



# First record of *Gymnosiphon tenellus* (Benth.) Urb. (Burmanniaceae) in Paraná state and southern Brazil

Inti de Souza<sup>1</sup>, Christopher Thomas Blum<sup>1</sup>, Marcelo Leandro Brotto<sup>2</sup>

**1** Federal University of Paraná, Forest Science Department, Av. Prof. Lothário Meissner, 632, Jardim Botânico, CEP 82.590-300, Curitiba, Paraná, Brazil. **2** Municipal Botanical Museum of Curitiba, R. Eng. Ostoja Roguski, 690, Jardim Botânico, Curitiba, Paraná, Brazil.

**Corresponding author:** Inti de Souza, [intidesouza@gmail.com](mailto:intidesouza@gmail.com)

## Abstract

*Gymnosiphon tenellus* (Bentham) Urban is recorded for the first time in the state of Paraná and in southern Brazil. Until now it has only been known to occur in Central America, the Amazonian Rainforest, and in the Atlantic Rainforest of the state of Rio de Janeiro in southeastern Brazil. An updated description is provided, along with original, detailed pictures of the species.

## Keywords

Araucaria Rainforest, myco-heterotrophic plants, saprophytes.

**Academic editor:** Guilherme Dubal dos Santos Seger | Received 17 April 2019 | Accepted 8 September 2019 | Published 27 September 2019

**Citation:** Souza I, Blum CT, Brotto ML (2019) First record of *Gymnosiphon tenellus* (Benth.) Urb. (Burmanniaceae) in Paraná state and southern Brazil. Check List 15 (5): 863–866. <https://doi.org/10.15560/15.5.863>

## Introduction

The Burmanniaceae is thought to be an ancient family because closely related species are found in the Americas, Africa, and Asia (Jonker 1938; Merckx et al. 2008). Despite having a low capacity for long-distance dispersal, some genera of this family are widely distributed and occur over astounding distances (Merckx et al. 2008).

*Gymnosiphon* Blume is a species-rich Pantropical genus of Burmanniaceae (Merckx et al. 2008), characterized by outer petals 3-lobed, caducous, fruits in line with the pedicel, dehiscent through three valves or with the capsule wall irregularly withering (Maas et al. 1986b). The genus comprises 24 species, of which 14 are found in the Neotropics (Maas-van de Kamer 1998). In Brazil, nine species are known thus far (Maas et al. 2015). Although some Burmanniaceae are autotrophic (restricted to *Burmattia* Linnaeus), most species of

the family are myco-heterotrophic and occur in the litter layer of moist, well-preserved forests (Jonker 1938). Myco-heterotrophic plants, often called saprophytes, obtain their nutrition from a saprophytic ectomycorrhizal associated fungi (Maas et al. 1986a; Leake 1994). This strategy allows them to survive under the low-light conditions of forest understories and provides an alternative to avoid more competitive conditions (Bidartondo et al. 2004).

Due to their habits, myco-heterotrophic plants are generally poorly documented. For instance, *Thismia nepuntis* Beccari (Thismiaceae) was rediscovered after 151 years without collection records (Sochor et al. 2018), and *Thismia prataensis* Mancinelli, C.T. Blum & E.C. Smidt is known only by its type specimen (Mancinelli et al. 2012). In the state of Paraná, the family Burmanniaceae is represented by nine species from six genera (Smidt 2014), although the “Flora do Brasil 2020” mentions nine

species from five genera (Maas et al. 2015). As a result of recent sampling efforts, one additional species, *Gymnosiphon tenellus* (Bentham) Urban, is now added to the flora of Paraná. The new record extends this species' occurrence to southern Brazil.

## Methods

As part of the EFC Herbarium extension program, regular expeditions were made to expand knowledge of the flora of Paraná. Field campaigns in the municipalities of Curitiba (Capão do Cifloma urban forest) and Quatro Barras (Serra da Baitaca State Park) led to the discovery of two populations of a species of Burmanniaceae not previously known from the state. The specimens were deposited in the EFC Herbarium (Federal University of Paraná, Jardim Botânico Campus, Brazil).

Specialized literature was used to confirm identity of the species and determine its geographic distribution (Jonker 1938; Maas et al. 1986b; Maas-van de Kamer and Maas 1988, 2003, 2005). Additional data were obtained from speciesLink (<http://splink.cria.org.br/>), Tropicos (<http://www.tropicos.org/>), Catalogue of Life (<http://www.catalogueoflife.org/>), and Flora do Brasil 2020 (<http://floradobrasil.jbrj.gov.br/>) databases. The collections from the MBM (Municipality of Curitiba, Brazil), EFC, and UPCB (both from the Federal University of

Paraná, Brazil) herbaria were also checked for possible additional material.

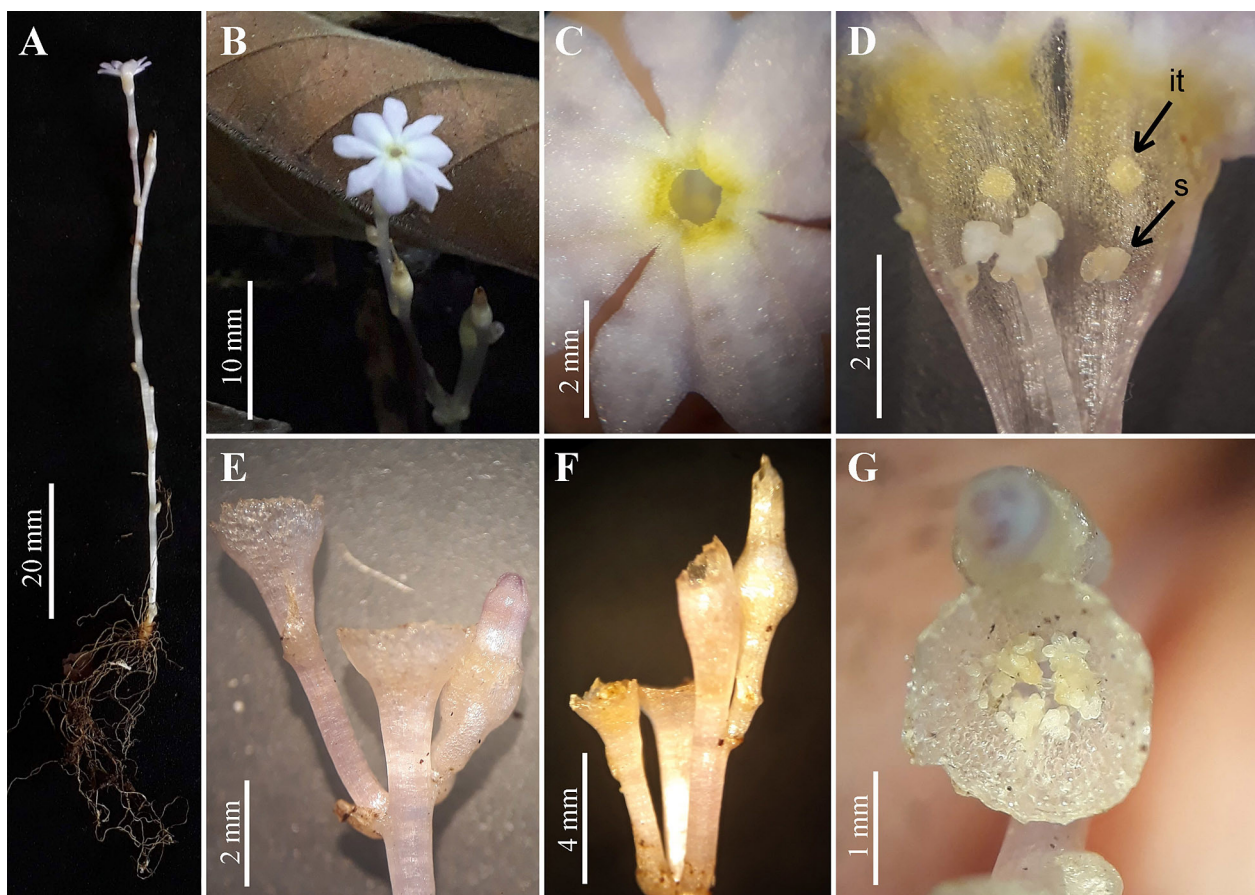
## Results

*Gymnosiphon tenellus* (Bentham) Urban, Symb. Ant. 3(3): 438. 1903.

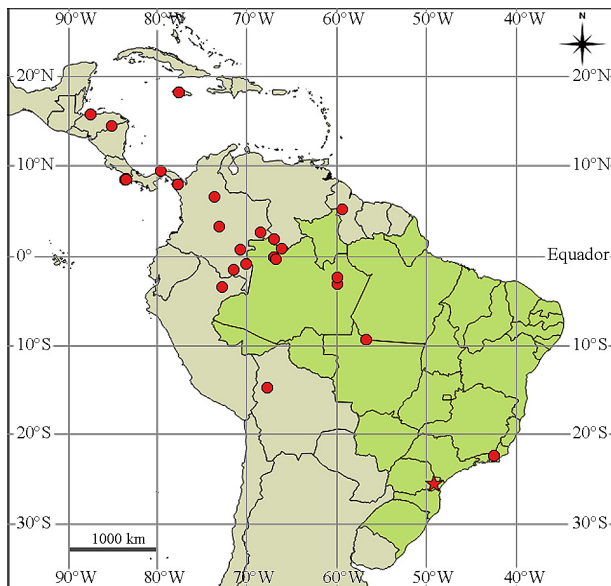
Figure 1

**New records.** Brazil. • Paraná, Curitiba, Capão do Cifloma, 25°26'57"S, 049°14'21"W, alt. 910 m, 19 Jan. 2016, C.T. Blum 2457 (EFC 14974) • ibidem, 15 Feb. 2018, I. Souza 230 (EFC 16361) • ibidem, 16 Mar. 2018, I. Souza 236 (EFC 16355) • Piraquara, Serra da Baitaca State Park, 25°23'15"S, 049°00'26"W, alt. 1170 m, 21 Feb. 2018, I. Souza 222 (EFC 16266) • São José dos Pinhais, Contenda, 28 Feb. 1967, G. Hatschbach 16078 (MBM 2531).

**Identification.** Myco-heterotrophic herb 5–12 cm tall. Stem white to purplish, usually branched. Leaves ovate, ca 1.5 × 1.0 mm, apex acute. Inflorescence a bifurcate cincinnus, each cincinnus ca 10 mm long, with one to three flowers. Bracts ovate, ca 1.5 × 1.0 mm, apex acute. Flowers erect, sessile to sub-sessile, actinomorphic, ca 1.2 mm long. Floral tube ca 7 mm long. Outer tepals 3-lobed, 3–4 mm long, central lobe ovate-triangular. Inner tepals orbicular (in fresh material), ca 0.4 × 0.4



**Figure 1.** *Gymnosiphon tenellus* (Benth.) Urb. **A.** Individual with flower and fruit. **B.** Individual with flower and fruits in natural environment. **C.** Floral tube opening. **D.** Inner flower structures: inner tepals three (it) above the stigma, stamens three (s) under the stigma. **E.** Floral button and dehiscent fruits. **F.** Mature fruit and dehiscent fruits. **G.** Seeds in fruit.



**Figure 2.** Geographical distribution of *Gymnosiphon tenellus* (Benth.) Urb. in the Neotropics (red dots) and the new record (red star).

mm; stamens three, adnate to the perianth. Style ca 4 mm long. Stigmas horseshoe-shaped, without appendages. Ovary obovoid, one-celled with three parietal placenta, ca 1 mm long. Capsule globose,  $2 \times 1.5\text{--}2$  mm.

**Distribution** (Fig. 2). Central America (Costa Rica, Honduras, Jamaica, and Panama), Amazonian regions of Bolivia, Colombia, Venezuela, and Brazil, and in the Brazilian states Rio de Janeiro (Maas et al. 1986b; Maas-van de Kamer and Maas 1988, 2005; Maas et al. 2015; Kew 2018; Tropicos 2018) and now Paraná. From sea level to 1400 m a.s.l. (Maas et al. 1986b; Maas-van de Kamer and Maas 1988). The specimens studied here were collected at 900–1200 m a.s.l., within Araucaria and Atlantic rainforests. These populations consisted of individuals scattered over the forest floor as well as clustered in moist places with leaf litter.

**Phenology.** Flowering and fruiting year-round (Maas et al. 1986b). The specimens were observed flowering and fruiting in February and March. Additional material indicates reproductive activity also in January in the state of Paraná.

## Discussion

With the addition of the new records, two *Gymnosiphon* species are now confirmed in the state of Paraná: *Gymnosiphon divaricatus* (Bentham) Bentham & Hooker and *G. tenellus*. *Gymnosiphon tenellus* can be distinguished from *G. divaricatus* by the stigma appendages (easily observed with a simple microscope), which are absent in *G. tenellus* (Maas et al. 1986b).

Maas et al. (1986b: 109) described the inner tepals of *G. tenellus* as “narrowly elliptic to narrowly obovate”. However, upon the analysis of fresh material, we found the inner tepals to be orbicular and yellowish in color.

The inner walls of the floral tube are also yellowish.

The early diversification of the family Burmanniaceae probably resulted from vicariance, whereas its pantropical distribution was caused by expansion of tropical forests during the Eocene. Both processes may explain the wide geographical distribution of *G. tenellus* (Jaramillo et al. 2006, 2010; Merckx et al. 2008).

Our new records include the most southern record of *G. tenellus* thus far. The occurrence of this species is in a region having the Cfb climate, according to the Köppen system (Maack 1981; Roderjan 1994); Cfb occurs throughout southern Brazil (Alvares et al. 2013), which suggests that *G. tenellus* may occur in all southern Brazilian states.

## Acknowledgements

Our kind regards to Hiltje Maas-van de Kamer and Paul J.M. Maas for confirming the identification.

## Authors' Contributions

IS collected the data and wrote the manuscript, CTB wrote the manuscript, and MLB produced the figures and revised the manuscript.

## References

- Alvares CA, Stape JL, Sentelhas PC, Gonçalves JLM, Sparovek G (2013) Köppen's climate classification map for Brazil. *MeteorologischeZeitschrift* 22 (6): 711–728. <https://doi.org/10.1127/0941-2948/2013/0507>
- Bidartondo MI, Burghardt B, Gebauer G, Bruns TD, Read DJ (2004) Changing partners in the dark: isotopic and molecular evidence of ectomycorrhizal liaisons between forest orchids and trees. *Proceedings of the Royal Society B: Biological Sciences* 271: 1799–1806. <https://doi.org/10.1098/rspb.2004.2807>
- Jaramillo CA, Rueda MJ, Mora G, (2006) Cenozoic plant diversity in the Neotropics. *Science* 311: 1893–1896. <https://doi.org/10.1126/science.1121380>
- Jaramillo C, Ochoa D, Contreras L, Pagani M, Carvajal-Ortiz H, Pratt LM, Krishnan S, Cardona A, Romero M, Quiroz L, Rodriguez G, Rueda MJ, Parra F, Morón S, Green W, Bayona G, Montes C, Quintero O, Ramirez R, Mora G, Schouten S, Bermudez H, Navarrete R, Parra F, Alvarán M, Osorno J, Crowley JL, Valencia V, Vervoort J (2010) Effects of rapid global warming at the Paleocene–Eocene boundary on Neotropical vegetation. *Science* 330: 957–961. <https://doi.org/10.1126/science.1193833>
- Jonker FP (1938) A monograph of the Burmanniaceae. *Mededeelingen van het Botanisch Museum en Herbarium van de RijksUniversiteit Utrecht* 51: 1–279.
- Kew (2018) <http://www.catalogueoflife.org/>. Accessed on: 2018-12-21.
- Leake JR (1994) The biology of myco-heterotrophic (“saprophytic”) plants. *New Phytologist* 127: 171–216. <https://doi.org/10.1111/j.1469-8137.1994.tb04272.x>
- Maack R (1981) *Geografia física do estado do Paraná*. J. Olympio, Rio de Janeiro, 450 pp.
- Maas PJM, Maas-van de Kamer H, Benthem J, Snelders HCM, Rübsamen T, Ruyters P (1986a) Saprophytes pro parte. *Flora Neotropica* 40–42: 1–5.
- Maas PJM, Maas-van de Kamer H, Benthem J, Snelders HCM, Rübsamen T (1986b) Burmanniaceae. *Flora Neotropica* 42: 1–189.
- Maas P, Maas H, Melo A (2015) Burmanniaceae in lista de species

- da Flora do Brasil. Jardim Botânico do Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/jabot/floradobrasil/FB110588>. Accessed on: 2018-12-21.
- Maas PJM, Maas-van de Kamer H (1988) Burmanniaceae. In: Pinto P, Lozano G (Eds) *Flora de Colombia: Monografía n. 7*. Universidad Nacional de Colombia, Bogotá, 33–124.
- Maas-van de Kamer H (1998) Burmanniaceae. In: Kubitzki K (Ed.) *The families and genera of vascular plants, monocotyledons, Liliaceae (except Orchidaceae)*. Springer, Berlin, 154–164. <https://doi.org/10.1007/978-3-662-03533-7>
- Maas-van de Kamer H, Maas PJM (2003) Burmanniaceae. In: Wanderley MGL, Shepherd GJ, Melhem TSA, Giullietti AM, Kirizawa M (Eds) *Flora fanerogâmica do estado de São Paulo*, v. 3. Rima, São Paulo, 1–8.
- Maas-van de Kamer H, Maas PJM (2005) Flora da Reserva Ducke, Amazonas, Brasil: Burmanniaceae. *Rodriguésia* 56 (86): 125–130. <https://doi.org/10.1590/2175-78602005568625>
- Mancinelli WS, Blum CT, Smidt EC (2012) *Thismia prataensis* (Thismiaceae), a new species from the Brazilian Atlantic Rain Forest. *Systematic Botany* 37 (4): 879–882. <https://doi.org/10.1600/036364412X656545>
- Merckx V, Chatrou LW, Lemaire B, Sainge M, Huysmans S, Smets E (2008) Diversification of myco-heterotrophic angiosperms: evidence from Burmanniaceae. *BMC Evolutionary Biology* 8 (1): 178. <https://doi.org/10.1186/1471-2148-8-178>
- Roderjan CV (1994) A floresta Ombrófila densa altomontana no morro Anhangava, Quatro Barras, PR: aspectos climáticos, pedológicos e fitossociológicos. PhD dissertation, Universidade Federal do Paraná, Curitiba, 119 pp.
- Smidt EC (2014) Burmanniaceae. In: Kaehler M, Goldenberg R, Evangelista PHL, Ribas OS, Vieira AOS, Hatschbach GG (Eds) *Plantas Vasculares do Paraná*. Universidade Federal do Paraná, Curitiba, 94.
- Sochor M, Egertová Z, Hroneš M, Dančák M (2018) Rediscovery of *Thismia neptunis* (Thismiaceae) after 151 years. *Phytotaxa* 340 (1): 071–078. <http://dx.doi.org/10.11646/phytotaxa.340.1.5>
- SpeciesLink (2018) <http://slink.cria.org.br/>. Accessed on: 2018-12-21.
- Tropicos (2018) <http://www.tropicos.org/>. Accessed on: 2018-12-21.