

## New records to *Odontadenia hypoglauca* (Apocynaceae) in Brazil

**Thales Silva Coutinho<sup>1</sup>**

*Universidade Federal de Mato Grosso*

**Lorran André Moraes<sup>2</sup>**

*Universidade Federal do Piauí*

**Gleison Soares<sup>3</sup>**

*Universidade Federal de Pernambuco*

### ABSTRACT

*Odontadenia hypoglauca* is a species of Apocynaceae previously recorded only in the Cerrado and ombrophilous forest vegetation types, in the Cerrado and Amazon and Atlantic Forest domains, respectively, in Brazil and Bolivia. In this paper, we show new records of the species for the states of Maranhão, Piauí and Tocantins, thus expanding its known distribution in Brazil to the caatinga and seasonal deciduous forest vegetation types, in the Caatinga and Atlantic Forest domains. In the state of Piauí in particular, this is also the first record of the genus *Odontadenia*. In addition to reporting these new records, we provide a description for the species, photographs, geographic distribution, taxonomic comments, conservation status, map, and an identification key for the species of *Odontadenia* that occur in the aforementioned states and other morphologically related species.

**Keywords:** Apocynoid; Atlantic Forest; Caatinga; Climbing; New occurrences.

## Novos registros para *Odontadenia hypoglauca* (Apocynaceae) no Brasil

### RESUMO

*Odontadenia hypoglauca* é uma espécie de Apocynaceae previamente registrada apenas em tipos de vegetação do cerrado e floresta ombrófila, nos domínios do Cerrado e Florestas Amazônica e Atlântica, respectivamente, no Brasil e Bolívia. Neste estudo, nós mostramos novos registros da espécie para os estados do Maranhão, Piauí e Tocantins, logo expandindo sua distribuição conhecida no Brasil para os tipos vegetacionais caatinga e floresta estacional decidual, nos domínios da Caatinga e Floresta Atlântica, respectivamente. No estado do Piauí em particular, este é também o primeiro registro do gênero *Odontadenia*. Além de reportar esses novos registros,

<sup>1</sup> Doctor. UFPE. PE. Laboratório de Estudos Integrados de Plantas (LEIP). Federal University of Mato Grosso (UFMT), Cuiabá, Mato Grosso, Brasil. Av. Fernando Corrêa da Costa, n. 2367, Boa Esperança, Cuiabá, Mato Grosso, Brasil, 78060-900. ORCID: <https://orcid.org/0000-0002-2173-4340>. Lattes: <http://lattes.cnpq.br/2583558289426414>. E-mail: thales\_scoutinho@hotmail.com.

<sup>2</sup> Doctor. UFPI. PI. State University of Maranhão (UEMA), Coelho Neto, Maranhão, Brasil. Rua Antônio Guimarães, s/n, Olho D'Aguinha, 65620-000. ORCID: <https://orcid.org/0000-0002-3858-3059>. Lattes: <http://lattes.cnpq.br/8479768402300921>. E-mail: lorranbio@hotmail.com.

<sup>3</sup> Magister. UFPE. PE. Plant Biology Post-Graduate Program. Doutorando na Universidade Federal de Pernambuco (UFPE), Recife, Pernambuco, Brasil. Av. Professor Moraes Rego, n. 1235, Cidade Universitária, Recife, Pernambuco, Brasil, 50670-901. ORCID: <https://orcid.org/0000-0003-0405-5407>. Lattes: <http://lattes.cnpq.br/9272328295562361>. E-mail: gleison-ufcg@hotmail.com.

nós fornecemos uma descrição para a espécie, fotografias, distribuição geográfica, comentários taxonômicos, status de conservação, mapa, e uma chave de identificação para as espécies de *Odontadenia* ocorrentes nos estados mencionados e outras espécies morfológicamente relacionadas.

**Palavras-chave:** Apocynoid; Floresta Atlântica; Caatinga; Lianas; Novas ocorrências.

## Nuevos registros de *Odontadenia hypogleuca* (Apocynaceae) en Brasil

### RESUMEN

*Odontadenia hypogleuca* es una especie de la familia Apocynaceae conocida anteriormente solo para la vegetación del cerrado (dominio del Cerrado) y el bosque tropical (dominios de la Amazonía y Mata Atlántica), en Brasil y Bolivia. En este estudio, ampliamos su distribución en Brasil a las vegetaciones de caatinga y bosque caducifolio estacional (dominios de Caatinga y Mata Atlántica), donde la especie está siendo registrada por primera vez a los estados de Maranhão, Piauí y Tocantins; en el estado de Piauí, en particular, este es el primer registro del género *Odontadenia*. Además de reportar estos nuevos registros, proporcionamos una descripción de la especie, imágenes, comentarios taxonómicos y de distribución geográfica, estado de conservación, mapa y una clave de identificación de las especies de *Odontadenia* que se encuentran en los estados antes mencionados y otras especies morfológicamente relacionadas.

**Palabras clave:** Apocynoid; Mata Atlántica; Caatinga; Lianas; Nuevas ocurrencias.

### INTRODUCTION

Apocynaceae comprises 5,350 species belonging to 378 genera, mostly with a tropical distribution, but with some genera also occurring in temperate regions (ENDRESS et al., 2018; SENNBLAG; BREMER, 2002). In Brazil, Apocynaceae is represented by 94 genera and 974 species. Members of the family are present in all phytogeographical domains but predominate in the Atlantic and Amazon Forests (FLORA E FUNGA DO BRASIL, 2022). The family is represented mostly by lianas or vines (Endress et al., 2014) and has been classified in five subfamilies (Apocynoideae, Asclepiadoideae, Periplocoideae, Rauvolfioideae and Secamonoideae). However, molecular phylogenetic studies showed that Apocynoideae and Rauvolfioideae (Apocynaceae *sensu stricto*) are non-monophyletic (LIVSHULTZ et al., 2007; SIMÕES et al., 2007) and therefore are treated as Apocynoid and Rauvolfioid grades (ENDRESS et al., 2018).

*Odontadenia* Benth. is an American genus phylogenetically positioned in the Apocynoid grade, distributed mostly in South America, with some species occurring in Mexico and Central America (ALVARADO-CÁRDENAS, 2016; MORALES, 1999). The genus was established by Bentham (1841) based on the material *Schomburgk 309*, housed in the herbaria K, G and BM (acronyms according to Thiers, continually updated). At the time, only one species was included, *O. speciosa* Benth., characterized by an infundibuliform corolla with contorted lobes, included stamens, 5-dentate nectary, conical and fleshy stigmas, and oblong-linear and short-stipitate follicles in pairs (or one per abortion) with numerous seeds (BENTHAM, 1841).

Woodson (1935) provided the first taxonomic study for the genus and recognized 27 species (six new taxa), sorting them in two subgenera and five sections. Afterwards, Morales (1999) conducted a taxonomic revision recognizing 20 species in two subgenera and seven

sections, based on characters related to inflorescences, sepals, corolla, and follicles. Recently, Morales; Morais (2018) described *Odontadenia chapadensis* J.F. Morales & I.L. Morais, endemic to Brazil, and proposed the transfer of *Echites semidigynus* P.J. Bergius to *Odontadenia*, bringing the number of species to 22.

*Odontadenia hypoglauga* (Stadelm.) Müll.Arg is included in *O.* subg. *Odontadenia* sect. *Nitidae* Woodson (MORALES, 1999) and has a more restricted pattern of distribution than other species in the genus, being known only from cerrado and dense rainforest vegetations in the Cerrado, and Amazon and Atlantic Forests domains, respectively (FLORA E FUNGA DO BRASIL, 2022). However, during field expeditions and herbarium work in northeastern Brazil, we found records of the species in two phytogeographies and three Brazilian states where the species had not been collected before, one of them being the first record of the genus *Odontadenia* in that state.

The discovery of new records in previously unknown areas is important because it provides valuable information about distribution patterns of species, can guide conservation efforts, and can contribute to the long-term survival of species and their habitat, contributing to our understanding of the biology and ecology of the species (e.g., REIS et al, 2020; FRIDAY; DILLMAN, 2021). Additionally, these new discoveries provide insight into the biogeographic history of a region, highlight the need for conservation (e.g., ALVES; LOEUILLE, 2021; SOARES et al., 2022), reveal new information about species behavior and adaptations, and potentially lead to new biotechnological applications and economic opportunities.

Therefore, the aim of this paper is to contribute to our knowledge of the geographic distribution of *Odontadenia hypoglauga*, reporting and expanding its area of occurrence in three Brazilian states and to provide a complete morphological description of the species, with photographs, conservation status, geographic distribution, taxonomic comments, a map, and an identification key with related species occurring in the study area.

## MATERIAL AND METHODS

Data were obtained through field expeditions in the state of Maranhão and by consulting collections of the herbaria CEN\*, EAC, HUEFS\*, MO\*, RB\*, TEPB and UEC\* (\*online digitized materials; acronyms according to Thiers (2023), continuously updated); the online materials were studied using the Specieslink (<http://www.splink.org.br/>) and Re flora (<http://reflora.cria.org.br/>) platforms. For description, morphological terminology follows Harris; Harris (2001) and Radford et al. (1974); venation types and corolla shape are according to Hickey (1973) and Simões; Kinoshita (2002), respectively.

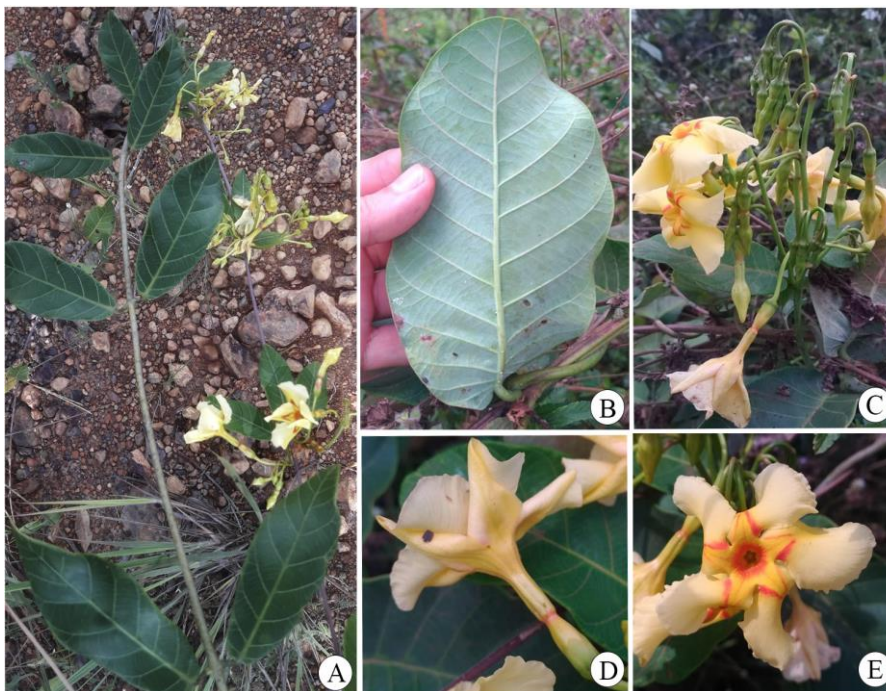
The distribution map was created using QGIS version 3.16.14; phytogeographic domain boundaries (in a 1:250000 scale) were obtained from IBGE (Instituto Brasileiro de Geografia e Estatística) (<https://www.ibge.gov.br/geociencias/cartas-e-mapas/informacoes-ambientais/15842-biomas.html>). The conservation status was assessed with support of the GeoCat tool (BACHMAN et al., 2011), based on Area of Occupancy (AOO) and Extension of Occurrence (EOO), using total distribution data for the species, and classified according to the IUCN categories and criteria (2019).

## RESULTS AND DISCUSSION

*Odontadenia hypoglauca* (Stadelm.) Müll.Arg., Fl. Bras. 6(1): 118, t. 35, f. 1. 1860. (Fig. 1).

Woody climbing, white latex. Branches glabrous, interpetiolar colleters absent; stipules absent. Leaves opposite; petioles 0.4–0.8 cm long, glabrous, intrapetiolar colleters present; leaf blade chartaceous, discolor, 5.1–7.2 × 3.6–5.5 cm, elliptic, rarely slightly circular, base cordate to subcordate, margins plane, apex rounded to slightly emarginate, adaxial surface glabrous, lustrous, abaxial canescent, opaque; venation brochidodromous. Inflorescences cymose, pedunculate, many-flowered; peduncle 3.2–5.5 cm long, glabrous. Flowers pedicellate, pedicels 0.8–1.6 cm long, glabrous. Calyx gamosepalous, sepals equal in length, 5–6 × 2–3 mm, ovate, externally glabrous, apex acute; colleters internally on the base of the sepals. Corolla gamopetalous, yellow, reddish on the base of corolla lobes and throat, hypocrateriform, tube 18–21 × 3–4 mm, cylindrical, slightly constricted in median portion, glabrous, lobes c. 13 × 10 mm, circular, apiculate laterally, glabrous, patent. Stamens included, anthers adnate to the style head, base sagittate, apex acuminate, glabrous dorsally. Ovary c. 1.3 mm long, ovoid, glabrous; nectary c. 0.5 mm long, forming a ring around the ovary; style head c. 3 mm long, fusiform. Follicles 2, 21–23 × 1–1.2 cm, slightly falcate, glabrous; seeds comose.

**Figure 1** – *Odontadenia hypoglauca* (Stadelm.) Müll.Arg. A. Habit. B. Leaf blade in abaxial view. C. Inflorescence. D. Flower showing hypocrateriform corolla. E. Corolla showing the throat.



Source: A. Authors. B-E. M.E. Engels

**Examined material:** Brazil: Maranhão: Caxias, Buriti Correntes, 27 Jun 1972, fl., D. Sucre & J.F. Silva 9370 (RB [photo!]). Timon, entre Timon e entrada para Buriti Bravo, 09 Nov 1979,

fl., *P. Martins s.n.* (EAC 7281); Timon, 5°10'44''S, 42°51'58''W, 07 Apr 2020, fl., *L.A. Moraes 842* (TEPB); Timon, próximo a BR-226 depois do condomínio Village Cajueiro, 5°8'13''S, 42°51'34''W, 25 Apr 2020, fl., *L.A. Moraes 906* (TEPB). *sin. loc.*, entre Butirama e São Domingos, BR-230, 22 Apr 1980, fl., *A. Fernandes & E. Nunes s.n.* (EAC 8515, MO barcode MO3382861 [photo!]). Piauí: Brasileira, Parque Nacional de Sete Cidades, 13 Jan 2001, fl., *M.E. Alencar et al. 1141* (UEC [photo!]). São Raimundo Nonato, [Parque Nacional] Serra da Capivara, 06 Apr 1992, fl., *A. Fernandes s.n.* (EAC 18429). Uruçuí, Pratinha, 18 Apr 2005, fl., *L.W. Lima-Verde 3322* (EAC). Tocantins: Paranã, Canteiro de obras do UHE São Salvador, 07 Jun 2006, fl., *G. Pereira-Silva et al. 10452* (CEN [photo!]). Porto Nacional, Fazenda Providência, 219 m, 13 Jun 2017, fl., *D.B. das Chagas 204* (HUEFS [photo!]).

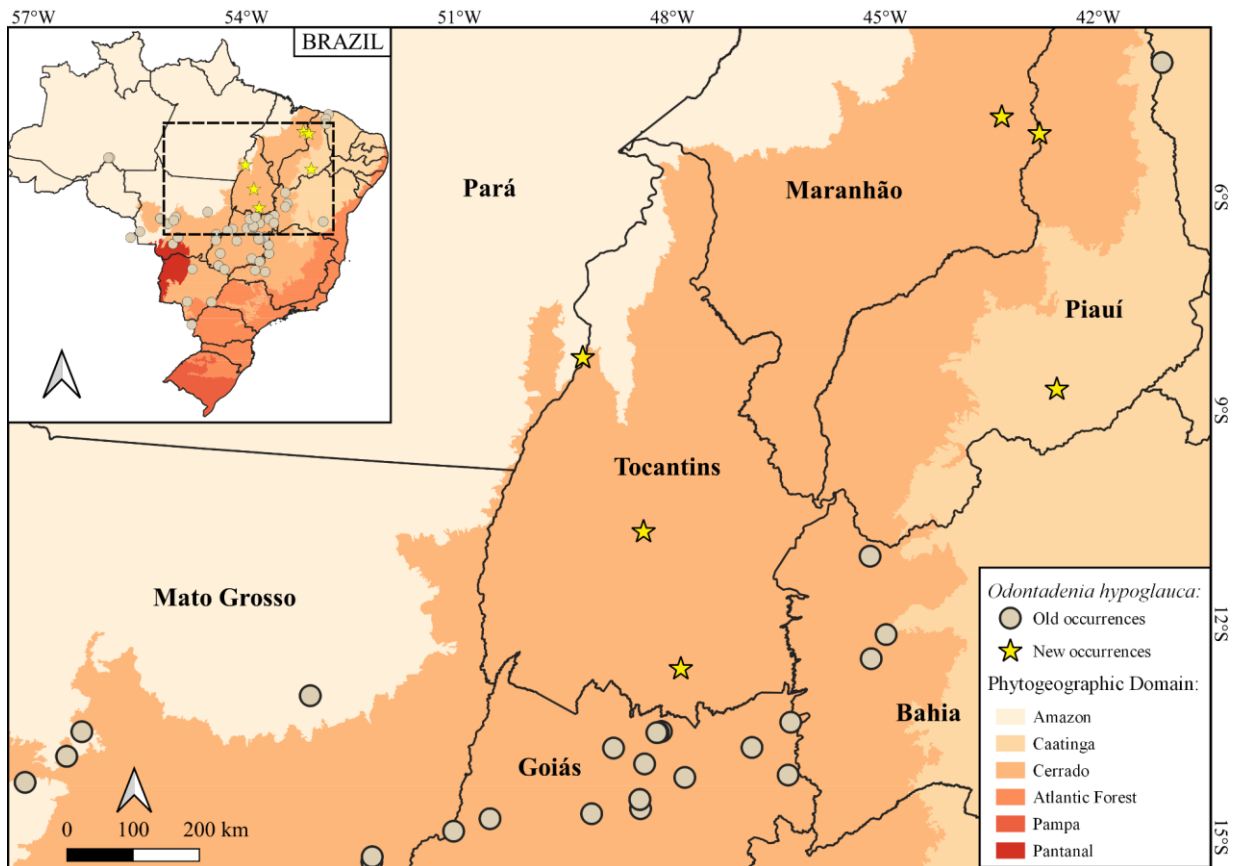
**Material additional examined:** Brazil: Goiás: Campinaçu, Fazenda Praia Grande, 07 Oct 1995, fr., *T.B. Cavalcanti et al. 1823* (CEN).

### Distribution notes

This species occurs only in South America, specifically in Bolivia and Brazil (GOVAERTS et al., 2023; MORALES, 1999). In Brazil, it is found in the Central-West (states of Distrito Federal, Goiás, Mato Grosso and Mato Grosso do Sul), North (states of Amazonas and Pará), Northeast (states of Ceará, Bahia and Pernambuco) and Southeast (state of Minas Gerais) regions, in areas of the Amazon Forest and Cerrado domains (COUTINHO; LOUZADA, 2023; FLORA E FUNGA DO BRASIL, 2022; LOIOLA et al., 2020; MORALES, 1999).

In this study, we show the first records of *Odontadenia hypoglauca* in the states of Maranhão, Piauí and Tocantins (Fig. 2). In these states, the species occurs preferably in cerrado vegetation (Forested, Grassy-woody and Wooded Savanna), but it is also first recorded in the Caatinga domain in Piauí and in Seasonal Deciduous Forest vegetation in Maranhão. It should be mentioned that this is also the first record of the genus in the state of Piauí. Recent collection efforts and studies focusing on the family have brought to light new occurrences of some genera of Apocynaceae in different states, such as Paraíba (*Macoubea* Aubl.; MAMEDE et al., 2020), Pernambuco (*Odontadenia*; COUTINHO; LOUZADA, 2018), and Rio Grande do Norte (*Cynanchum* L., *Macoubea*, *Odontadenia*, *Tabernaemontana* L., and *Temnadenia* Miers; SOUZA JÚNIOR; JARDIM, 2021).

**Figure 2** - Distribution map of *Odontadenia hypoglauca* (Stadelm.) Müll.Arg. including old and new records in Brazil.



Source: Authors.

### Conservation Status

With an AOO of 260 km<sup>2</sup> and EOO of 4,000,000 km<sup>2</sup>, *Odontadenia hypoglauca* is assessed as Least Concern (LC) according to the IUCN (2019) criteria. In addition to being widely distributed, *Odontadenia hypoglauca* is found in two conservation areas in the state of Piauí, the Parque Nacional Serra da Capivara and Parque Nacional de Sete Cidades.

### Taxonomic Notes

*Odontadenia hypoglauca* is recognized by the climbing habit with white latex, abaxial surface of the leaf blades with whitish indument, hypocrateriform yellow corolla with reddish throat (Fig. 1) and fusiform style head. Morales (1999) classified *O. hypoglauca* in *O.* subg. *Odontadenia* sect. *Nitidae* Woodson especially because of its opposite leaves, absence of stipules, cymose inflorescences, equal or subequal sepals, infundibuliform to subsalverform corolla, glabrous anthers and glabrous to glabrescent follicles.

This species is morphologically related to *Odontadenia geminata* (Hoffmanns. ex Roem. & Schult.) Müll.Arg. and *O. nitida* (Vahl) Müll.Arg., sharing similar characteristics of the leaves, sepals, inflorescences, and fruits. However, *O. hypoglauca* can be differentiated from them by leaves with canescent abaxial surface (vs. glabrous). *Odontadenia hypoglauca* also differs from *O. geminata* by the subcordate to cordate leaf base (vs. rounded, acute, or

truncate), and from *O. nitida* by the hypocrateriform corolla (vs. infundibuliform to narrowly infundibuliform) (MORALES, 1999).

In Brazil, *Odontadenia hypoglauca* has a wider distribution (mentioned above) than the other two species, which are restricted to the Central-West and North regions (FLORA E FUNGA DO BRASIL, 2022). It occurs in sympatry with *O. chapadensis* J.F. Morales & I.L. Morais, *O. lutea* (Vell.) Markgr., *O. macrantha* (Roem. & Schult.) Markgr. and *O. perrottetii* (A. DC.) Woodson in the states where it is now recorded, however, it can be morphologically distinguished from these species by the characters described in the identification key below.

**Identification key to *Odontadenia* Benth. species from Maranhão, Piauí and Tocantins, and to species morphologically related to *O. hypoglauca* (based on MORALES, 1999; MORALES; MORAIS, 2018)**

1. Calyx lobes unequal ..... 2
2. Inflorescences many-flowered; upper tube of the corolla conical-campanulate to campanulate; anthers pubescent; nectariferous disc deeply 5-lobed, longer than ovary ..... *O. lutea* (Vell.) Markgr.
- 2'. Inflorescences 1–4-flowered; upper tube of the corolla narrowly conical; anthers glabrous to glabrescent or puberulent only near the base; nectariferous disc irregularly lacerate, slightly shorter than ovary ..... 3
3. Ovary glabrous ..... *O. perrottetii* (A. DC.) Woodson
- 3'. Ovary minutely and sparsely puberulent ..... *O. chapadensis* J.F. Morales & I.L. Morais
- 1'. Calyx lobes equal ..... 4
4. Leaf blade tomentose abaxially ..... *O. hypoglauca* (Stadelm.) Müll.Arg.
- 4'. Leaf blade glabrous abaxially ..... 5
5. Nectariferous disc deeply lacerate ..... *O. macrantha* (Roem. & Schult.) Markgr.
- 5'. Nectariferous disc 5-lobed ..... 6
6. Corolla hypocrateriform to subhypocrateriform, yellow; anthers dorsally glabrous ..... *O. geminata* (Hoffmans. ex Roem. & Schult.) Müll.Arg.
- 6'. Corolla infundibuliform to narrowly infundibuliform, anthers whitish yellow to cream; dorsally puberulent ..... *O. nitida* (Vahl.) Müll.Arg.

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