



Prosopanche demogorgoni: a new species of *Prosopanche* (Aristolochiaceae: Hydnoroideae) from southern Brazil

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Abstract

Here we describe a new species of *Prosopanche* from southern Brazil. This is the first report of *Prosopanche* in Santa Catarina state and for the Atlantic Forest region. We present field photographs, illustrations, ecologic and conservation comments on the new species. We contrast the morphology of the new species with the other *Prosopanche* species that occur in Brazil, *P. bonacinai* and *P. caatingicola*. The new species is morphologically similar to *P. bonacinai*, which has anthers composed by 20–30 thecae, synandrium 15–25 × 6–8 mm and tepals 35–55 × 9–20 mm vs. anthers composed by 3–4 thecae, synandrium 5–6 × 3–4 mm and tepals 15–20 × 5–8 mm in *P. demogorgoni*.

Keywords: Hydnoraceae, Neotropics, Piperales, root parasite plant, threatened species

Resumo

Descrevemos aqui uma nova espécie de *Prosopanche* originária do sul do Brasil. Este é o primeiro registro do gênero para o estado de Santa Catarina, assim como para a Mata Atlântica. Apresentamos fotografias de campo e ilustrações, além de comentários sobre ecologia e conservação da nova espécie. Contrastamos características da nova espécie com as espécies de *Prosopanche* que ocorrem no Brasil, *P. bonacinai* e *P. caatingicola*. A nova espécie é próxima de *P. bonacinai*, que possui anteras compostas por 20–30 tecas, sinândrios com 15–25 × 6–8 mm e tépalas de 35–55 × 9–20 mm vs. anteras compostas por 3–4 tecas, sinândrios com 5–6 × 3–4 mm e tépalas de 15–20 × 5–8 mm em *P. demogorgoni*.

Palavras-chave: Hydnoraceae, espécie ameaçada, neotrópicos, Piperales, planta parasita de raízes

Introduction

Hydnoroideae is a subfamily of Aristolochiaceae composed of root holoparasitic herbs (Nickrent *et al.* 2002, Barkman *et al.* 2007, Naumann *et al.* 2013). The subfamily includes two genera and about 11–12 species (Machado & Queiroz 2012, Martel *et al.* 2018), *Hydnora* Thunberg (1775: 69), restricted to Africa and the Arabian Peninsula (Bolin *et al.* 2018) and *Prosopanche* de Bary (1868: 267) in America (Cocucci 1965, Gómez & Gómez 1981, Machado & Queiroz 2012).

In the most complete review of the genus *Prosopanche*, Cocucci (1965) accepts only two species: *P. americana* (Brown 1845: 245) Baillon (1886: 27) and *P. bonacinai* Spegazzini (1898: 19–22). Gómez & Gómez (1981) later described *P. costaricensis* Gómez & Gómez (1981: 53–54) from Costa Rica. Machado & Queiroz (2012) described *P. caatingicola* R.F.Machado & L.P.Queiroz (2012: 59) from Brazilian dry forests. Martel *et al.* (2018) described *P. panguanensis* C.Martel & Rob.Fernandez (2018: 242) as the fifth species, in this case from Peru. Here we propose *P. demogorgoni* as a new species based on distinctive morphology, from southern Brazil high altitude grasslands in the Atlantic Forest Domain.

Taxonomic treatment

Prosopanche demogorgoni Funez *sp. nov.*

Similar to *P. bonacinai* by the trigonous stems in cross section, staminodes bilobed at the apex and the long (36–85 mm) perigonal tube.

Differs from *P. bonacinai* by the lower number of thecae, 20–30 in *P. bonacinai* vs. 3–4 in *P. demogorgoni*, size of synandrium 15–25 × 6–8 mm in *P. bonacinai* vs. 5–6 × 3–4 mm in *P. demogorgoni*, and tepal size 35–55 × 9–20 mm in *P. bonacinai* vs. 15–20 × 5–8 mm in *P. demogorgoni*.

Type:—BRAZIL. Santa Catarina: Urubici, Santa Bárbara, Parcela TN-1500, módulo Santa Bárbara do Peld-PPbio, 28°08'43"S, 49°27'23"W, 27 January 2019, *L.A. Funez et al.* (holotype FLOR!, isotype FURB!) Figs. 1–2.

Perennial holoparasitic herb, hypogean, achlorophyllous; rhizomes 3-angular, 3–4 mm diam., fleshy, haustorial rudiments numerous on the angles, 1–3 mm apart. Leaves and bracts absent. Flowers isolated, bisexual, emergent; pedicel 7–20 × 2–5 mm; perigonal tube 36–85 mm long, composed of two layers, external layer brown and rugose, internal layer whitish and smooth. The external layer is thinner and resistant, separating to form part of the perigonal tube during floral development, exposing the internal layer, which is more elastic and extends the flower from the soil surface; tepals 3, outer surface brown, inner surface white, interior region ochre, valvate, fleshy, 15–20 × 5–8 mm, linear, oblong or ovate-oblong; anthers 3, with 3–4 thecae, joined in an oblongoid, dark-red synandrium, 5–6 × 3–4 mm, filaments 1–2 × 1 mm; staminodes reflexed, sessile, entire, bilobed at apex, papillose, ca. 2.0–2.1 × 1.0–1.5 mm at the base; ovary inferior, 15–23 × 12–15 mm, ellipsoidal to almost spheroidal, ovules much reduced, numerous, embedded in a fleshy parietal placenta, stigma surface triradiate, lamellate, 5–6 lamellae per stigmatic lobe. Fruits hypogean, not seen at maturity, indehiscent, berry-like, globose to ellipsoid, surface rugose, seeds numerous.

Etymology:—Demogorgon is a fictional monster whose mouth resembles the *P. demogorgoni* flower.

Distribution and habitat:—Known only from the type locality in Urubici municipality, Santa Catarina state, southern Brazil. This species occurs in a specific transitional area between subtropical grasslands and cloud forests, known as “vassoural”, a formation dominated by shrubby species of Asteraceae, including *Baccharis uncinella* DC., the apparent host of *P. demogorgoni* (Fig. 3B).

Prosopanche demogorgoni was found flowering during January, associated only with roots of *Baccharis uncinella* (Fig. 3A). In February, no flowers or mature fruits were found, but some rotten individuals and rests of consumed fruits were observed.

Conservation status:—Critically endangered (CR–B2a,b[iii]). This species has an area of occupancy (AoO) of only 0,25 km². Although this species is only known to occur in a conservation unit, Parque Nacional de São Joaquim (PNSJ), there is no guarantee of protection, since the locality of Santa Bárbara and several other areas within the PNSJ have been undergoing repeated political attempts to deprotect the areas in order to allow their use for diverse economic uses, as agriculture, livestock and forestry.

Additional material examined:—BRAZIL. Santa Catarina: Urubici, Santa Bárbara, Parcela TN-1500, módulo Santa Bárbara do Peld-PPbio, 27 January 2019, *L.A. Funez et al.* 8725 (Paratypes FLOR, FURB).

Taxonomic comments:—This species resembles in some aspects *P. bonacinai* (Fig. 4B–D) by the stems which are trigonous in cross section (Fig. 4A), staminodes bilobed at the apex and the long perigonal tube. *Prosopanche bonacinai* (Fig. 4B–D) is a widespread taxon and has some synonymies; thus, to certify that *P. demogorgoni* is not a variety or synonym of *P. bonacinai*, we carefully reviewed all synonymies proposed by Cocucci (1965): *Prosopanche burmeisteri* var. *minor* Spegazzini ex Burmeister (1901: 129–130), *Prosopanche minor* Chodat (1916: 65), *Prosopanche clavata* Chodat (1916: 65), *Prosopanche bertonensis* Bertoni (1916: 21) and *Prosopanche mazzuchii* Spegazzini (1921: 252), according to the illustrations, protologues and comments of Cocucci (1965), we can confirm that none of these names represents *Prosopanche demogorgoni*, because all of them are within the morphological concept proposed by Cocucci (1965) for *Prosopanche bonacinai*, not exceeding the extremes.

The most striking distinction between *P. bonacinai* and *P. demogorgoni* are the number of thecae: 20–30 vs. 3–4, respectively. The synandrium is smaller than in *P. bonacinai* 5–6 × 3–4 mm vs. 15–25 × 6–8 mm. Tepals are smaller than *P. bonacinai*, 15–20 × 5–8 mm vs. 35–55 × 9–20 mm. The ovary and fruits are globose to slightly ellipsoid in *P. demogorgoni* vs. pyriform in *P. bonacinai*. The rhizome diameter of *P. demogorgoni* is smaller, 3–4 mm vs. 4–10 mm diam in *P. bonacinai*. Another similar species is *P. caatinguicola*, found in Brazilian dry forest (Caatinga), with a large distribution gap of ca. 2000 km in straight line. *Prosopanche caatinguicola* presents 5–8 thecae in each anther, and staminodes split into two oblongoid bodies, perigonal tubes up to 10 mm long and tepals 18–22 × 4–14 mm vs. 3–4 thecae for each anther, staminodes bilobed at the apex, perigonal tubes 36–85 mm long and tepals 15–20 × 5–8 mm in *P. demogorgoni*.

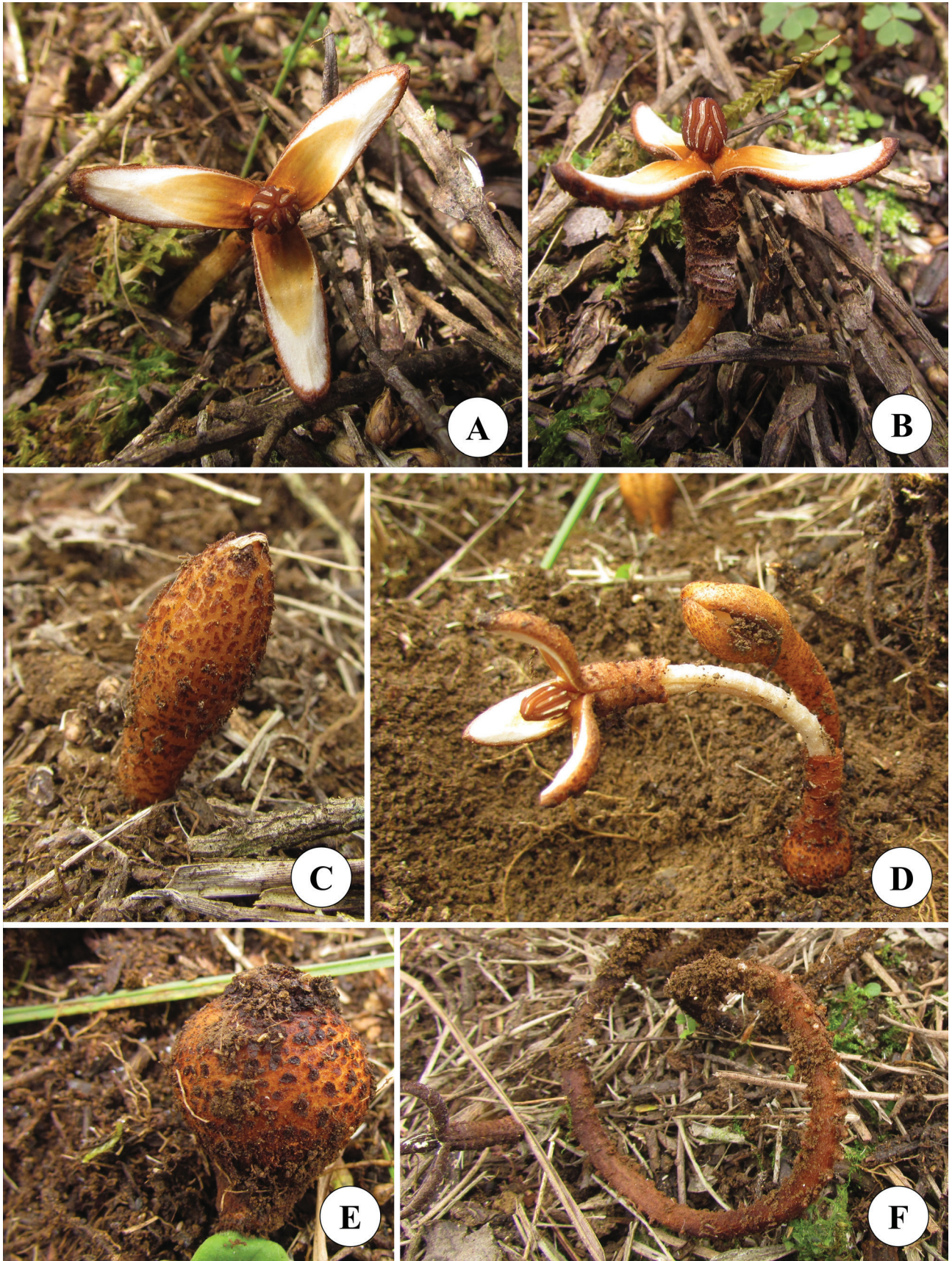


FIGURE 1. Field photographs of *Prosopanche demogorgoni*. A. Flower in frontal view. B. Flower in lateral view. C. Flower bud. D. Flower showing the long perigynial tube. E. Immature fruit. F. Trigonous rhizomes.

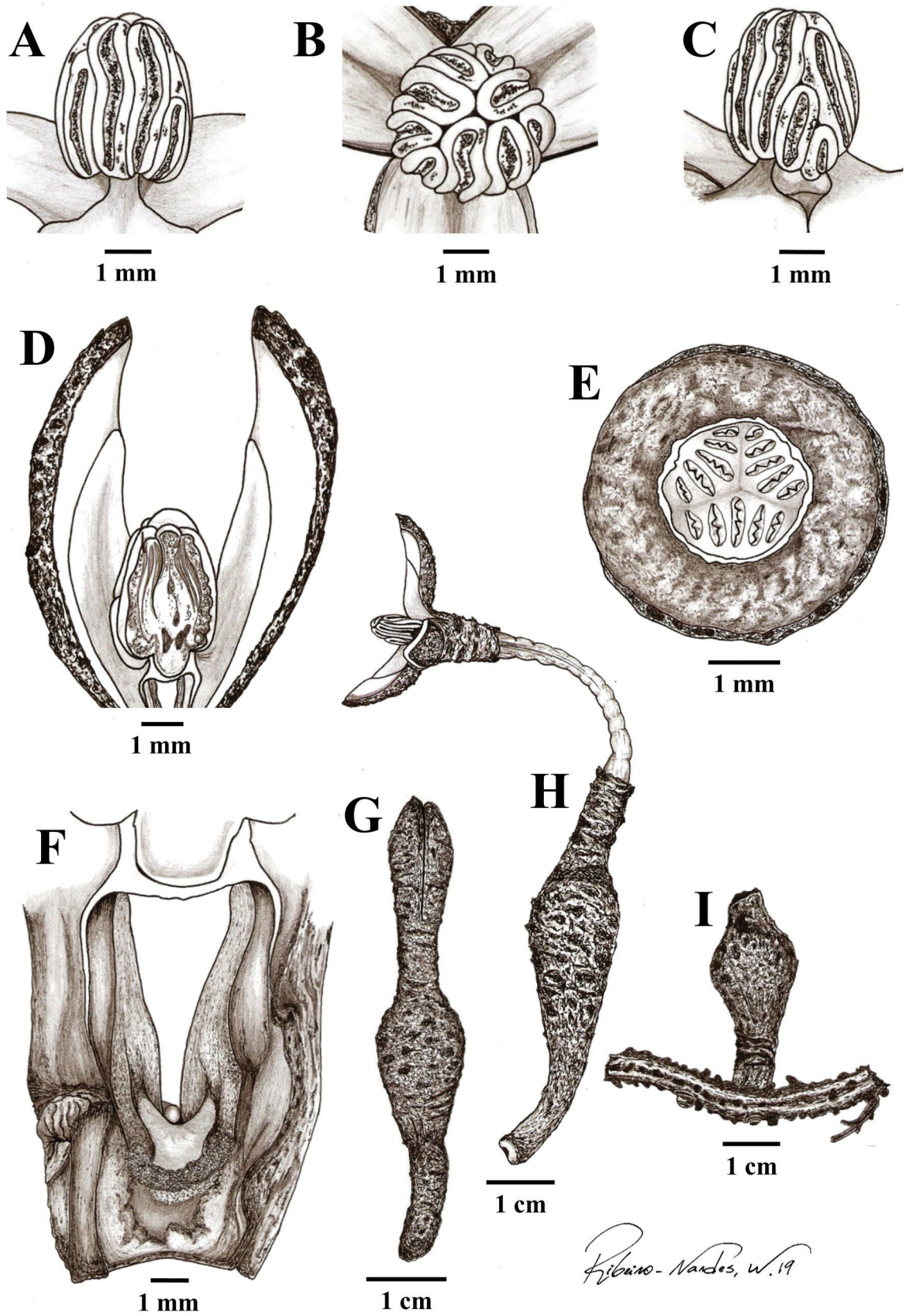


FIGURE 2. Line drawings of *Prosopanche demogorgoni*. A–C. Synandrium. D. Longitudinal section of a flower. E. Stigma. F. Staminode. G. Floral bud. H. Flower at anthesis. I. Immature fruit and rhizome.



FIGURE 3. A. Habit of *Prosopanche demogorgoni*, showing the flowers emerging from the soil. The herbaceous layer and dead plants were removed. B. Habitat of *Prosopanche demogorgoni*, in “vassoural” vegetation, showing the abundant host plant, *Baccharis uncinella*.

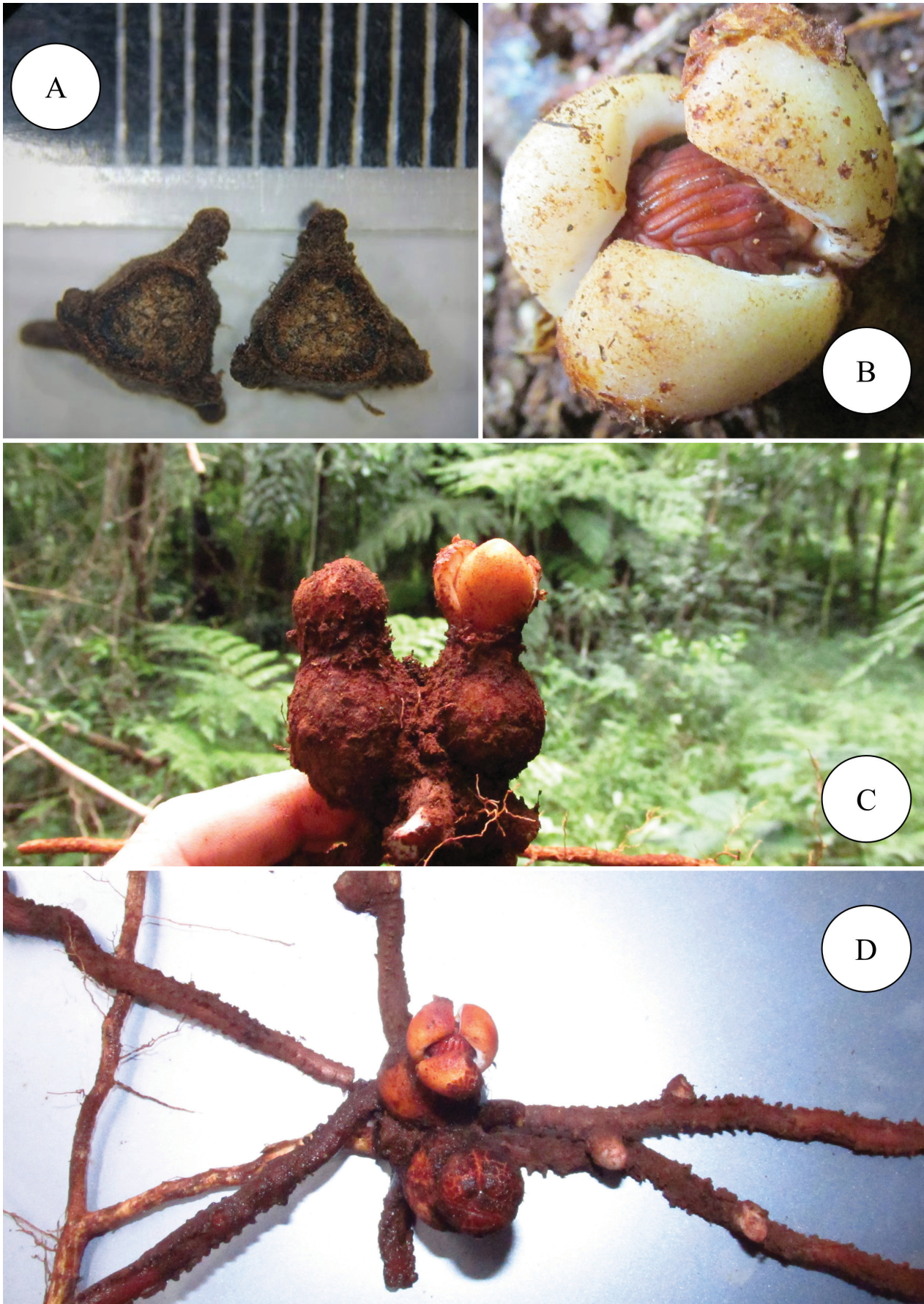


FIGURE 4. A. Rhizomes of *Prosopanche demogorgoni* in cross section. B–D. Field photographs of *Prosopanche bonacinai*. B. Flower in anthesis, showing the tepals and synandrium. C. Flowers in lateral view, showing the perigonal tube and the ovary. D. Whole plant removed from the soil. Credits: A. Luís Adriano Funez, B–D. Héctor Alejandro Keller.

There is a remarkable character in the perigonal tube of *P. demogorgoni*, that can also be observed in *P. americana* (Chodat 1916): the external layer thicker and resistant, brown, outbreaking during the floral development, exposing the whitish internal layer, which is more elastic and raises the flower above the soil level. In other species of *Prosopanche*, the external layer of the perigonal tube does not outbreak during the floral development, not exposing the internal whitish and elastic layer.

Additional specimens of *Prosopanche bonacinai* examined:—ARGENTINA. Misiones: General Manuel Belgrano, Dos Hermanas, 27 December 2013, *H.A. Keller & G. Hildt 11982* (CTES); Santiago del Estero: Prope Selva, December 1905, without collector (LP 17383); March 1921, *Mazzuchi s.n.* (LP 17380); San Juan: Médano Colorado, February 1911, *C.L. Spegazzini s.n.* (LP 17375); San Luis, January 1903, *C.L. Spegazzini s.n.* (LP 17374); Tucumán: May 1906, *C.L. Spegazzini s.n.* (LP17411), *17412* (LP 17412); Without locality, January 1905, *C.L. Spegazzini s.n.* (LP 17408). BRAZIL. Rio Grande do Sul: Vale Veneto: 28 June 1956, *J. Pivetta. 1238* (PACA-AGP 61.421).

Key to the species of *Prosopanche*

1. Flowers in fascicles; rhizomes 4–5 angular; endemic to Central America (Costa Rica)*P. costaricensis* Gómez & Gómez
- Flowers solitary; rhizomes 3(–4) angular or (4–)5(–6) angular; South American species.....2
2. Rhizomes (4–)5(–6) angular; synandrium 30–40 × 23–25 mm; tepals 60–70 × 30–50 mm*P. americana* (R.Br.) Bail.
- Rhizomes 3(–4)–5 angular; synandrium 5–25 × 3–14 mm3
3. Staminodes cucullate; synandrium 11–14 mm wide; rhizomes 3–5 angular; Peru*P. panguanensis* C.Martel & Rob.Fernandez
- Staminodes bilobed at apex or split in two oblongoid bodies; synandrium 3–8 mm wide; rhizomes 3(–4) angular.....4
4. Staminodes split in two oblongoid bodies; perigonal tube 5–10 mm long; Brazilian semiarid region (Caatinga).....
- *P. caatinguicola* R.F.Machado & L.P.Queiroz
- Staminodes bilobed at apex; perigonal tube 12–85 mm long; southern region of Brazil, Argentina, Paraguay and Bolivia5
5. Anthers composed of 20–30 thecae; synandrium 15–25 × 6–8 mm; tepals 35–55 × 9–20 mm*P. bonacinai* Speg.
- Anthers composed of 3–4 thecae; synandrium 5–6 × 3–4 mm; tepals 15–20 × 5–8 mm *demogorgoni* Funez

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