



A new species and a new status in *Heliotropium* (Heliotropiaceae) from Brazil

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Summary. We present two taxonomic novelties in the Heliotropiaceae: *Heliotropium burchellii* (I.M.Johnst.) J.I.M.Melo, a new status for *Heliotropium elongatum* (Lehm.) Gürke var. *burchellii* I.M.Johnst., restricted to the central-western and northern regions of Brazil, and *Heliotropium zildae* J.I.M.Melo & M.G.M.Gonç., a new species to science, known only from Pará State, Brazil. This work includes taxonomic descriptions, a list of material examined for *H. burchellii*, distribution data, preferred environments, reproductive phenophases, taxonomic notes, images, maps and ink drawings of the species. An identification key is provided for *Heliotropium* representatives currently recognised for Brazil. Based on these results, with the addition of *H. burchellii*, *Heliotropium* sect. *Tiaridium* (Lehm.) Griseb. now includes three species, and the number of climbing species of that genus in the Brazilian flora is increased to six.

Key Words. Conservation, diversity, Heliotropiaceae, South America, taxonomy.

Introduction

Under its traditional circumscription, the Boraginaceae family is composed of the subfamilies Boraginoideae, Cordioideae, Ehretioideae and Heliotropioideae (Candolle 1845; Johnston 1949; Nowicke & Miller 1990). Recent molecular studies, however, have elevated these subfamilies to family level: Ehretiaceae, Cordiaceae, Heliotropiaceae, and Boraginaceae s.s. (Gottschling *et al.* 2001; Miller & Gottschling 2007), all of them within the order Boraginales which, therefore, has 11 families, including c. 133 genera and c. 2700 species (Luebert *et al.* 2016). However, based on earlier work, Vasile *et al.* (2025) define Boraginales as comprising nine families in two clades: Boraginaceae, Codonaceae and Wellstediaceae in Boraginales I and Coldeniaceae, Cordiaceae, Ehretiaceae (including Lennoaceae), Heliotropiaceae, Hydrophyllaceae (including Namaceae), and Hoplestigmataceae in Boraginales II.

Heliotropiaceae encompasses four genera, *Euploca* Nutt., *Heliotropium* L., *Ixorhea* Fenzl and *Myriopus* Small, with c. 450 species in the tropical, subtropical and temperate zones of all continents, being most diverse in seasonal habitats. *Heliotropium* is the most taxonomically diverse, with c. 300 species (Diane *et al.* 2016) and the only genus with a cosmopolitan distribution. *Heliotropium* includes herbs, subshrubs, shrubs and herbaceous or woody climbers, with branches glabrous or hairy, leaves are alternate or subopposite, rarely fleshy, inflorescences are terminal, axillary, or internodal, multiflorous or rarely pauciflorous, lax or congested, flowers are white, yellow, blue, pink or purple, and

fruits are schizocarpic or drupaceous and smooth or ornamented (adapted from Diane *et al.* 2016).

Knowledge concerning the taxonomic diversity of the Heliotropiaceae has expanded considerably during the last three decades, especially in Brazil, through works published by Melo & Semir (2006, 2008, 2010), Melo *et al.* (2013), Melo & Vieira (2015), Melo *et al.* (2022), Silva & Melo (2022), Melo (2023) and Melo *et al.* (2025, continuously updated). However, despite efforts to understand the taxonomic diversity associated with South American Heliotropiaceae, there remain gaps in the representativeness of our knowledge and, consequently, of the geographic distributions of its family members. From this perspective, the preparation of taxonomic monographs for states in different regions of Brazil, undertaken as part of the "Flora and Fungi of Brazil" project (<http://floradobrasil.jbrj.gov.br/>), led to the rediscovery of neglected or presumed extinct Heliotropiaceae species, the elucidation of "enigmatic" species (Melo 2025) and, most importantly, the discovery of new species and new local or regional records.

During morphotaxonomic analyses of Heliotropiaceae collections from northern Brazil, two *Heliotropium* specimens attracted our attention due to their peculiar morphological characteristics, with the conclusion that they were distinct and unrecorded taxonomic entities for the country's flora. This work, therefore, presents *Heliotropium burchellii* (I.M.Johnst.) J.I.M.Melo, a new status for a neglected specific taxon restricted to the central western and northern regions of Brazil, based on *Heliotropium elongatum* (Lehm.)

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I.M. Johnst. var. *burchellii* I.M. Johnst., as well as *Heliotropium zildae* J.I.M. Melo & M.G.M. Gonç., a new species to science.

The taxonomic treatment of the species discussed here includes morphological descriptions, a list of examined material for *Heliotropium burchellii*, distribution data, preferred environments, reproductive phenophases and taxonomic notes, images, maps and ink drawings. Additionally, an identification key is provided for the *Heliotropium* species currently recognised in Brazil.

Material and Methods

Morphometric analyses of vegetative and reproductive structures for 35 specimens were undertaken based on material incorporated into the Manuel de Arruda Câmara Herbarium HACAM (herbarium acronyms follow Thiers 2025, continuously updated) and CEN, as well as specimens available online through both the virtual herbarium of the Flora and Funga of Brazil (Reflora Virtual Herbarium 2025) and the SpeciesLink (2025) platforms from Brazilian (ALCB, HTO, IBGE, MBM, RB, SPF, UEC) and overseas (GH, K, MO, NY, P, US) herbaria. We adopted the biological or population concept of species (Mayr 1942).

The protologues, type specimens, and other materials, including historical collections, of the species related to *Heliotropium burchellii* and *H. zildae*

were compared to, or taken from, the GBIF (2025), JSTOR (2025) and Tropicos (2025) databases. The descriptive terminologies used by Hickey (1973), Radford *et al.* (1974), Payne (1978), Hewson (1988) and Harris & Harris (2001) were adopted. Distribution maps were produced using ArcGIS Desktop 10.8 software (<https://www.esri.com/en-us/arcgis/products/arcgis-pro/>). Preliminary conservation assessments of the Extent of Occurrence (EOO) and Area of Occupancy (AOO) were calculated using GeoCAT software (Bachman *et al.* 2011) and based on IUCN guidelines (IUCN 2024) with 2×2 km cells for AOO.

Taxonomic Treatment

Based on these results, the current circumscription of *Heliotropium* sect. *Tiaridium* (Lehm.) Griseb. now includes three species, *H. burchellii* (I.M. Johnst.) J.I.M. Melo, *H. elongatum* (Lehm.) Gürke and *H. indicum* L., with the number of climbing representatives of the genus in the Brazilian flora increasing to six species, *H. angustiflorum* (Ruiz & Páv.) Govaerts, *H. cuspidatum* (Kunth) Feuillet, *H. funkiae* Feuillet, *H. melanochaeta* (DC.) Feuillet, *H. ulei* (Vaupel) Feuillet, and *H. zildae*. The remaining Brazilian species are *H. amplexicaule* Vahl, *H. angiospermum* Murray, *H. curassavicum* L., *H. leiocarpum* Morong, *H. nicotianifolium* Poir., *H. phyllicoides* Cham., and *H. transalpinum* Vell.

Key to the species of *Heliotropium* in Brazil

- 1a Fruit a drupe; subshrubs, erect shrubs or shrubs with supporting branches and lianas..... 2
- 1b Fruit a schizocarp; herbs or subshrubs, rarely shrubs..... 7
- 2a. Stems and leaves densely hairy..... 3
- 2b. Stems and/or leaves glabrous or sparsely hairy..... 4
- 3a. Branches ferrugineous; inflorescences terminal and/or lateral, hairy, with rusty trichomes; flowers up to 12 mm long; calyx lacinia subulate..... ***H. cuspidatum***
- 3b. Branches never ferrugineous; inflorescences terminal and subterminal, with blackish, or not, trichomes; flowers up to 7 mm long; calyx lacinia ovate-triangular..... ***H. melanochaeta***
- 4a. Leaves sessile to sessile, blade concolorous..... ***H. angustiflorum***
- 4b. Leaves petiolate, blade discolorous..... 5
- 5a. Inflorescences loose; flowers sessile, up to 7 mm long; stigma conical..... ***H. ulei***
- 5b. Inflorescences congested; flowers sessile to subsessile, up to 2 mm long; stigma umbraculiform or coroniform..... 6
- 6a. Cystoliths absent from vegetative and reproductive organs; leaf blades lustrous; flowers sessile; calyx lobes erect; corolla salverform; ovary glabrous; stigma umbraculiform; fruits glabrous..... ***H. funkiae***
- 6b. Cystoliths present, associated with adaxial and abaxial surfaces of the leaf blade, pedicels and calyx; leaf blade opaque; flowers with pedicels up to 2 mm long; calyx lobes uncinat; corolla lageniform; ovary bearded, with moniliform trichomes inserted in the median portion and reaching to the base of the stigma; stigma coroniform; fruits sericeous..... ***H. zildae***
- 7a. Leaves sessile..... 8
- 7b. Leaves petiolate..... 10
- 8a. Leaf blades subcarnous to carnos; inflorescences pauciflorous..... ***H. curassavicum***
- 8b. Leaf blades membranaceous or chartaceous; inflorescences multiflorous..... 9
- 9a. Corolla lacinia suborbicular; ovary c. 1 mm long; stigma depressed-conical..... ***H. amplexicaule***

- 9b. Corolla lacinia emarginate; ovary 0.5 – 0.7 mm long; slightly bifid at its apex, penicillate..... **H. phyllicoides**
- 10a. Petiole only sulcate, attenuated..... **11**
- 10b. Petiole subcylindrical, cylindrical or sulcate, never attenuated..... **13**
- 11a. Nutlets divergent; leaf blade smooth on both sides; stigma subcapitate..... **H. indicum**
- 11b. Nutlets contiguous; leaf blade smooth or bullate; stigma clavate or obcampanulate..... **12**
- 12a. Branches not deeply sulcate; leaf blade ovate to cordate, bullate on the adaxial surface, with short interspersed trichomes alternating with long adpressed trichomes; flowers up to 7.5 mm long, white or purplish in the same inflorescence; anthers up to 1 mm long, oblong; stigma clavate; fruits up to 3 mm long, mitriform; nutlets not recurved at apex..... **H. elongatum**
- 12b. Branches deeply sulcate; leaf blade lanceolate to spatulate, adaxial surface smooth, with elongated aciculiform trichomes up to c. 1.2 mm long; flowers up to 15 mm long, white, purplish or orange in the same inflorescence; anthers up to 2 mm long, oblong-lanceolate; stigma obcampanulate; fruits up to 2.5 mm long, subglobose; nutlets recurved at the apex..... **H. burchellii**
- 13a. Trichomes malpighiaceus and simple..... **H. transalpinum**
- 13b. Trichomes glandular and/or simple..... **14**
- 14a. Corolla obcampanulate..... **H. angiospermum**
- 14b. Corolla tubular or infundibuliform..... **15**
- 15a. Leaf blade cordate at base, margins slightly to strongly sinuate; corolla tubular; stamens inserted c. 1 mm above the stigmatic apex..... **H. leiocarpum**
- 15b. Leaf blade cuneate at base, margins entire; corolla infundibuliform; stamens inserted at the stigmatic apex height..... **H. nicotianifolium**

Heliotropium burchellii (I.M.Johnst.) J.I.M.Melo, **comb. nov.** $\equiv$ *Heliotropium elongatum* (Lehm.) Gürke var. *burchellii* I.M.Johnst., *Contr. Gray Herb.* 81: 19 (Johnston 1928). Type: Brazil. Goiás: Inter Conceição et Natividade headwaters Tocantins River, s.d., W. J. Burchell 8191 (holotype GH [GH00097616]!; isotypes K [K00096794, K00096795]!, P [P03877002]!). Figs 1, 2A – D; Map 1.

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Herbs or subshrubs, erect or prostrate, with aciculiform trichomes up to c. 1.2 mm long throughout on vegetative and floral parts. *Leaves* alternate or subopposite; leaf blade 2.6 – 6.0 $\times$ 1.5 – 3.3 cm, hispid or hirsute, with long rubicund trichomes with brown bases on both the adaxial and abaxial surfaces, chartaceous, lanceolate or spatulate, apex acute, base asymmetrical and truncate, margins ciliate and sinuate, petiole 0.4 – 1.9 cm long, midrib and secondary veins with long and sparse trichomes. *Inflorescences* 1.5 – 21.3 cm long, subterminal and axillary; peduncle 1.6 – 2.9 cm long, hirsute. *Flowers* 0.9 – 1.5 cm long, sessile; *calyx* 2.8 – 3 $\times$ 1 – 2 mm; *corolla* 0.9 – 1.5 cm long, ventricose, white, purplish or yellow even in the same inflorescence, externally hirsute, with trichomes c. 1.7 mm long and needle-shaped, tube c. 1.1 cm long, lacinia 2 – 2.8 mm long, linear and hirsute; stamens subsessile, filaments inserted c. 2 mm above the base of the tube; anthers c. 2 mm long, oblong-lanceolate; ovary c. 0.5 mm long, globose; style c. 0.5 mm long; stigma c. 0.5 mm long,

obcampanulate. *Fruit* a *schizocarp* up to 2.5 mm long, subglobose, calyx persistent. *Nutlets* with recurved apex; seeds 2, trigones present.

RECOGNITION. *Heliotropium burchellii* is morphologically similar to *H. elongatum* with both sharing general appearances, especially in dried samples. They can be distinguished, however, by *H. burchellii* having branches deeply sulcate, leaf blade generally lanceolate to spatulate, with a smooth adaxial surface and, mainly, by having elongated aciculiform trichomes up to c. 1.2 mm in length, flowers up to 15 mm long, with an externally hirsute corolla with acicular trichomes measuring up to c. 1.7 mm long, flowers white, purplish or orange in the same inflorescence, anthers up to 2 mm long, oblong-lanceolate, stigma obcampanulate and fruits up to 2.5 mm long, subglobose with nutlets recurved at the apex. *Heliotropium elongatum* (Figs 2E – G, 3), on the other hand, is characterised by having branches not deeply sulcate, leaf blade ovate to cordate, bullate on the adaxial surface, with short trichomes interspersed with long adpressed trichomes up to c. 1.2 mm in length, flowers up to 7.5 mm long, with an externally hirsute corolla with acicular trichomes measuring approximately 1 mm long, flowers white and purplish in the same inflorescence, anthers up to 1 mm long, oblong, stigma clavate and fruits up to 3 mm long, mitriform with nutlets not recurved at the apex. *Heliotropium elongatum* is widely distributed in South America (Brazil, Uruguay, Argentina, Paraguay and Bolivia) and commonly associated with xeric habitats,

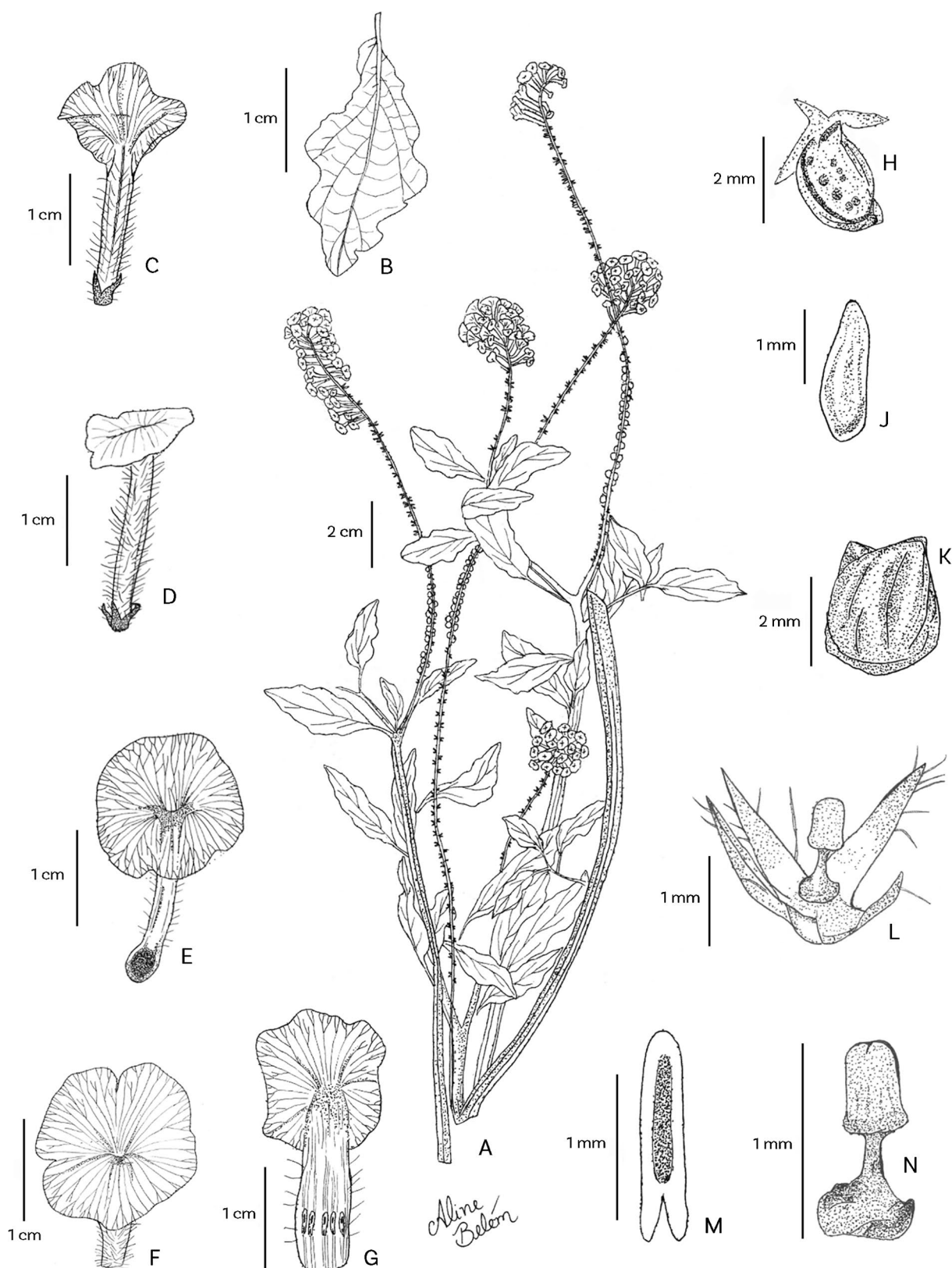


Fig. 1. *Heliotropium burchellii*. **A** reproductive branch; **B** leaf; **C** flower (dorsal view); **D** flower (lateral view); **E** flower (frontal view); **F** corolla lobes; **G** open corolla, showing the androecium; **H** nutlet; **J** seed; **K** fruit; **L** calyx and gynoecium; **M** stamen; **N** gynoecium. Drawn from A. C. Sevilha et al. 3291 (HACAM) and A. C. Allem et al. 3074 (HACAM). ILLUSTRATED BY A. BELÉM.



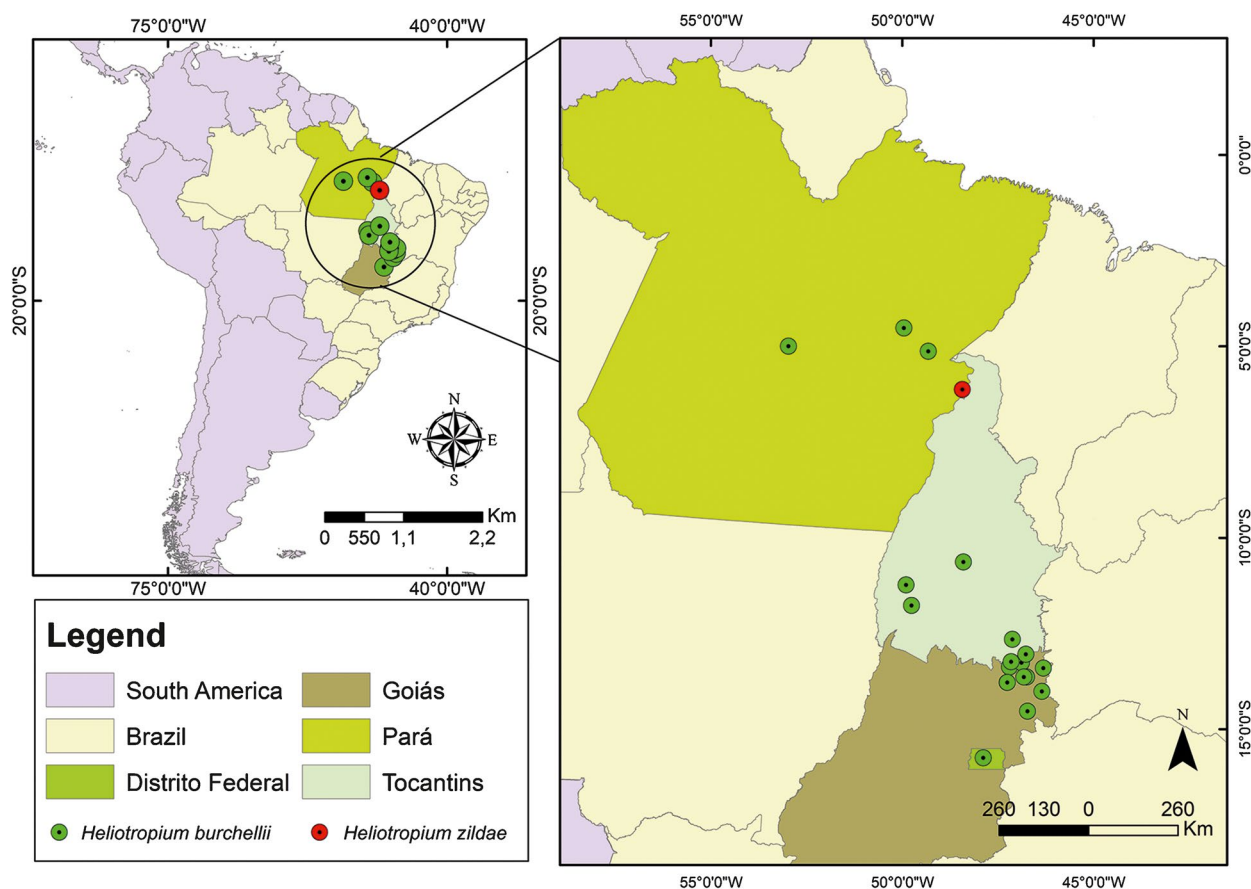
Fig. 2. **A – D** *Heliotropium burchellii*: **A** natural population and habitat; **B** habit; **C** inflorescence (lateral view); **D** inflorescence (frontal view). **E – G** *Heliotropium elongatum*, **E** habit; **F** inflorescence; **G** fruits. PHOTOS: **A – D** J. M. P. CORDEIRO; **E – G** B. F. ROCHA.

while *H. burchellii* is restricted to Brazil, growing mainly in humid habitats and at the margins of pools, rivers and streams.

DISTRIBUTION AND HABITAT. *Heliotropium burchellii* is restricted to Brazil, being recorded in the Federal District and in the states of Goiás (central-western), Tocantins and Pará (north). It is commonly found in humid areas, including marshy environments, being mainly associated with the banks of the Tocantins and Araguaia rivers.

ADDITIONAL SPECIMENS EXAMINED. BRAZIL. Distrito Federal: Brasília, Parque Olhos d'Água, 26 Sept. 1996, A. Pires, A. B. Sampaio & R. V. Nunes 01 (CEN [CEN57038]). Goiás: 7 km ao Sul de Monte Alegre rumo a Cavalcante, 13°18'S 47°12', 21 Nov. 1984, A. C. Allem, G. Webster & Werneck 3074 (CEN8755); Km 66 da estrada de Teresina de Goiás a Monte Alegre de Goiás, 560 m, 1 Dec. 1991, B.

A. S. Pereira, D. Alvarenga & F. C. A. Oliveira 1943 (IBGE [IBGE28933], US [US3239398]); Alvorada do Norte, Ponto 3, próximo à gruta, 14°31'30"S 46°43'43"W, 400 m, 4 Dec. 2003, G. P. Silva, A. C. Sevilha, C. Sinigaglia, F. F. M. Santos, G. A. Moreira, J. B. Pereira, J. M. Rezende & J. P. Amaral 8124 (CEN [CEN77134]); Campos Belos, 5 – 10 km S, 9 Nov. 1991, G. Hatschbach, M. Hatschbach & J. M. Silva 55998 (MBM [156463], MO [MO-5310376]); Entre Rio Formoso e Rio Javaés, 28 July 1978, J. M. Pires & M. R. Santos 16268 (NY [00858163]); Monte Alegre de Goiás, Estrada para a Fazenda do Sr. Osmar, cerca de 10 km da rodovia, 13°23'S 47°15'W, 1100 m, 22 Nov. 1991, R. F. Vieira 1196 (CEN [CEN16895]); Posse, Estrada entre Guarani e Posse, desvio ao lado direito de quem vai para Posse, 14°91'35"S 46°37'00"W, 830 m, 2 Sept. 2018, M. L. Guedes, E. B. Lopes & F. Araújo 30825 (ALCB [ALCB134139], HURB [HURB24138]); São Domingos,



Map 1. Known distributions of *Heliotropium burchellii* and *H. zildae*. PRODUCED BY K. R. PARENTE.

Fazenda Flor do Ermo, 13°37'55"S 46°45'12"W, 1 Sept. 2003, A. C. Sevilha, G. A. Moreira & J. M. A. Silva 3291 (CEN [CEN61087]); *ibidem*, Fazenda do Sr. Décio, Barragem para gado no retiro, 13°37'57"S 46°49'27"W, 427 m, 5 Sept. 2003, A. C. Sevilha, G. A. Moreira & J. M. A. Silva 3373 (CEN [CEN60405]); *ibidem*, Parque Estadual de Terra Ronca, Estrada transversal para a sede do parque, 6 Dec. 2003, R. Mello-Silva, R. C. Forzza, B. R. Silva & R. D. Melo 2320 (SPF [SPF161549]); Teresina de Goiás, à margem da rodovia (GO-118; Km 178) para Monte Alegre de Goiás, c. 1 km antes da ponte, e c. 35.8 km do trevo de entrada para Campo Alegre, 20 Nov. 2013, A. Campos-Rocha & J. H. A. Dutihl 1324 (UEC [UEC209338]); Trecho entre Teresina de Goiás e Montes Claros, Km 560, 3 Dec. 1991, R. C. Mendonça, M. L. F. Rezende & R. D. Lopes 1958 (IBGE [IBGE29148], NY [00858166], RB [RB00062262], UEC [UEC065999], US [3239420]). Pará: Itupiranga, along Rio Tocantins, 21 Oct. 1977, C. C. Berg & A. J. Anderson BG 663 (K [K006005747], NY [02398730]); *ibidem*, margem oposta do rio Itupiranga e margem de Itupiranga, 25 Aug. 1983, J. Revilla, F. E. Miranda, J. Ramos, E. Lima & A. Silva 8343 (NY [02398731]). Tocantins: 50 km

from Arraias on the road to Conceição do Tocantins (Rodovia Coluna Prestes, TO-050), 12°39'S 47°06'W, 300 m, 23 Nov. 1998, J. A. Ratter, J. FONSECA-FILHO & S. Bridgewater 8151 (K [K006005748, K006005749], HTO [HTO3644]); Formoso do Araguaia, Conglomerado TO-519, Subunidade 01, subparcela 02, indivíduo 01, 11°42'00"S, 49°51'36"W, 6 Dec. 2017, P. R. Teixeira IFN 192 (CEN [CEN125631]); Rodovia TO-050, próximo do Km 366, sentido Palmas TO-Arraias TO, 20 Oct. 2000, A. A. Santos, R. B. Neves & L. R. M. Andrade 835 (CEN [CEN37793]).

CONSERVATION ASSESSMENT. The EOO corresponds to 432,654 km², and the AOO to 68 km². Based on the small AOO, the species is likely to be threatened, *sensu* IUCN (IUCN 2024), however, there is insufficient evidence regarding the threats it faces, size of its population and the number of locations it occupies to accurately assess its status. It is, therefore, provisionally assessed as Least Concern [LC], however, if evidence of threat to its riverine habitat is established, this status will need to be re-assessed.

PHENOLOGY. It has been recorded with flowers and fruits throughout the year.

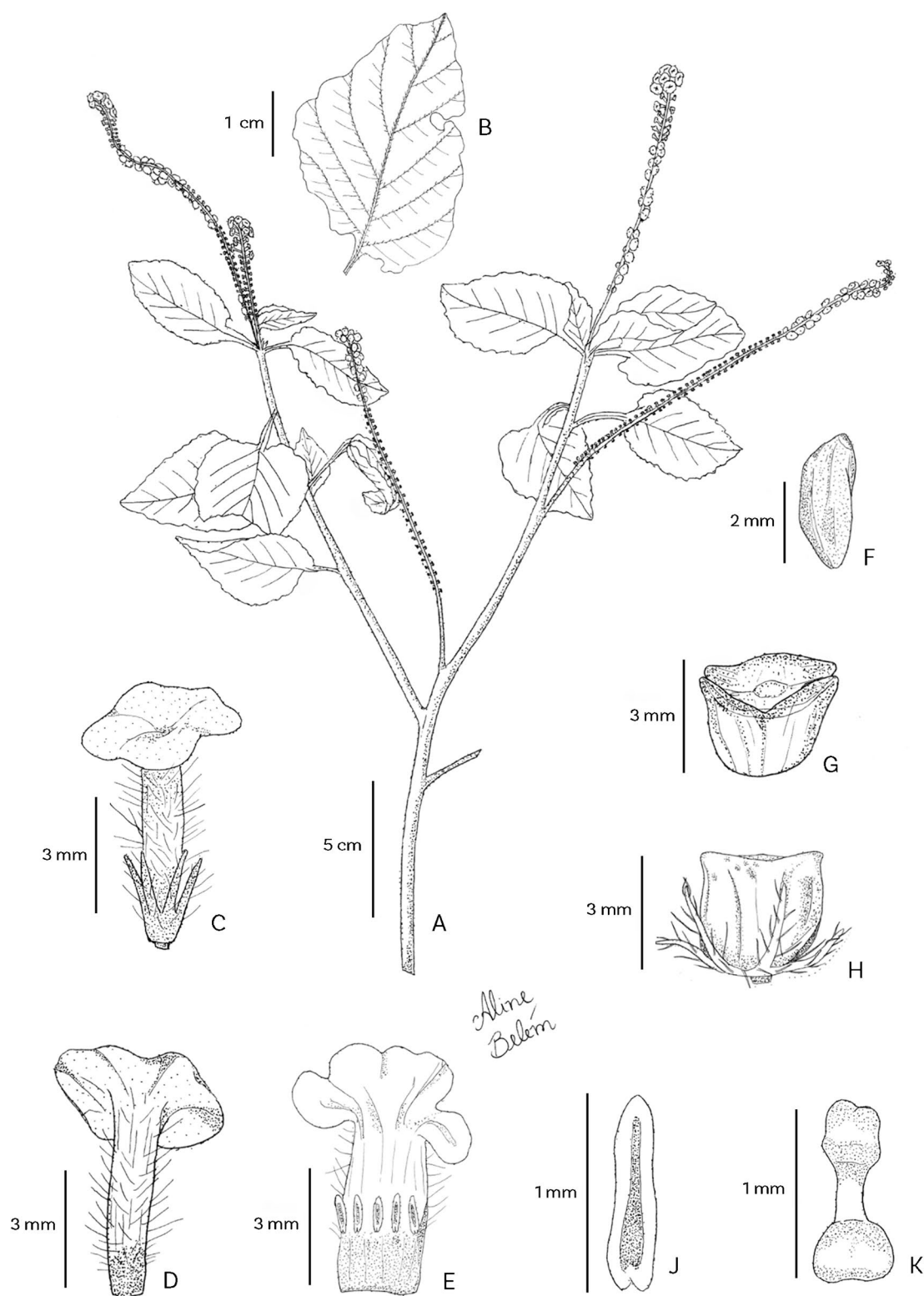


Fig. 3. *Heliotropium elongatum*. **A** reproductive branch; **B** leaf; **C** flower (frontal view); **D** corolla (dorsal view); **E** open corolla, showing androecium; **F** embryo; **G** fruit (transverse cut), showing one seed; **H** calyx and fruit; **J** stamen; **K** gynoecium. Drawn from B. F. Rocha *et al.* 518 (HACAM) and B. F. Rocha & J. I. M. Melo 538 (HACAM). ILLUSTRATED BY A. BELÉM.

ETYMOLOGY. The specific epithet honours William John Burchell, a British botanist who contributed greatly to knowledge of the Brazilian flora.

NOTES. *Heliotropium elongatum* var. *burchellii* was established by Johnston (1928) as a variety of *H. elongatum* based on specimens collected by Burchell in Serra da Natividade, Goiás State, Brazil. It has been treated as an infraspecific taxon for almost 100 years, however, after detailed morphological analyses it has been verified that *H. burchellii* presents morphological discontinuities with *H. elongatum*. Therefore, we propose *H. burchellii* as a separate species, that can be readily distinguished from *H. elongatum*, with both belonging to *H. sect. Tiaridium*. They can be distinguished especially by the shapes of their branches, the shapes and surfaces of their leaf blades, the sizes of their flowers, their colours, their indumenta, the sizes of their corollas, the lengths and shapes of their anthers and their stigma shapes, as well as by characters associated with the fruits, as highlighted in the diagnosis of *H. burchellii*. We chose to use the specific epithet “*burchellii*” to honour Burchell, who collected the specimens that gave rise to the name originally given by Johnston (1928) to the infraspecific taxon.

Melo & Semir (2008) provided the first complete morphological description of *Heliotropium burchellii*, given that Johnston (1928), when establishing *H. elongatum* var. *burchellii*, listed only a few characters differentiating it from the typical variety of *H. elongatum*. Table 1 provides an overview of the morphological differences between these species. See also Figs 1–3.

***Heliotropium zildae* J.I.M. Melo & M.G.M. Gonç., sp. nov.** Type: Brazil. Pará: Palestina do Pará, Fazenda Andorinha, Sede 2, Início da Mata do Rio Gameleira, 06°07'08"S 48°25'02"W, 160 m, 18 Sept. 2004, G. Pereira-Silva et al. 8785 (holotype HACAM [HACAM3663]!; isotype CEN [CEN00059128]!). Figs 4–5; Map 1.

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Herbaceous vine, branches cylindrical to subcylindrical, glabrescent to strigose, grooved or not. *Leaves* alternate, petiolate; petiole 0.2–0.8 cm long, flattened to subcylindrical, glabrescent to strigose; leaf blade 4.5–10.7 × 2.9–6.8 cm long, ovate to broadly ovate, margins entire to sinuous, base asymmetrical, apex acute, trichomes short and sparse on both surfaces, elongated trichomes on the central and secondary veins, especially present on the adaxial surface, cystoliths on both surfaces, colourless. *Inflorescences* 1.1–4.8 cm long, terminal, umbelliform, multiflorous, pedunculated; peduncles strigose, those of the 1st order 3.3–4.5 cm long, those of the 2nd order 1.1–1.8 cm long, those of the 3rd order 0.3–0.6 cm long. *Flowers* pedicellate; pedicels up to 2 mm long, strigose, with cystoliths; *calyx* c. 1 mm long, cupuliform, strigose, with cystoliths, lacinia c. 0.5 mm long, elliptic, uncinat; *corolla* up to 10 mm long, lageniform, white, grooved, externally villous, internally sericeous only in the proximal median portion; lobes c. 1.5 mm long, sub patent, externally sericeous, internally glabrescent; stamens 5, sessile, inserted c. 3.5 mm from the base of the corolla tube, anthers c. 2 mm long, linear; gynoecium c. 1.5 mm long; *ovary* c. 0.5 mm long, subglobose, with a ring of elongated, moniliform trichomes inserted in the median portion and reaching the base of the stigma; *style* c. 0.7 mm long, subcylindrical; *stigma* c. 0.3 mm long, coroniform, compressed, barbellate. *Drupe* c. 3 mm long, subglobose, sericeous, furrowed, green when immature, calyx persistent, lacinia c. 0.8 mm long, lanceolate. *Seeds* 2, c. 1.8 mm long, narrowly elliptic.

RECOGNITION. Among the morphologically similar South American species of *Heliotropium*, *H. zildae* is most similar to *H. funkiae*, a species widely distributed in the Neotropics, with which it shares a climbing habit, general appearances, exclusively terminal inflorescences and

Table 1. Morphological comparisons between *Heliotropium burchellii* and *H. elongatum*.

Character	<i>H. burchellii</i>	<i>H. elongatum</i>
Leaf blade, shape	lanceolate to spatulate	ovate to cordate
Leaf blade, adaxial surface	smooth	bullate
Flower, length (mm)	up to 15	up to 7.5
Corolla, indument	externally hirsute with acicular trichomes c. 1.7 mm long	externally hirsute with acicular trichomes c. 1 mm long
Corolla, colour	white, purplish and yellow in the same inflorescence	white and purplish in the same inflorescence
Anther, length (mm)	up to 2	up to 1
Anther, shape	oblong-lanceolate	oblong
Stigma, shape	obcampanulate	clavate
Fruit, length (mm)	up to 3	up to 2.5
Fruit, shape	subglobose	mitriform
Nutlets, apex	recurved	not recurved

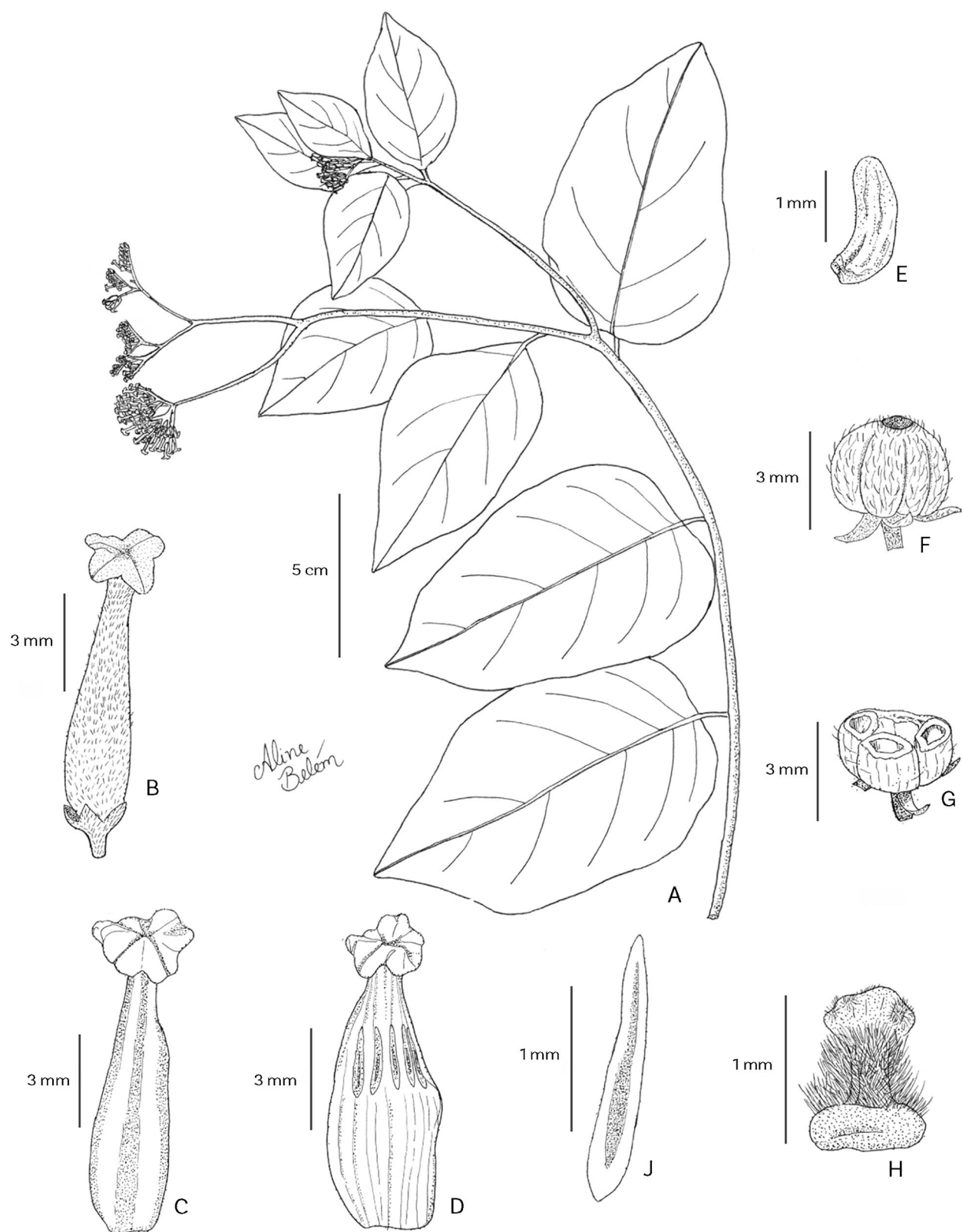


Fig. 4. *Heliotropium zildae*. **A** reproductive branch; **B** flower; **C** corolla; **D** open corolla, showing androecium; **E** seed; **F** fruit; **G** fruit (transverse cut); **H** gynoecium; **J** stamen. Drawn from G. Pereira-Silva et al. 8785 (HACAM). ILLUSTRATED BY A. BELÉM.



Fig. 5. *Heliotropium zildae*. G. Pereira-Silva et al. 8785 (holotype: HACAM [HACAM3663]!)

Table 2. Morphological comparisons between *Heliotropium zildae* and *H. funkiae*.

Character	<i>Heliotropium zildae</i>	<i>Heliotropium funkiae</i>
Leaf blade, cellular inclusions	cystoliths	no inclusions
Leaf blade, surface	opaque	lustrous
Flower, pedicels	pedicellate	sessile
Calyx lobes, shape	uncinate	erect
Corolla, shape	lageniform	salverform
Ovary, indument	bearded, with moniliform trichomes inserted in the median portion and reaching the base of the stigma	glabrous
Stigma, shape	coroniform, compressed	umbraculiform
Fruit, indument	sericeous	glabrous

discolorous leaf blades. *Heliotropium zildae* can be readily recognised, however, by the presence of cystoliths associated with the adaxial and abaxial surfaces of the leaf blade, pedicels and calyx, an opaque leaf blade, flowers with pedicels up to 2 mm long, uncinat calyx lobes, lageniform corolla, bearded ovary with moniliform trichomes inserted in the median portion and reaching the base of the stigma, stigma coroniform and compressed and sericeous fruits. *Heliotropium funkiae*, on the other hand, lacks cystoliths in the vegetative and reproductive parts, has lustrous leaf blades, sessile flowers, calyx lobes erect, corolla salverform, ovary glabrous, stigma umbraculiform and fruits glabrous. Table 2 provides an overview of the morphological differences between these species. See also Figs 4–5.

DISTRIBUTION AND HABITAT. Found in a forested environment associated with gently undulating terrain on sandy-clayey soils with milky quartz inclusions, in an ombrophilous forest area of the Amazon biome, on the banks of the Araguaia River in Pará State, Brazil.

CONSERVATION ASSESSMENT. The fact that there is only one known collection of *Heliotropium zildae* (G. Pereira-Silva *et al.* 8785), made more than 40 years ago, suggests that it is a rare species. Given the lack of direct or indirect information about its status or possible threats, and with no known recent surveys to verify the continued existence of this species, its current conservation status cannot be assessed accurately. Based on IUCN criteria (IUCN 2024), *H. zildae* should, therefore, be provisionally considered Data Deficient (DD).

ETYMOLOGY. The specific epithet is a tribute to Maria Zilda Alves Gonçalves, paternal grandmother of Marcio Gleisson Medeiros Gonçalves, one of the authors of the species.

PHENOLOGY. Recorded with flowers and fruits in April.

NOTES. *Heliotropium zildae* can be readily recognised by the presence of cystoliths associated with the adaxial and abaxial surfaces of the leaves, pedicels and calyx, opaque leaf blades, flowers with pedicels up to 2 mm long, uncinat calyx lobes, lageniform corolla, bearded ovary and styles with moniliform trichomes, coroniform, stigma compressed and fruits sericeous.

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Declarations

Conflicts of interest/competing interests The authors have no conflicts of interest to declare that are relevant to the content of this article.

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