



## A new species of *Prepusa* (Helieae, Gentianaceae) from the Brazilian Atlantic Forest, with an emended key for the genus

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### Abstract

The new species *Prepusa dibotrya* from the Brazilian Atlantic Forest in Espírito Santo is described and illustrated, with comments on its ecology, geographical distribution, and conservation status. The new species is similar to *P. viridiflora* and must be considered “critically endangered” in accordance with the criteria of the IUCN Red List of endangered plant species.

**Key words:** Brazil, endemism, Espírito Santo, taxonomy

### Introduction

*Prepusa* Martius (1827: 120) is a genus endemic to rocky outcrops in eastern Brazil. It was established by von Martius, when he described *P. montana* Martius (1827: 121). Until now, the genus was known to have five species: *Prepusa alata* Porto & Brade (1935: 222), *P. connata* Gardner ex Hooker (1839: 225), *P. hookeriana* Gardner ex Hooker (1842: 3909), *P. montana*, and *P. viridiflora* Brade (1949: 18). The first three species are endemic to the state of Rio de Janeiro, occurring in the high-altitude grasslands (campos de altitude): *P. alata* is endemic to the Desengano Rock (Desengano State Park), *P. connata* is endemic to the Órgãos mountains (Serra dos Órgãos National Park), and *P. hookeriana* has a wider distribution, occurring both in the Órgãos mountains (Serra dos Órgãos National Park) and in the Mantiqueira mountains (Itatiaia National Park). While *P. viridiflora* is endemic to the state of Espírito Santo, restricted to three inselbergs, such as the Caveira da Anta, the Forno Grande Rock (Forno Grande State Park) and the Blue Rock (Pedra Azul State Park); *P. montana* is endemic to the state of Bahia, occurs in campos rupestres (herbaceous or shrubby vegetation on sandy or stony soils) and cerrados (savannas), sometimes close to river margins and swamps, in the Chapada Diamantina (Chapada Diamantina National Park, Morro do Chapéu State Park, Mucugê Municipal Park), and outside the boundaries of these parks (Calió et al. 2008).

The family Gentianaceae contains 87 genera and ca. 1650 species. Cladistic analyses of *trnL* intron, *MatK*, and the internal transcribed spacer (ITS) sequence data for 66 genera (with some genera that could not be represented by DNA data placed in higher categories according to morphological considerations) suggest the recognition of six tribes: Exaceae, Chironieae, Gentianeae, Helieae, Potalieae, and Saccifolieae (Struwe et al. 2002). The only exclusively Neotropical tribe is that of Helieae, with over 200 species in 23 genera, and ranging from the Andean cloud forest trees to the diminutive annual herbs from seasonally-flooded lowland savannas. A suite of morphological characters distinguishes Helieae from other tribes, such as broadly bilamellate stigmas, long styles that become flattened and twisted with age, a glandular disk or glandular area at the base of a sessile ovary, and pollen with elaborate exine sculpturing, often released as tetrads or polyads (Struwe et al. 2009). In phylogenetic studies of the Helieae based on morphological and molecular data, *Prepusa*, *Senaeta* Taub. (1893: 515), and *Celiantha* Maguire (1981: 382) are consistently placed as the sister taxa to the rest of the tribe, with *Celiantha* in an

2. Calyx winged from the base to the apex of the calyx tube; calyx lobes transversely elliptic, widely elliptic or depressed ovate, with caudate to mucronate apex; corolla campanulate, longer than calyx ..... *P. alata*  
- Calyx not winged ..... 3.
3. Bracts 34–61 × 18–32 mm, connate at the base, forming a bilabiate sheath; calyx lobes caudate; filaments twisted when dry ..... *P. connata*  
- Bracts 19–27 × 5–9 mm, sub-connate at the base; calyx lobes apiculate to mucronate; filaments not twisted when dry ..... *P. hookeriana*
4. Stems woody, shrub or small tree; leaf apex obtuse and emarginate; calyx yellowish-green, lobes cuspidate; corolla greenish (Bahia) ..... *P. montana*  
- Stems not woody (herbaceous) or woody only at the base (subshrub); calyx greenish-brown, lobes acuminate; corolla green or wine-brown (Espírito Santo) ..... 5.
5. Leaf apices obtuse or rounded; inflorescence compound; corolla wine-brown, usually longer than the calyx; stigma villous ..... *P. dibotrya*  
- Leaf apices acuminate or acute; simple inflorescence; corolla green, usually the same size as the calyx; stigma verrucose. .... *P. viridiflora*

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## References

- Brade, A.C. (1949) Contribuição para o conhecimento da flora do estado do Espírito Santo – II. espécies novas das famílias Orchidaceae, Rubiaceae e Gentianaceae. *Archivos do Jardim Botânico do Rio de Janeiro* 9: 9–35.
- Calió, M.F., Pirani, J.R. & Struwe, L. (2008) Morphology-based phylogeny and revision of *Prepusa* and *Senaea* (Gentianaceae: Helieae) — rare endemics from eastern Brazil. *Kew Bulletin* 63: 169–191.  
<http://dx.doi.org/10.1007/s12225-008-9030-1>
- Fidalgo, O. & Bononi, V.L.R. (1984) *Técnicas de coleta, preservação e herborização de material botânico*. Instituto de Botânica do Estado de São Paulo, São Paulo, il. (manual n° 4) 61 pp.
- Harris, J.G. & Harris, M.W. (2001) *Plant Identification Terminology: An Illustrated Glossary*. Spring Lake Publishing, Spring Lake. 216 pp.
- Hickey, M. & King, C. (2000) *The Cambridge Illustrated Glossary of Botanical Terms*. Press Syndicate of the University of Cambridge, Cambridge. 208 pp.  
<http://dx.doi.org/10.2307/1224767>
- Hijmans, R. J., Guarino, L., Jarvis, A., O'Brien, R., Mathur, P., Bussink, C., Cruz, M., Barrantes, I. & Rojas, E. (2005) *DIVA-GIS: Version 5.2. Manual*. Lizard Tech, Inc. and University of California, Berkeley. 73 pp.
- Hooker, W.J. (1839) *Icones Plantarum; or figures with brief descriptive characters and remarks of new or rare plants, selected from the author's herbarium*. Vol 3. Longman, Rees, Orme, Brown, Green & Longman, London. 191 pp.  
<http://dx.doi.org/10.5962/bhl.title.16059>
- Hooker, W.J. (1842) *Curtis Botanical Magazine; or flower garden displayed: In which the most ornamental foreign plants cultivated in the open ground, the green-house, and the stove, are accurately represented and coloured*. Vol. 15: Stephen Couchman, London. 256 pp.
- IUCN. (2001) *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. Gland, Switzerland and Cambridge. 32 pp.
- Maguire, B. (1981) Gentianaceae. In: Maguire, B. & Collaborators. The Botany of the Guayana Highland - Part. XI. *Memoirs of The New York Botanical Garden* 32: 330–388.
- Martius, C.F.P. von. (1826) 1827. *Nova genera et species plantarum quas in itinere per Brasiliam annis 1817–1820*. Vol. 2. Wolf, München. 148 pp.  
<http://dx.doi.org/10.5962/bhl.title.450>
- Nilsson, S. (2002) Gentianaceae a review of palynology. In: Struwe, L. & V.A. Albert (eds.) *Gentianaceae: Systematics and natural history*. Cambridge University Press, Cambridge, pp. 377–497.  
<http://dx.doi.org/10.1017/cbo9780511541865.005>
- Porembski, S. (2007) Tropical inselbergs: habitat types, adaptive strategies and diversity patterns. *Revista Brasileira de*

*Botânica*. 30: 579–586.

<http://dx.doi.org/10.1590/s0100-84042007000400004>

- Porto, P. C. & Brade, A.C. (1935) Contribuição para a Flora Fluminense. *Arquivos do Instituto de Biologia Vegetal* 1(3): 222.
- Struwe, L., Albert, V.A., Calió, M.F., Frasier, C., Lepis, K.B., Mathews, K.G. & Grant, J.R. (2009) Evolutionary patterns in neotropical Helieae (Gentianaceae): evidence from morphology, chloroplast and nuclear DNA sequences. *Taxon* 58 (2): 479–499.
- Struwe, L., Kadereit, J.W., Klackenberg, J., Nilsson, S., Thiv, M., von Hagen, K.B. & Albert, V.A. (2002) Systematics, character evolution, and biogeography of Gentianaceae, including a new tribal and subtribal classification. In: Struwe, L. & V. A. Albert (eds.) *Gentianaceae: Systematics and natural history*. Cambridge University Press, Cambridge, pp. 21–309.
- <http://dx.doi.org/10.1017/cbo9780511541865.003>
- Taubert, P. (1893) *Plantae glaziovianae novae vel minus cognitae* IV. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie*. Leipzig 17: 502–526.
- Weberling F. (1989) *Morphology of flowers and inflorescences*. Cambridge Univ. Press, Cambridge. 405 pp.

## Annex

*Additional Specimens Examined of Prepusa viridiflora*—BRASIL. Espírito Santo: Alegre, Caveira da Anta, 1420–1480 m elev., 12 Oct 2007 (fl), D.R. Couto et al. 368 (MBML!, RB!); Pedra da Caveira da Anta, 19°20'27"S and 41°23'21"W, 1484 m elev., 5 Jun 2009 (fl), L. Kollmann et al. 11633 (MBML!, RB!). Castelo, Parque Estadual do Forno Grande, 13 Oct 2000 (fl), L. Kollmann & C.N. Fraga 3188 (MBML!, RB!, SPF!); C.N. Fraga & L. Kollmann 722 (MBML!, RB!); 1400 m elev., 11 Jun 2004 (fl), L. Kollmann & R.L. Kollmann 6708 (MBML!); Subida para o Forninho, 1600 m elev., 1 Nov 2004 (fl), A.P. Fontana et al. 1010 (MBML!); 31 May 2006 (fl), L. Kollmann et al. 9134 (MBML!); 20°31'16"S and 41°05'50"W, 1700 m elev., 18 Jul 2007 (fl), P.H. Labiak et al. 4209 (MBML!, UPGB!); Afloramento rochoso por baixo do mirante, 20°30'58"S and 41°05'01"W, 1105–1400 m elev., 16 Jul 2008, L. Kollmann & A.P. Fontana 11081 (MBML!, RB!); Trilha para o Forninho, 20°30'58"S and 41°05'01"W, 1100–1400 m elev., 12 Feb 2008 (fl), R.C. Forzza et al. 4955 (CEPEC!, MBML!, RB!, UPGB!); Trilha para base do Forno, 20°31'14"S and 41°06'02"W, 14 Oct 2008 (fl), C.N. Fraga et al. 2233 (CEPEC!, MBML!, RB!, UPGB!). Domingos Martins, Parque Estadual da Pedra Azul, trilha das piscinas, 13 Jul 2005 (fl), L. Kollmann & R.L. Kollmann 8023 (MBML!, RB!).