



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*, *Senaia* 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

uncertain position. However, *Prepusa* and *Senaea* lack some of the typical characters of the Helieae, and have unique 6-merous flowers (Struwe et al. 2009), *Prepusa*-type pollen (Nilsson, 2002), and inflated calyces (Calió et al., 2008).

In the parsimony analyses, based on morphologic data, *Prepusa* and *Senaea* are sister to one another, although this relationship receives only a limited boot-strap support, with the monophyly of *Prepusa* supported by only winged calyces, and the support of less than 50%. Within *Prepusa*, *P. montana* branches first, followed by *P. viridiflora*; *P. alata* is sister to the pairing of *P. connata* and *P. hookeriana*. The subclade containing *P. viridiflora*, *P. alata*, *P. connata* and *P. hookeriana* is supported by several characters, such as leaves arranged in a basal rosette, connate leaf bases, non-prominent leaf midribs on abaxial surface, and connate bract bases. Within this subclade, the group formed by *P. alata*, *P. connata*, and *P. hookeriana* is supported by the red- to magenta-coloured leaf margins and apices, the presence of papillae on the inner side of calyces, and the reddish calyces. The link between *P. connata* and *P. hookeriana* is supported by urceolate calyces (Calió et al. 2008).

As a result of fieldwork at various inselbergs in Espírito Santo, we have found a new *Prepusa* species on the Pedra da Onça inselberg that is described and illustrated here.

Material and Methods

Morphological data were obtained through the study of herbarium specimens and living material collected in the field. The descriptions and illustrations are based on both living and dried material studied using a stereomicroscope, morphological characters are based on Harris & Harris (1994) and Hickey & King (2000), the inflorescence analysis follows Weberling (1989), and the emended key to the species of *Prepusa* is based on Calió et al. (2008). Voucher specimens were pressed according to Fidalgo & Bononi (1984) and deposited at RB, with duplicates distributed to BHCB, CEPEC, HUEFS, K, MBM, MO, NY, P, RB, and SPF.

Data on the distribution of the new species is presented in a map, with elevations, state limits and vegetation types. The map was made using DIVA-GIS, version 5.2 (Hijmans *et al.* 2005).

Taxonomy

Prepusa dibotrya Fraga, A.P. Fontana & L. Kollmann, *sp. nov.* (Figures 1, 2)

The new species resembles Prepusa viridiflora Brade, but differs by obtuse or rounded leaf apices, a wine-brown corolla that is usually longer than the calyx, and two morphological features new to the genus: compound inflorescences (dibotryum), and flowers with villous stigma.

Type:—BRAZIL. Espírito Santo: Santa Teresa. Pedra da Onça, 19°53'55"S and 40°48'56"W, 900 m elev., 16 Jan 2013 (fl), L. Kollmann, A.P. Fontana, C.N. Fraga, E.J. Lirio, V. Sarnaglia 12598 (holotype: MBML!; isotypes: BHCB!, CEPEC!, HUEFS!, K!, MBM!, MO!, NY!, P!, RB!, SPF!).

Herbs, woody at the base, 29–43 cm tall without the inflorescence, branched at the base. Stems cylindrical 3.6–8.3 mm diam., internodes 3.8–28.7 mm long at the base, pale yellowish to castaneous, thereafter quadrangular 4.1–8.8 mm long, winged, internodes 6.3–140.5 mm long in the leafy part and below inflorescence, greenish-castaneous to dark wine-coloured. Leaves elliptic-oblong to narrowly elliptic, oblanceolate, 60.5–160 × 18.8–45.2 mm, oppositely crossed, base attenuate to connate-perfoliate only at the base, colleters internal, margins straight to slight revolute, apex obtuse to rounded, sometimes mucronulate; adaxial surface sulcate to conduplicate at the base, dark-green to wine-coloured at the apex, abaxial surface carinate in the midvein at the base, greenish, 2–5 pairs of secondary veins greenish to white. Inflorescence compound, dibotryum, erect, 2–5 botryoid paraclades, 15–53-flowered, cylindrical 190–320 × 1.8–5.5 mm, internodes 20–165 mm long, wine-coloured; botryoid paraclades ending in triads, erect, 3–9-flowered, cylindrical, 2–135 × 1–3.1 mm, internodes 2–130 mm long, wine-coloured; bracts elliptic, obelliptic, obovate or oblanceolate, 7–45 × 3–26 mm, connate-perfoliate only at the base, colleters internal, margin straight to slight revolute, apex obtuse to rounded, sometimes mucronulate; adaxial surface sulcate to conduplicate at the base, dark-green to wine-coloured at the apex, abaxial surface carinate in the midvein at the

base, greenish, 2–3 pairs of secondary veins greenish to white; bracteoles 1 pair per flower, inserted at 1/5–4/5 of the pedicel length (from the base), terminal flower commonly lacking subtending bracteoles, oblanceolate, narrowly elliptic or oblong, $2.5\text{--}7 \times 0.5\text{--}2\text{ mm}$, base attenuate to connate, apex mucronate, green to wine-coloured

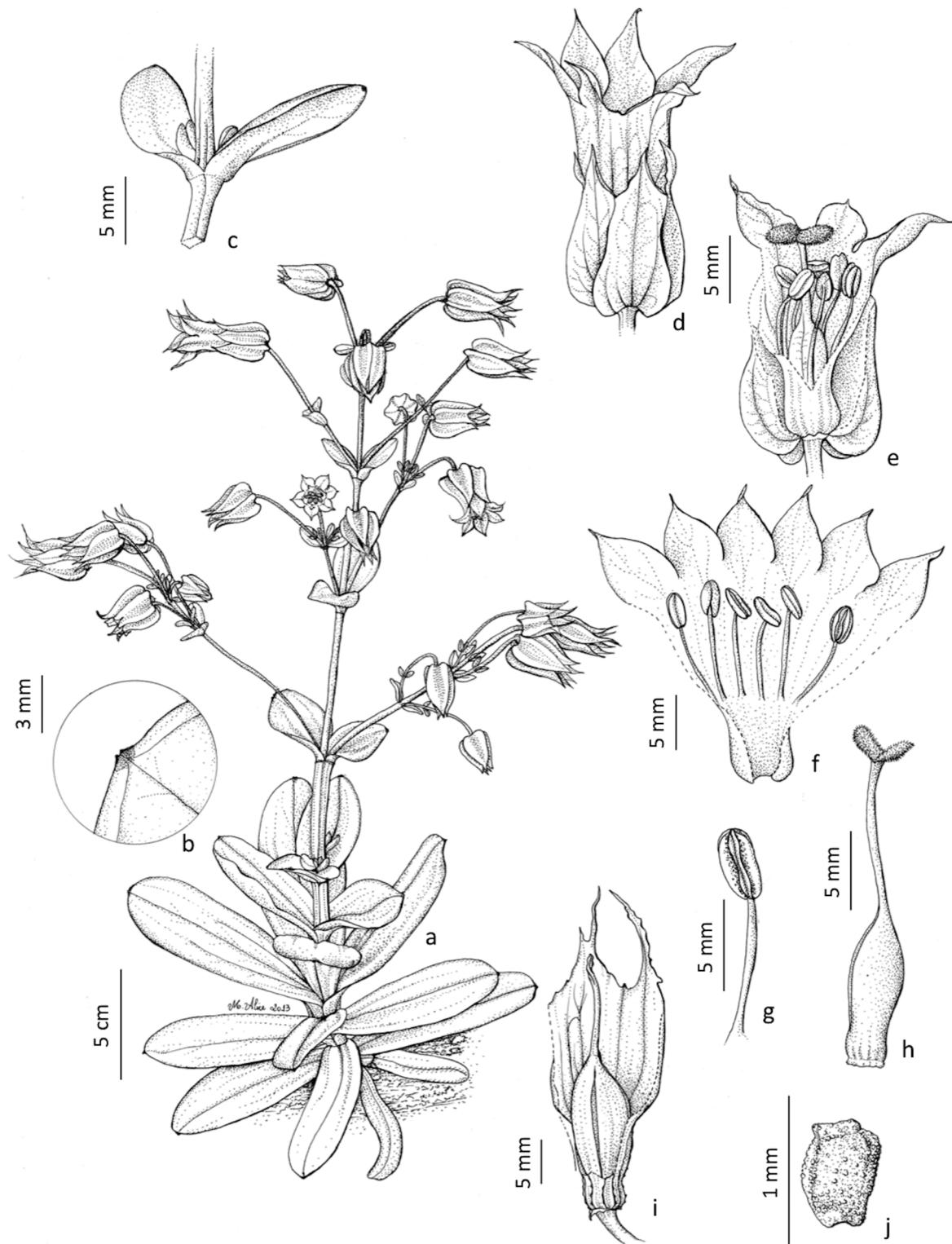


FIGURE 1. Line drawing of *Prepusa dibotrya* Fraga, A.P. Fontana & L. Kollmann. **a.** Habit. **b.** Detail of the apex and adaxial side of the leaf. **c.** Detail of the branchlet apex, bracts and the inflorescence base. **d.** Flower, side view. **e.** Pedicel, sepals, petals, stamens, and ovary, side view (sepals and petals partially cropped). **f.** Stretched petal, front view. **g.** Stamen, front view. **h.** Ovary, side view. **i.** Fruit and part of an old sepal, side view. **j.** Seed, side view. (*L. Kollmann et al 12598*).

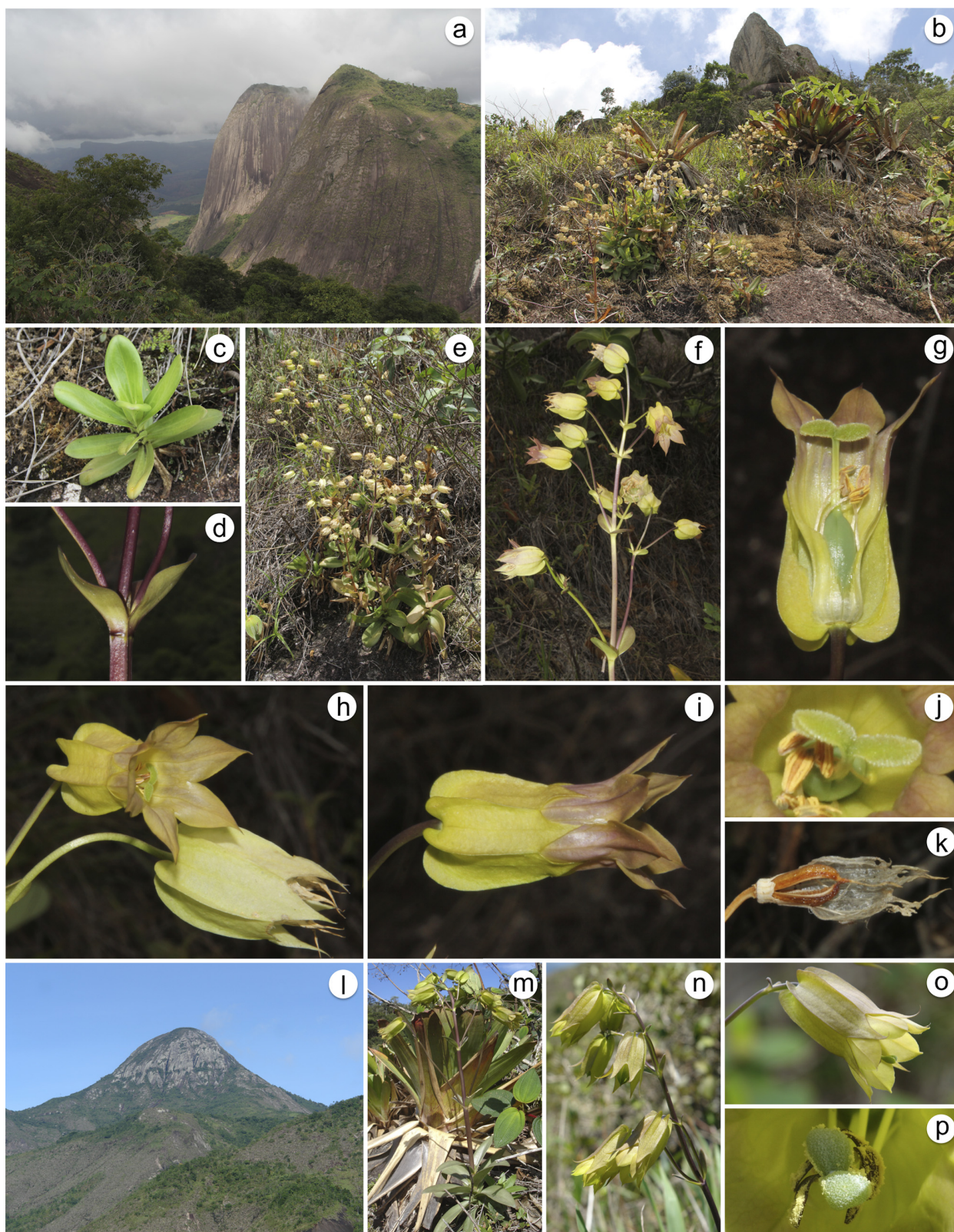


FIGURE 2. Vegetation physiognomy of the type-locality and morphology of *Prepusa dibotrya* (a–k) and *P. viridiflora* (l–p). **a.** General view of the Tropical Semideciduous Forest and inselbergs of Pedra da Onça, Santa Teresa, Espírito Santo, Brazil. **b.** Population of the new species on saxicolous vegetation of inselberg islands. **c.** Sterile specimen. **d.** Detail of the branchlet apex, bracts and the inflorescence base. **e.** Fertile specimen. **f.** Branched inflorescence (thyrsoid) and flowers. **g.** Flower, side view. **h.** Pedicel, sepals, petals, stamens, and ovary, side view (sepals and petals partially cropped). **i.** Flowers at anthesis (foreground) and post-anthesis (background). **j.** Flower, side view. **k.** Villous stigma and anthers. **l.** General view of the Atlantic Forest and inselbergs of Forno Grande, Castelo, Espírito Santo, Brazil. **m.** Fertile specimen. **n.** Simple inflorescence and flowers. **o.** Flower, side view. **p.** Verrucose stigma and anthers. (C.N. Fraga et al. 2233). All photos by C. N. Fraga.

at the apex; pedicel cylindrical, 25–50 × 0.7–1.3 mm at anthesis, to 45–60 × 1–1.5 mm during fruiting, green to wine-coloured at the apex. Calyx campanulate, 20–30 mm at anthesis, to 30–38 mm during fruiting, papillose internally and externally, dorsally winged, yellowish-green to paleaceous when old; wings 0.8–3.7 mm wide, reaching the base of the calyx lobes; lobes triangular, 6–10 × 5–8.6 mm at anthesis, to 6.5–10.3 × 5–8.6 mm during fruiting, apex acute. Corolla funnel-shaped, longer than the calyx, 2.3–38 mm long, 4.8–7.2 mm diam. at mouth, tube 6.5–9 mm long, 3–4.9 mm diam. at base, 3–4 mm wide below filament insertion; lobes lanceolate, 10–12 × 4.3–5.2 mm, margin slightly crenulate, apex acute or acuminate, cream to brown-purplish in the upper half, yellowish-green in the lower half to whitish at the base. Filaments almost equal in length, not twisted when dry, 10.4–13.6 mm long; anthers 4–4.1 mm long, attached to filaments 1–1.1 mm long from the anther base. Ovary 7.8–9.2 mm long; style 8.4–9.7 mm long; stigma lobes obovate, villous on adaxial surface, 2.2–3 mm long. Capsule dehiscent, 11–18 mm long; seeds 0.1 mm.

Phenology:—Collected in flowers from August to January and flowers/fruits from March to April.

Etymology:—The specific epithet of the new species refers to its dibotryum inflorescences, a distinguishing character for this species.

Distribution, habitat and ecology:—The new species is endemic from Pedra da Onça, Santa Teresa, Espírito Santo. This region is characterized by granitic and gneissic inselbergs that are frequently dome-shaped and rise more or less abruptly above the surrounding landscape and limited by the border of Tropical Semideciduous Forest. Geologically and geomorphologically they form old landscape features that are widespread on the crystalline continental shields, and are particularly abundant in certain tropical regions. The inselbergs of southeastern Brazil have been recognized as one of the three top hotspots of inselberg plant diversity, due to their species richness and high levels of endemism (Porembski, 2007). The habitat of *Prepusa dibotrya* is characterized by rather sparse vegetation, with thickets of shrubs among a herbaceous layer that usually fades in the dry season.

Conservation:—Due to the apparent rarity, restricted distribution, and vulnerability to human activities, we include this species in the critically endangered category of the IUCN Red List of endangered plant species (IUCN, 2001), in accordance with the following criteria [EN B1ab(i,iii,iv)].

Additional specimens examined (paratypes):—BRASIL. Santa Teresa, Pedra da Onça, 19°53'54.2"S and 40°48'56.3"W, 975–1029 m elev., 8 Mar 2009 (fl/fr), *M.D.S. Demuner & S. Venturini* 59 (MBML!); 25 Apr 2009 (fl/fr), *M.D.S. Demuner & A.M. Assis* 90 (MBML!); 10 Aug 2009 (fl), *M.D.S. Demuner & H. Loss* 122 (MBML!).

Affinities:—*Prepusa dibotrya* has two morphological features new to the genus: compound inflorescences (dibotryum) and flowers with villous stigma in a genus otherwise predominantly known for its simple inflorescences and smooth or verrucose stigma. By the characters of its stems, not woody (herbaceous), or woody only at the base (subshrub), its yellowish-green or greenish-brown calyx, dorsally winged, wings reaching the base of the calyx lobes, its stems not woody (herbaceous) or woody only at the base (subshrub), the new species to some extent resembles *Prepusa viridiflora* Brade.

However, this new species differs from the latter by stems that are cylindrical at the base yet merging to quadrangular (vs. cylindrical), leaf apices obtuse or rounded (vs. acuminate or acute), inflorescences compound, dibotryum, (vs. simple), bract apices obtuse to rounded, sometimes mucronulate (vs. acute or acuminate), calyces papillose on the inner and outer surface (vs. papillose only on the inner surface), corollas wine-brown, usually longer than the calyx, with lobes lanceolate, and apices acute or acuminate (vs. green, usually the same size as the calyx, with lobes widely ovate, and apices caudate), filaments less than 20 mm long (vs. more than 20 mm long), anthers attached to the filament 1–1.1 mm from the anther base (vs. anthers attached to the filaments 1.7–2.1 mm from the anther base), ovaries less than 10 mm long (vs. more than 10 mm long), styles less than 10 mm long (vs. more than 10 mm long), stigmas with villous obovate lobes (vs. stigmas with verrucose lobes, very widely ovate or oblong). Additional diagnostic characters are presented in Table 1.

Both species are endemic to Espírito Santo and are restricted to saxicolous vegetation islands on inselbergs with outcropping granitic and gneissic rocks, and do not occur in sympatry with any other *Prepusa* species. They are fairly isolated from each other, and their geographic distribution does not overlap. *Prepusa dibotrya* was collected in the northwestern mountainous region of the state, in regions near the Tropical Semideciduous Forest, at elevations between 900–1030 m, in areas continuously subject to drought, whereas *P. viridiflora* occurs in the southern mountainous region of the state, in areas next to the Tropical Ombrophilous Forest, at elevations of 1100 to 1600 m above sea level (see Annex), with higher humidity levels, but remaining subject to drought due to the thin soil cover (Figure 3).

TABLE 1. Comparison of morphological characteristics between *Prepusa dibotrya* and *P. viridiflora*.

Characters	<i>Prepusa dibotrya</i>	<i>Prepusa viridiflora</i>
Inflorescence	15–53-flowered	2–7-flowered
Bracteoles	2.5–7 × 0.5–2 mm	8–16 × 1.5–8.0 mm
Calyx during anthesis	20–30 mm long	33–46 mm long
Calyx during fruiting	30–38 mm long	42–50 mm long
Dorsal wings of the calyx	0.8–3.7 mm wide	2.3–4.1 mm wide
Calyx apical lobes during anthesis	6–10 × 5–8.6 mm long	11–20 × 7.5–11.2 mm long
Calyx apical lobes during fruiting	6.5–10.3 × 5–8.6 mm long	13–22 × 7.6–11.8 mm long
Size of corolla	23–38 mm long	36–45 mm long
Corolla tube	6.5–9 mm long	24–25 mm long
Corolla tube wide below the filament insertion	3–4.9 mm wide	5.7–6.5 mm wide
Corolla apical lobes	10–12 × 4.3–5.2 mm	12–15 × 9.8–11.0 mm
Filaments	10.4–13.6 mm long	22–26 mm
Anthers	4–4.1 mm long	4.9–5.0 mm long
Ovary	7.8–9.2 mm long	10–15 mm long
Style	8.4–9.7 mm long	16–20 mm long
Stigma	2.2–3 mm long	3.0–3.3 mm long

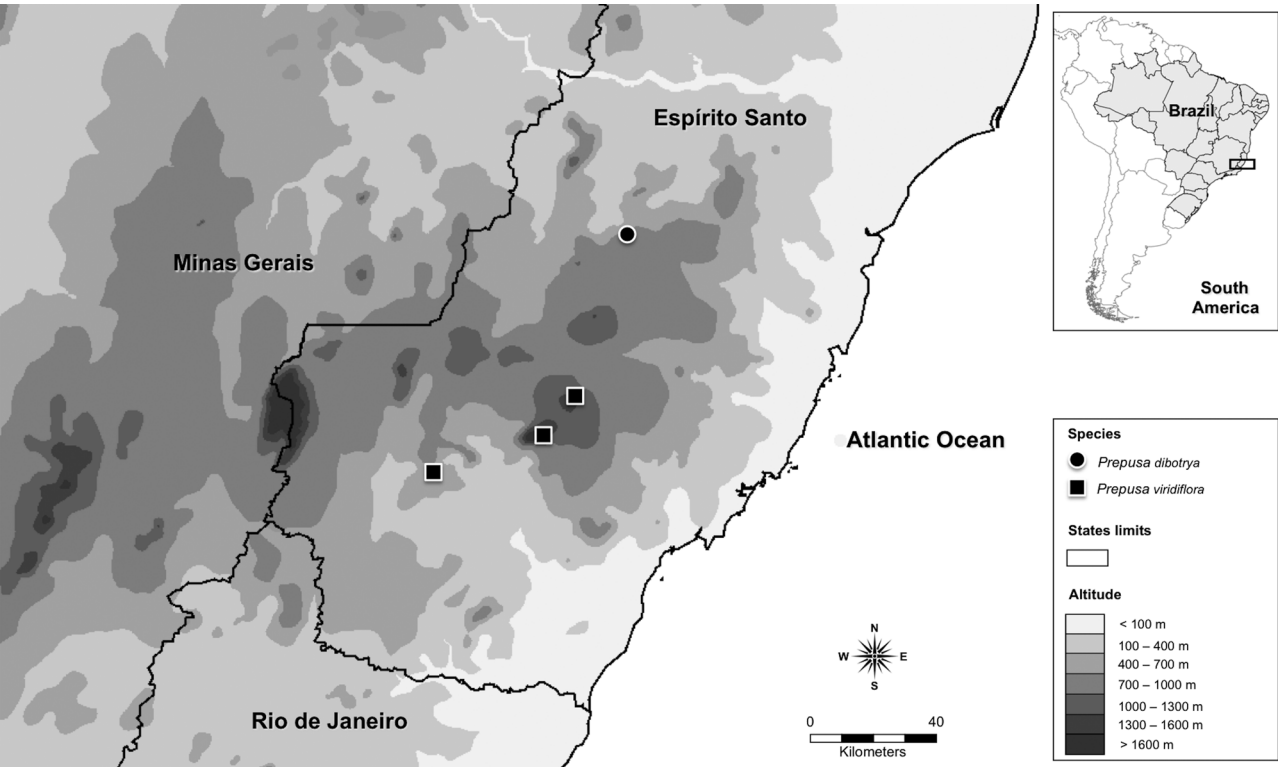


FIGURE 3. Map showing the geographical distribution of *Prepusa dibotrya* (black dots) and *Prepusa viridiflora* (black squares) in the southern part of Espírito Santo, Brazil.

Key to the species of *Prepusa*

1. Inflorescence simple; calyx reddish, winged from the base to the apex of the calyx tube or not winged; corolla white (Rio de Janeiro) 2.
- Inflorescence simple or compound; calyx yellowish-green or greenish-brown, winged from the base, but not reaching the apex of the calyx tube; corolla green to wine-brown 4.

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 *Seneae* (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!).