelli & Chiron, 2020; Krahl *et al.* 2021a, b; Krahl *et al.*, 2022a, b; Krahl *et al.*, 2023a, b; Petini-Benelli, 2023), being that some of them are considered rare (Krahl *et al.*, 2023c). In the same way the Amazonas State can be mentioned for being represented by 36 species, i.e. 48% of the species of the Brazilian Amazon (Krahl *et al.*, 2021a; Krahl *et al.*, 2023a, b; Petini-Benelli, 2023). The genus also presents a great number of natural hybrids: 36 nothospecies have been recorded, of which 28 in the Brazilian territory. From them 21 occur in the Brazilian Amazon and 5 in the Amazonas State (Krahl *et al.*, 2020; Cantuária *et al.*, 2021; Govaerts *et al.*, 2023; Petini-Benelli, 2023).

In this study a new taxon of *Catasetum* from the Amazonas State (Brazil) belonging to the *C. barbatum* complex is proposed. More precisely it is found within the limits of the *Reserva Biológica de Campina*, north of Manaus. A detailed description and ink and photographic illustrations are provided, together with additional data on habitat, phenology and geographical distribution. A key to the two species found in the *Reserva Biológica de Campina* is also proposed. The new species is compared to morphologically similar and/or sympatric taxa, i.e. *C. marinhoi* Krahl, Cantuária & J.B.F. Silva (in Krahl *et al.*, 2022a: 103), *C. ariquemense* Miranda & Lacerda (1992: 50), *C. tomasellii* Campacci & Silva (2016: 470) and *Catasetum barbatum* (Lindley 1836: t. 1778) Lindley (1844: Misc. 28).

## Material and methods

The new species was found when realizing the monograph of the Orchidaceae of the *campina* vegetation (sandy vegetation) of the *Reserva Biológica de Campina* (*REBio Campina*) (see Krahl, 2020) located at the Km 927 (formerly Km 62 and 45) of the BR 174 road linking the municipalities of Manaus (Amazonas) and Boa Vista (Rondônia) (fig. 1). We also point out that this Conservation Unit is administered by the *Instituto Nacional de Pesquisas do Amazonas* (INPA).



**Figure 1:** Location of the *campina* area in the *Reserva Biológica de Campina* (type locality of *C. dianneae*) in the municipality of Manaus, Amazonas, Brazil. Map by A.H. Krahl.

Type material has been collected and herborized according to the usual process described by Mori *et al.* (1989) and Petini-Benelli (2016) in view to later incorporation into the collection of the INPA herbarium (acronym according to Thiers, 2023). The same herbarium was consulted in search of more material from the locality. Terminology used in the description follows Dressler (1993) and Harris & Harris (2001). Digital images were made using a Canon T5 camera with a Canon EFS 18-55 mm lens. Photograph plates were made from these images using Adobe Photoshop® 2020. Observations relating to habitat and phenology of the

new entity were made *in situ*. The identification key is based on the species occurring in *REBio de Campina* as determined by Braga (1977) and Krahl (2020).

As for the comparison with the congeneric species sympatric and/or presenting a similar morphology we consulted the original descriptions of these species. The geographical distribution map was drawn using the QGIS software (Version 3.28 Firenze – Datum: GCS SIRGAS 2000/ EPSG 4674) and the conservation status was proposed according to the criteria described in IUCN (2022).

### Taxonomic treatment

*Catasetum dianneae* D.R.P. Krahl, Chiron, Krahl & J.B.F. Silva, *sp. nov.*

Type: Brazil: Amazonas, Manaus, BR 174, KM 927, Reserva Biológica de Campina, 02°35'27.2"S; 60°01'50.0"W, 29/II/2020, D.R.P. Krahl & A.H. Krahl 642 (holotype: INPA); *ibid.*, 09/VI/2020, A.H. Krahl & D.R.P. Krahl 1490 (paratype: INPA).

Additional material examined: Brazil: Amazonas, estrada Manaus-Caracarái, Km 62, Reserva Biológica de Campina do INPA, epífita em *Swartzia dolichopoda*, umbrófila, 25/06/1975, P.I.S. de Braga 2931A (INPA!).

*Catasetum dianneae* *Catasetum marinhoi* simile est sed labello ovato subovato (vs. sempre ovato), labelli fimbriis tenuioribus et versus labelli apicem crassioribus transientibus in inversum profundum V (vs. fimbriis brevioribus crassioribusque aequae distributis), basale callo unipartito paulo longo (vs. callo tripartito haud longo), apicale callo absente (vs. callo dentiforme ad bifidum), differt.

**Description** (figs. 2 & 3): Plant epiphytic and caespitose. Pseudobulb 6.2–11.2 × 1.6–2.5 cm, fusiform, 5–6-leaved, covered by leaf sheaths. Leaves 11.6–23.9 × 3.4–5.9 cm, oblanceolate, plicate, 3–5-nerved, margin entire, apex acute. Inflorescence 9.8–20.5 cm, lateral, racemose, erect to arched, 5–7-flowered; peduncle cylindrical greenish; floral bract ca. 0.9 × 0.2 cm, lanceolate, greenish and slightly purplish, margin entire, apex acute. Male flowers with petals and sepals greenish with irregular brownish stains and lip slightly brownish outside and whitish inside (including fimbriae), congested in the apical third, resupinate,

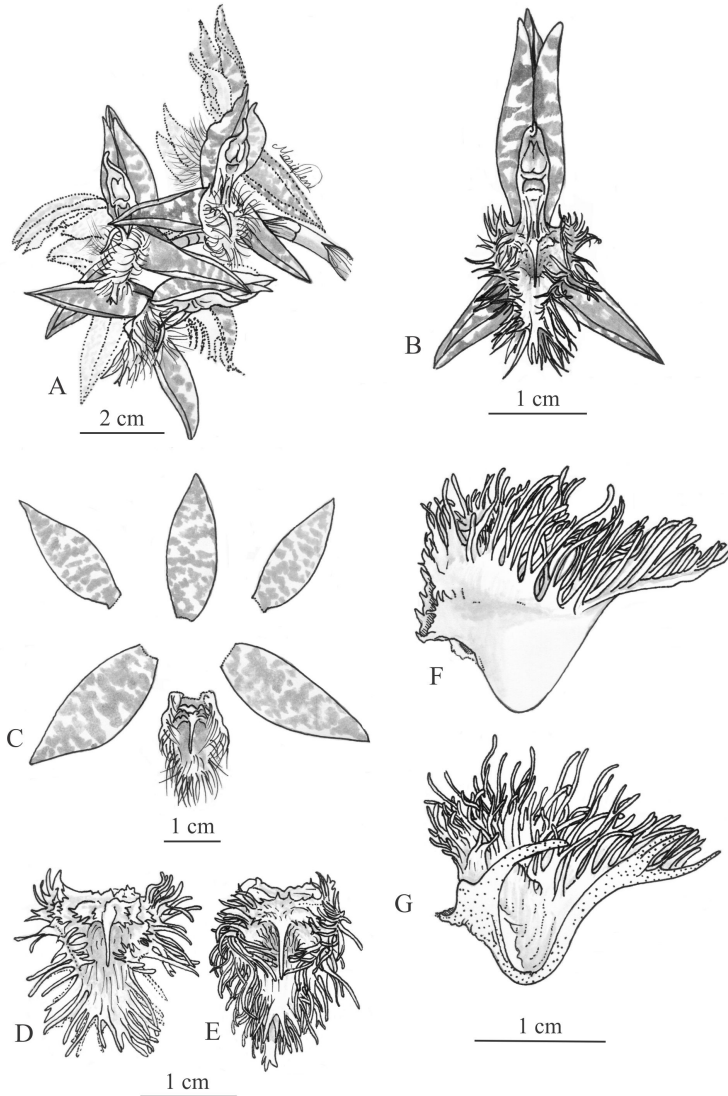
pedicelled; pedicel ca. 2.1 cm long, cylindrical, curved, greenish; sepals ca.  $2.6 \times 0.9$  cm, elliptic to lanceolate, concave, margin entire, the lateral ones slightly asymmetrical, apex acute; petals ca.  $2.4 \times 0.9$  cm, elliptic to lanceolate, margin entire, symmetrical, apex acute; lip ca.  $1.7 \times 1.3$  cm, entire, ovate to subovate, margined by relatively thin fimbriae becoming thicker and more crowded towards the lip apex where they may merge with each other and, sometimes, form an inverted deep V; sac ca. 0.8 cm deep, conical; basal callus rather long, ca. 1.1 cm, oblong, falcate, acute, in form of a claw, with small denticles at base on both sides; column ca. 2 cm long, contracted at base, rostrate; antennae ca. 0.6 cm long, symmetrical and parallel; anther cap greenish rostrate; viscidium whitish and sticky; stipe laminar and rolled; pollinia 2, obovate, thick, compressed, sulcate, yellow. Female inflorescence and fruit not observed.

**Etymology:** The specific epithet is given in honor of Dianne Rafaelle Passos Trindade Cavalcanti, a forest engineer, sister of the first author and Amazonian orchid enthusiast.

**Distribution, habitat and phenology:** Hitherto the new species is known from the only population of epiphytic orchids observed within the limits of the *Reserva Biológica de Campina* of the *Instituto Nacional de Pesquisas da Amazônia*. The number of individuals is about 50. The plants used *Swartzia recurva* Poeppig (1845: 61) as a phorophyte as it was observed by Braga (1977) (under the name *Swartzia dolichopoda* Cowan 1968: 130). The environment corresponds to an open *campina* (vegetation on a white sandy soil), characterized by a stunted and low-sized vegetation with marked scleromorphism, in addition to being possible to observe patches of soil exposed to an excessive light penetration. Thus, there is a grouping of plants forming islands of vegetation (fig. 4) (Anderson, 1981; Braga, 1977). The species is observed blooming during the first half of the year which coincides with the local rainy season (see Braga, 1977).

**Conservation status:** Data Deficient DD (IUCN, 2022). Because of the lack of information (only one population known and lack of representation in herbaria) we cannot discuss the conservation status. We may only presume that the taxon is somewhat protected because it grows within a Conservation Unit. However, even

so, we know that it suffers illegal collection by foresters or orchid lovers in view, respectively, to clandestine commercialization and cultivation. It could lead to some threat for the species in its natural habitat.



**Figure 2:** *Catasetum dianneae*. A – inflorescence; B – flower♂; C – perianth; D-G – lip. Illustration by M.F. Negrão.

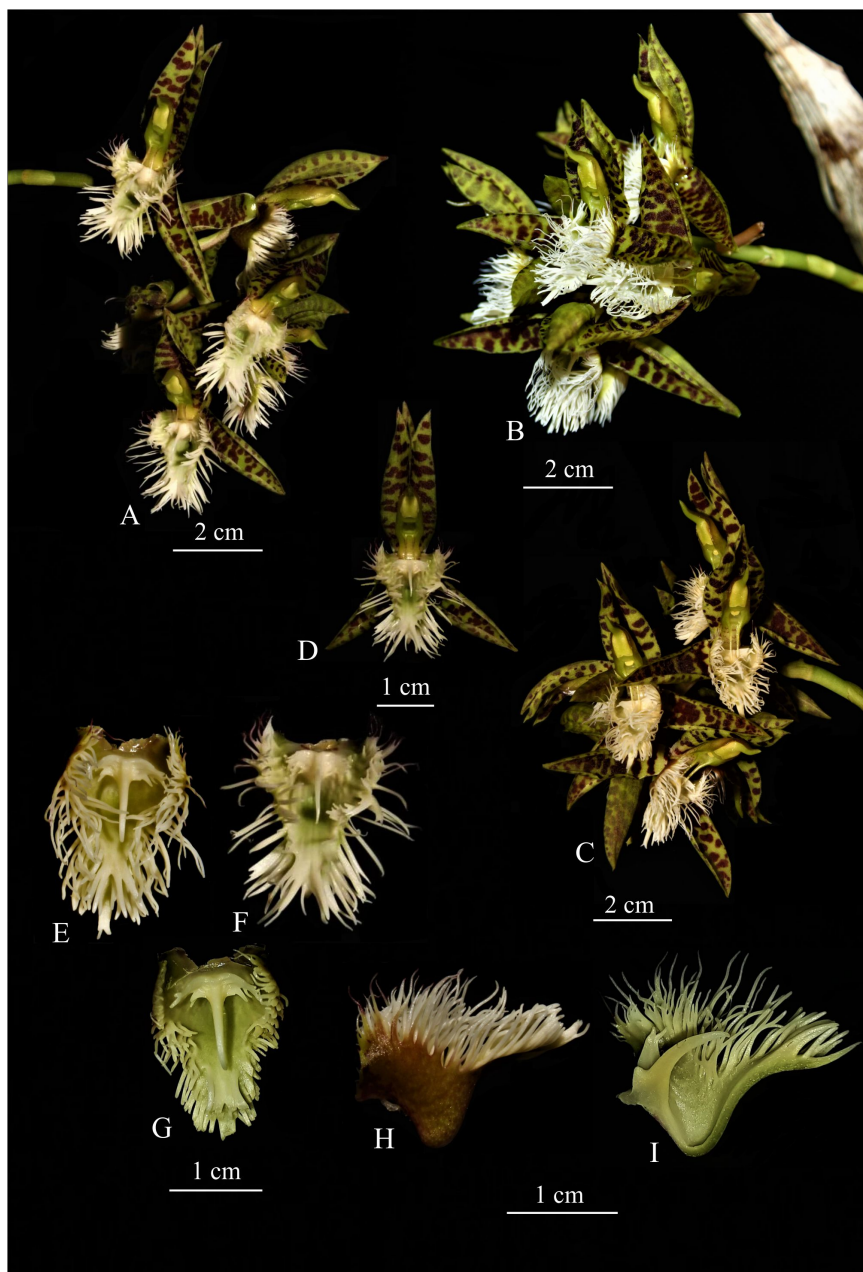


Figure 3: *Catasetum dianneae*. A-C – inflorescence; D – flower ♂; E-I – lip. Plate and photos by A.H. Krahl.





**Figure 4:** Aspect of the open *campina* vegetation of the *Reserva Biológica de Campina*. Photos by A.H. Krahl.

**Recognition:** On a traditional point of view *Catasetum dianneae* falls into the subgenus *Catasetum* section *Isoceras* subsection *Isoceras* because it presents symmetrical parallel antennae (Bicalho & Barros, 1988; Senghas, 1991) and can be included within the *Catasetum barbatum* complex. It shows some similarity with species of this group, mainly with *C. marinhoi*. We can differentiate them thanks to characteristics of the lip structure. In *C. dianneae* the lip is oval to suboval (*vs.* always oval), with fimbriae thinner becoming thicker and more crowded towards the lip apex where they may merge with each other and, sometimes, form an inverted deep “V” (*vs.* fimbriae shorter and thicker uniformly distributed on the lip margin). The callus on the lip of *C. dianneae* is unipartite and relatively long (ca. 1.1 cm long), with small denticles at base on both sides, whereas in *C. marinhoi* the callus is tripartite, with a central projection relatively short when compared with *C. dianneae* (ca. 0.3 cm long). Finally, in *C. marinhoi* there is a callus at the lip apex, tooth-shaped to bifid, whereas the lip of *C. dianneae* is devoid of any callus at its apex (fig. 5A-D and 5E-H) (see Krahl *et al.*, 2022a).

We can also compare it to *C. ariquemense* (Fig. 5I-L). However, *C. dianneae* presents an entire lip (*vs.* 3-lobed), with a callus oblong, falcate and relatively long (ca. 1.1 cm long), with small denticles at base on both sides (*vs.* tripartite, with all pieces dentiform, the central one slightly larger and relatively short [ca. 0.4 cm

long]) and without any callosity at the apex of the lip (*vs.* fleshy callus at the apex) (see Miranda & Lacerda, 1992). Compared with *C. tomaselli* (Fig. 6), *C. dianneae* differs by its oval to suboval lip (*vs.* triangular), by lip margins fimbriate mainly in the apical part where they become thicker and crowded with each other sometimes forming an inverted “V” (*vs.* margins uniformly fimbriate) and by a basal callus oblong, falcate and relatively long (ca. 1.1 cm long) (*vs.* tooth-shaped, relatively short [ca. 0.3 cm long]). Here again there is an apical callus of the lip rigid and triangular in *C. tomaselli* (*vs.* no callus at the lip apex of *C. dianneae*) (see Campacci & Silva, 2016).

*Catasetum dianneae* has sometimes been erroneously treated as *C. barbatum* (see Braga, 1977 and Krahl, 2020) as were several other recently described taxa (*e.g.* Krahl *et al.* 2021a, b; Krahl *et al.*, 2022a, b). Such an association is due to the lip of these species being fimbriate, a character (beard bearing) associated to *C. barbatum* by many authors. However, a set of other characters should be analyzed and considered. We are convinced that *C. barbatum* is a species well defined by a number of features which are evident when analyzing the holotype deposited at K.

Thus *C. dianneae*, compared to *C. barbatum*, stands out by an apically congested inflorescence (flowers are grouped on the apical third) (*vs.* an inflorescence with flowers relatively spaced on the two distal thirds), an ovate to subovate lip (*vs.* oblong to triangular), fimbriae more grouped at the lip apex, becoming thicker and crowded with each other sometimes forming an inverted “V” (*vs.* fimbriae simple uniformly grouped, variously dense) and a lip basal callus unipartite, oblong, falcate, acute and relatively long (ca. 1.1 cm long), with small denticles at base on both sides (*vs.* callus tripartite with all parts oblong and acuminate, the central projection a little more longer than the lateral ones [central projection about 0.4 cm long and side projections about 0.3 cm long.]). In *C. barbatum* we can see a tooth-shaped callus at the lip apex, either relatively acute or bifid whereas no apical callosity is present in *C. dianneae* (fig. 7) (see Lindley, 1836; Oliveira *et al.*, 2021; Petini-Benelli, 2023).

Key to the *Catasetum* species occurring in the *Reserva Biológica de Campina*

1. Terrestrial plant; flowers not resupinate; lip helmet-shaped with ciliate margins; column devoid of staminodes (antennae) ..... *C. discolor*

1a. Epiphyte plant; flowers resupinate; lip ovate and densely fimbriate; column with staminodes symmetrical and parallel..... *C. dianneae*

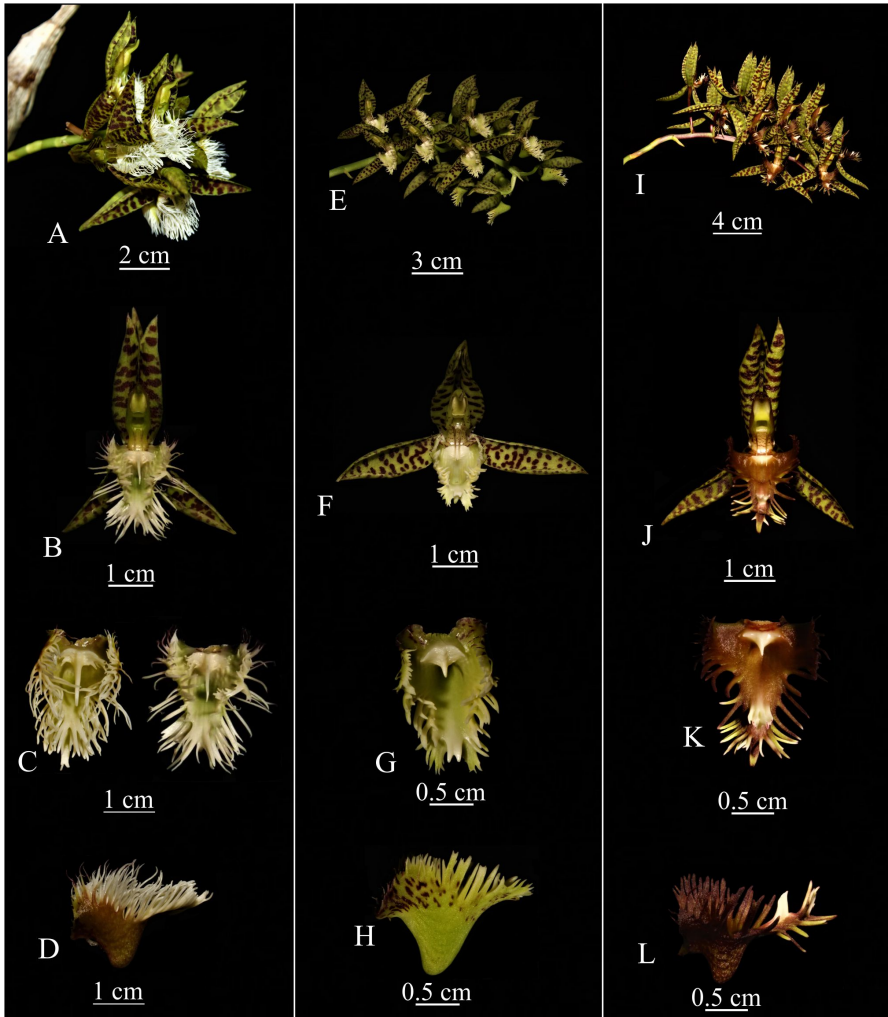


Figure 5: Comparison between *C. dianneae* (A-D), *C. marinholi* (E-H) and *C. ariquemense* (I-L). Plate and photos by A.H. Krahl.



**Figure 6: Comparison between *C. dianneae* (A-B) and *C. tomasellii* (C-D).** Plate by A.H. Krahl; photos A-B by A.H. Krahl; C-D by J.B.F. da Silva.

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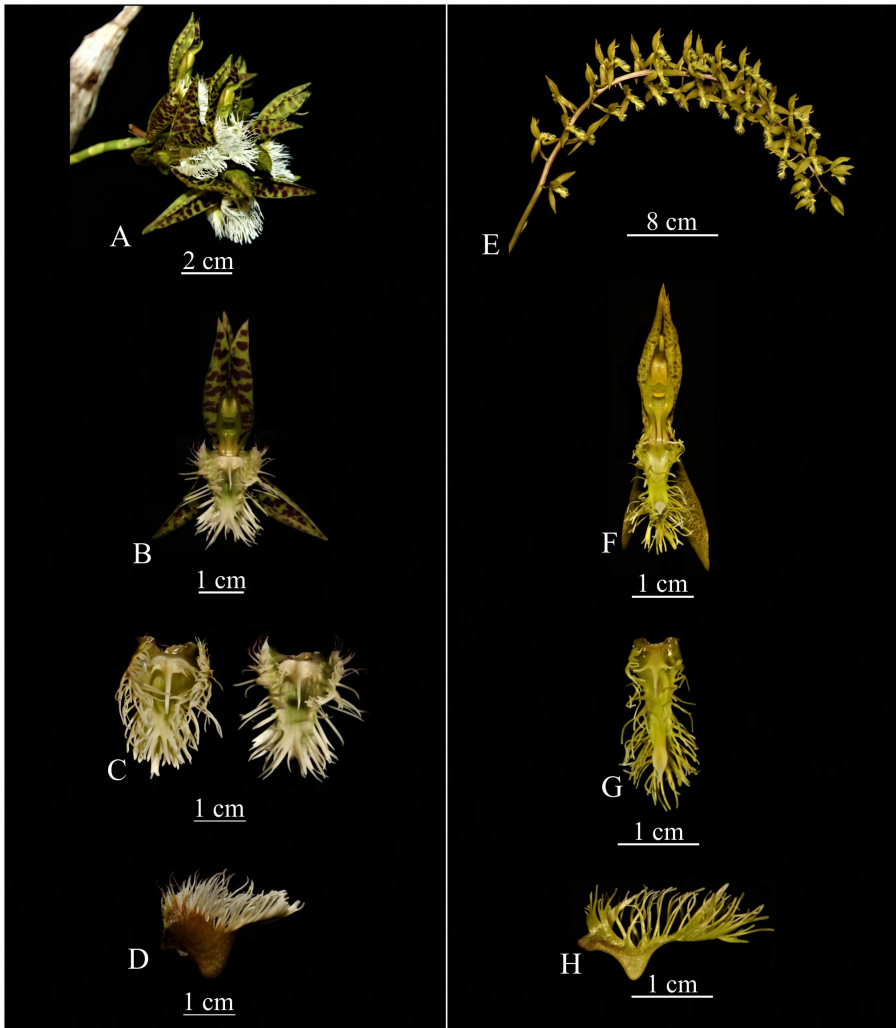


Figure 7: Comparison between *C. dianneae* (A-D) and *C. barbatum* (E-H). Plate and photos by A.H. Krahl.

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