

THE DISCOVERY OF *SCAPHYGLOTTIS PUNCTULATA* (LAELIINAE) IN THE HIGHLANDS OF BRAZILIAN AMAZONIA WITH A KEY TO THE SPECIES OF THE REGION

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ABSTRACT. The genus *Scaphyglottis* Poepp. & Endl. presents 78 species and occurs from Mexico to Brazil. *Scaphyglottis punctulata* (Rchb.f.) C.Schweinf. is known from various high elevation locations from Panama to Bolivia. Here, we report new records in two regions of the Brazil portion of the Guiana Shield. We provide a detailed description, photographic plates, updated distribution map, ecological and taxonomic comments for *S. punctulata*, and an identification key for *Scaphyglottis* species from the Brazilian portion of the Guiana Shield.

KEYWORDS/PALABRAS CLAVE: América del Sur, epífitas, epífitas, Escudo Guayanés, Guiana Shield, South America, taxonomía, taxonomy

Introduction. *Scaphyglottis* Poepp. & Endl. ranges from Mexico to southern Brazil and contains 78 species (Dressler 2001, Dressler *et al.* 2004, Govaerts *et al.* 2021, Szlachetko & Kolanowska 2014). Molecular and morphological studies place the genus in the Laeliinae (Dressler 2004). The genus may be distinguished from the other members of the subtribe by the overlapping pseudobulbs, usually apical leaves, flowers that are almost always resupinate, and a free column (Dressler 2001, Szlachetko & Kolanowska 2014).

Brazil has 13 recorded species of *Scaphyglottis* (Barros *et al.* 2015, Brazil Flora Group 2022), of which 11 occur in the North region of the country: *S. bidentata* (Lindl.) Dressler, *S. boliviensis* (Rolfe) B.R.Adams, *S. emarginata* (Garay) Dressler, *S. fusiformis* (Griseb.) R.E.Schult., *S. graminifolia* (Ruiz &

Pav.) Poepp. & Endl., *S. imbricata* (Lindl.) Dressler, *S. modesta* (Rchb.f.) Schltr., *S. prolifera* (Sw.) Cogn., *S. reflexa* Lindl., *S. sickii* Pabst, and *S. stellata* Lodd. ex Lindl. (Brazil Flora Group 2022). Of these 11 species, eight are recorded from the Guiana Shield (GS) (Brazil Flora Group 2022, Cantuária *et al.* 2021, Pessoa *et al.* 2015), a region that, within Brazil, is within the states of Roraima, Amapá, Amazonas, and Pará (Barbosa-Silva *et al.* 2020, Funk *et al.* 2007).

Regarding hydrography, the GS region covers parts of the Amazon, Negro, and Orinoco river basins (Barbosa-Silva *et al.* 2020, Berry & Riina 2005). In Brazil, the region contains elevation areas higher than Central Amazonia, including mountains and tepuis that harbor considerable plant species diversity and endemism (Riina *et al.* 2019). In addition, a series of scien-

tific expeditions carried out recently to some Brazilian protected areas within the Guiana Shield found new records for the Brazilian flora (Barbosa-Silva *et al.* 2016, 2020, Farroñay *et al.* 2019, Flores & Rodrigues 2017), including several species of Orchidaceae (Cantuária *et al.* 2020, Pessoa *et al.* 2013).

Recently, while analyzing specimens deposited in the herbarium of the Instituto Nacional de Pesquisas da Amazônia (INPA) coming from floristic surveys, we registered for the first time in Brazil the occurrence of *S. punctulata* (Rchb.f.) C.Schweinf. Here, we present these new records, accompanied by an updated description, taxonomic and ecological comments, distribution, photographic plates, and an identification key to species of *Scaphyglottis* recorded in the Brazilian portion of the GS.

Materials and methods. All cited specimens are deposited in the INPA herbarium (acronym according to Thiers 2022, continuously updated). Specimen identities were confirmed with the help of various protologues and specialized literature (Reichenbach 1855, Schweinfurth 1960, Szlachetko & Kolanowska 2014, Vásquez & Ibsch 2004). Morphological analyzes and measurements were carried out in dried material only, and dried flowers were hydrated and dissected for identification. Morphological measurements were performed using ImageJ software (Schneider *et al.* 2012) on images of the specimens. The distribution map was made within the R environment (R Core Team 2021), using the R packages base (R Core Team 2021), pretymapr (Dunnington 2017), raster (Hijmans 2022), rgdal (Bivand *et al.* 2021), rworldmap (South 2011), and sf (Pebesma 2018). To determine the conservation status of *S. punctulata*, we calculated the extent of occurrence (EOO) and area of occupancy (AOO) using the GeoCAT platform (Bachman *et al.* 2011). Field photographs were taken with a Nikon D3300 camera and photographs of dehydrated specimens with a Leica M205C Stereomicroscope.

TAXONOMIC TREATMENT

Scaphyglottis punctulata (Rchb.f.) C.Schweinf., Botanical Museum Leaflets 17(2): 47. 1955. ≡ *Ponera punctulata* Rchb.f., Bonplandia 3: 220. 1855. (Fig. 1). TYPE: Venezuela. *Geitner s.n.* (holotype: W!, W0109821, photo; isotypes: unknown).

Epiphytic or rupicolous *herbs*, 17.6–50.0 cm tall. *Pseudobulbs* 6.5–20.6 × 0.2 cm, green, overlapping, cylindrical and elongated. *Leaves* 2 per pseudobulb, 5.3–14.0 × 0.4–0.5 cm, green, conduplicate, apical, lanceolate, apex obtuse to slightly emarginate. *Inflorescence* 1–2 flowers, 22–29 mm, terminal. *Floral bracts* 5–8 × 1 mm, purple, lanceolate, base attenuated, apex acute. *Flowers* 12.7–12.8 mm, resupinate, petals and sepals cream with 5 purple lines, lip dark purple and cream; *ovary* pedicellate 16–19 × 1 mm, purple and green. *Dorsal sepal* 8 × 2–3 mm, oblong to ovate, apex acute. *Lateral sepals* 7–8 × 3 mm, oblong to elliptic, apex acute. *Petals* 6–8 × 2 mm elliptical to oblong, wider at midportion, apex acute. *Lip* entire 10–11 × 3–4 mm, obovate, apex emarginate to straight, margin entire to slightly eroded, reflex, concave callus. *Column* 5–6 × 1 mm, dark purple and cream, wings curved deltoid at the apex, *anther* obovate, 4-celled, stigmatic cavity conspicuous, obovate. *Pollinarium* and *Capsules* not seen.

DISTRIBUTION, HABITAT, AND PHENOLOGY: Previously reported for Bolivia, Colombia, Panama, Peru, and Venezuela (Govaerts *et al.* 2021), and here expanded to Brazil, *Scaphyglottis punctulata* occurs in highland regions of northern Brazil, with the first collection record in 2001 in the Parque Estadual (PE) Serra do Aracá, Amazonas state, then later collected in 2019 in the Indigenous Territory (IT) Raposa Serra do Sol, Roraima state. At PE Serra do Aracá, the species was recorded in a plateau at 1200 m, in a submontane evergreen rainforest with a canopy of *ca.* 10 m, on white-sand soil. In the IT Raposa Serra do Sol, the sheet *Perdiz et al.* 3619 (INPA) was collected by a waterfall on the Cotingo River, surrounded by a forest dominated by *Dimorphandra* Schott (Fabaceae), with a prevalence of mosses and other species of epiphytic orchids in an open submontane rainforest environment. In the same expedition, *Farronã y et al.* 1646 (INPA) was found on a 1500 m plateau, in the same type of forest, with a 25 m high canopy, in organic soil over white clay. Based on all records available on online platforms, the species blooms year-round (CRIA 2022, GBIF 2022).

MATERIAL EXAMINED: BRASIL. **Amazonas:** Barcelos, Parque Estadual Serra do Aracá, 26 August, 2001, fl., A. Vicentini & R.C. Mesquita. 1851. (INPA 214376); *ibid.*, 22 April, 2014, fl., P. H. Labiak *et al.* 5707. (RB

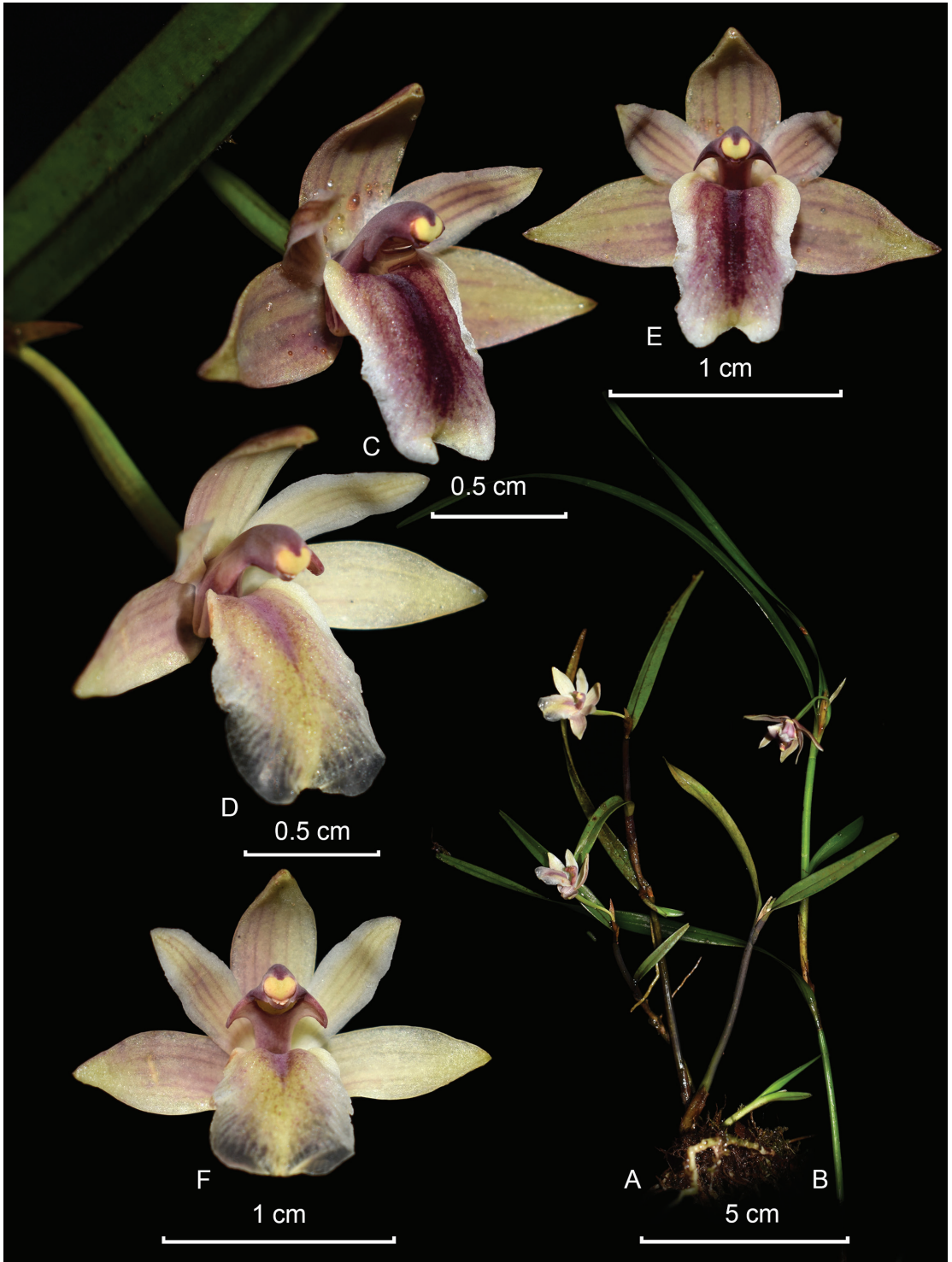


FIGURE 1. *Scaphyglottis punctulata*. A–B. Habit. C–D. Flower, $\frac{3}{4}$ view. E–F. Flower, frontal view. Based on *Farroñay 1646* (A, C, D) and *Perdiz 3619* (B, E, F). Photographs by F. Farroñay, figure preparation by G. Miranda.

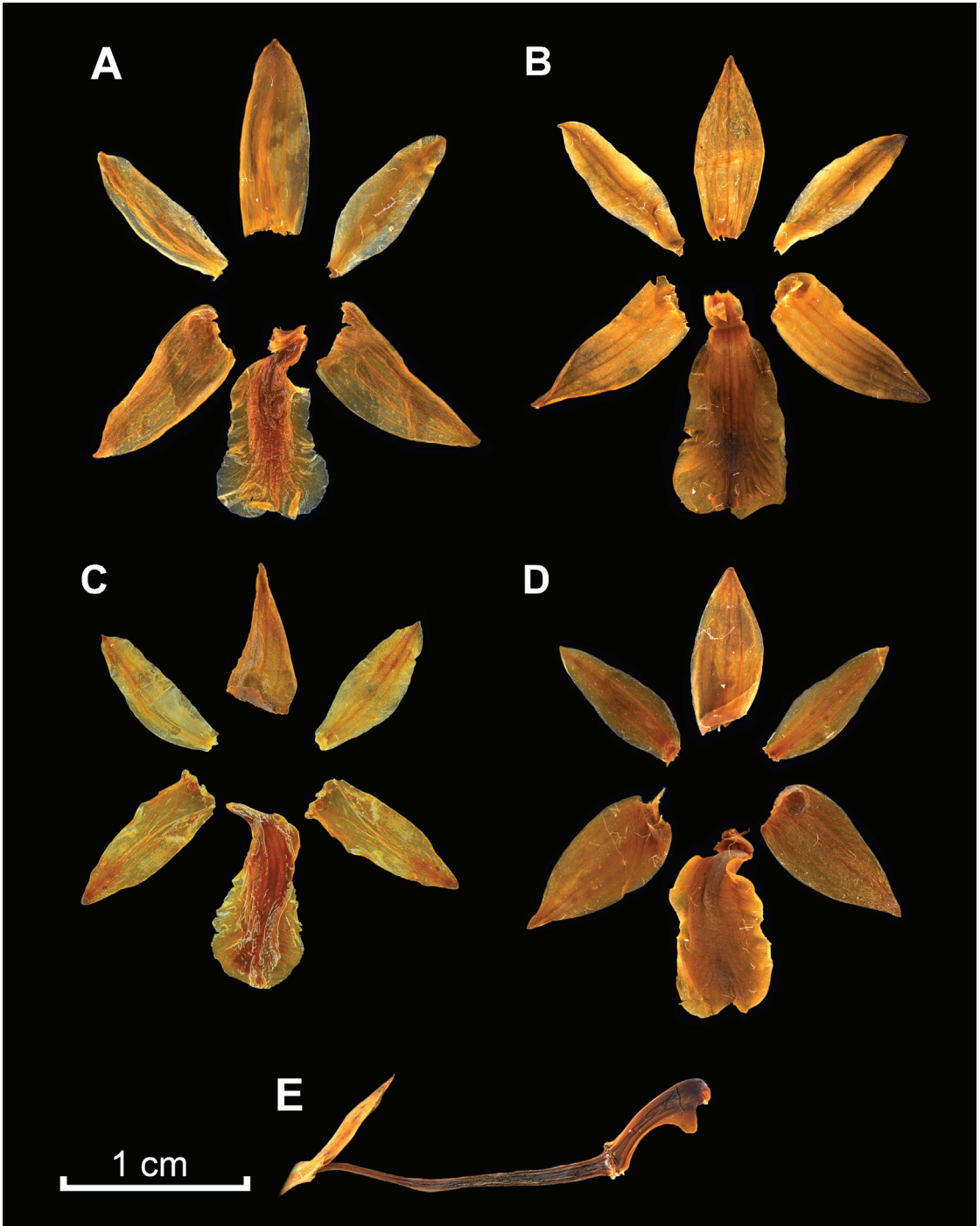


FIGURE 2. *Scaphyglottis punctulata*. A–D. Dissected perianth showing the morphological variation of the floral pieces, based on Vicentini 1851 (A), Perdiz 3619 (B), Labiak 5707 (C), and Farroñay 1646 (D). E. Column, pedicellate ovary and bract, based on Farroñay 1646. Photographs by F. Farroñay (A, B, D, E) and A. M. Araújo (C). Figure preparation by G. Miranda.

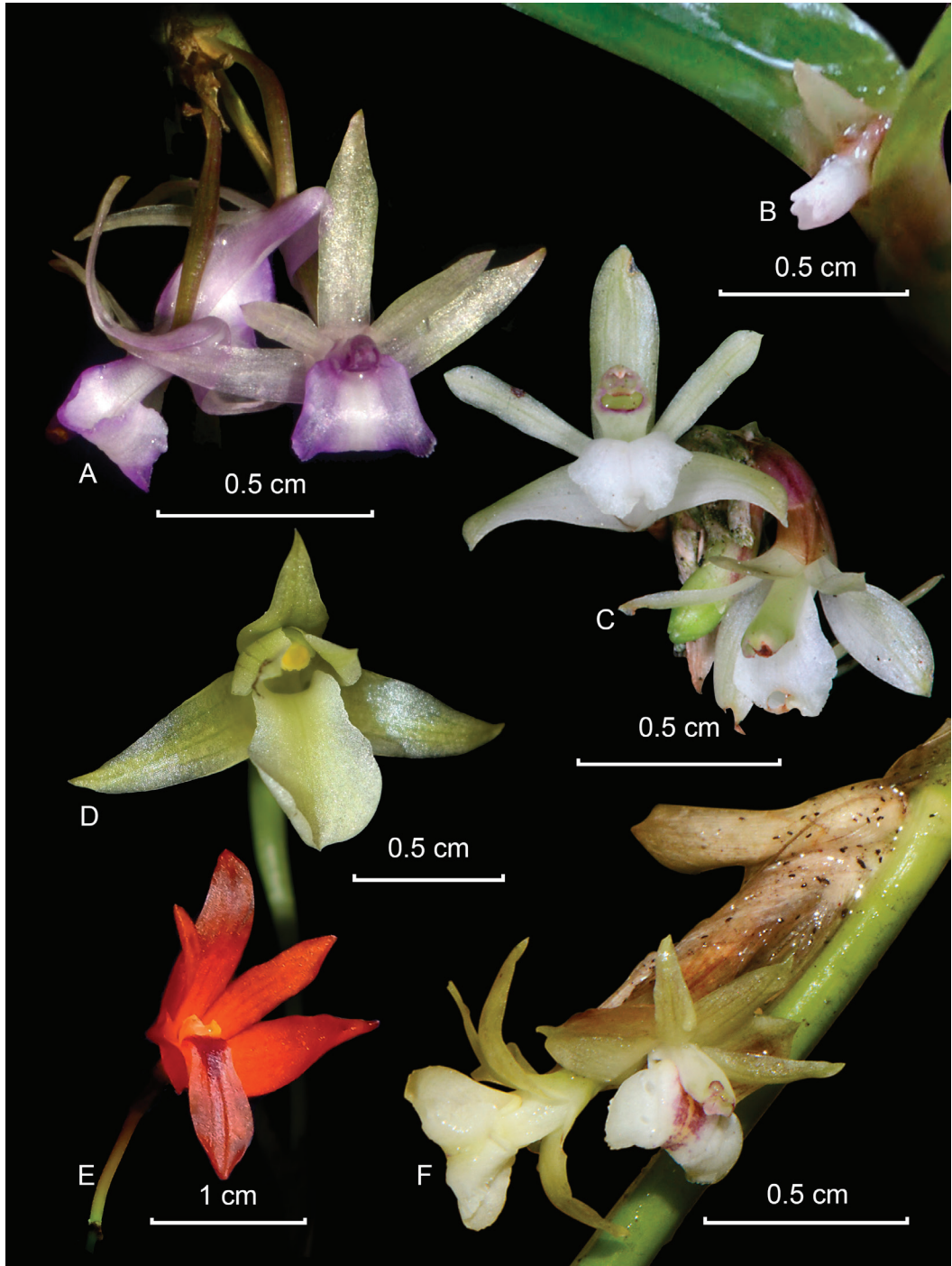


FIGURE 3. Species of *Scaphyglottis* that occur in the Guiana Shield. **A.** *Scaphyglottis stellata* Lodd. ex Lindl. **B.** *Scaphyglottis sickii* Pabst. **C.** *Scaphyglottis prolifera* (R.Br.) Cogn. **D.** *Scaphyglottis fusiformis* (Griseb.) R.E.Schultes. **E.** *Scaphyglottis bidentata* (Lindl.) Dressler. **F.** *Scaphyglottis reflexa* Lindl. Photographs by F. Farronay (A, D), A. M. Araújo (B, E), L. P. Félix (C), and R. G. Barbosa-Silva (F). Figure preparation by G. Miranda.

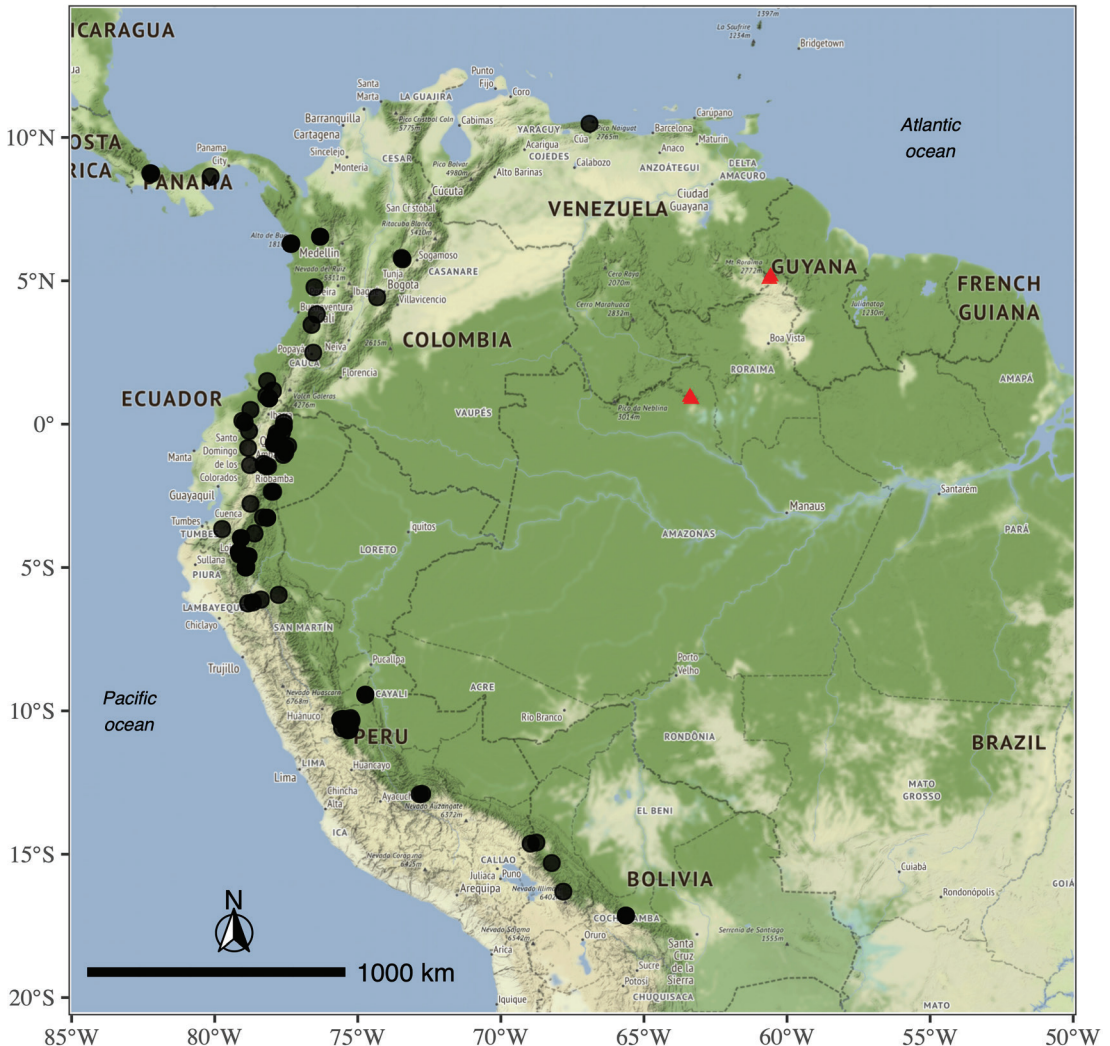


FIGURE 4. Geographical distribution of *Scaphyglottis punctulata*. Sites of old records are indicated by black circles. New record sites are indicated by red triangles. Map preparation by R. O. Perdiz.

601971). **Roraima:** Uiramutã, Terra Indígena Raposa Serra do Sol, 6 December, 2019, fl., R.O. Perdiz *et al.* 3619 (INPA 290578); *ibid.*, 13 December, 2019, *F. Farroñay et al.* 1646 (INPA 290579).

CONSERVATION STATUS: *Scaphyglottis punctulata* is distributed in central and northern South America, with a calculated EOO of 4,882,458.740 km², and an AOO of 360,000 km². Although AOO < 500 km², the number of populations exceeds 10 (condition “a”); therefore, the species is considered Least Concern (LC) according to the criteria of IUCN (2012).

TAXONOMIC NOTES: Based solely on vegetative characters, *S. boliviensis* is the Brazilian species morphologically closest to *S. punctulata*, as it also has elongated pseudobulbs and a stalked ovary. However, *S. punctulata* is distinguished by having 1–2 flowers (vs. 1–4 flowers at *S. boliviensis*), with an entire oblanceolate lip (vs. trilobed, obovate). Among Brazilian species, the flowers of *S. punctulata* most closely resemble those of *S. fusiformis*, differing by having one leaf non conduplicate, a longer lip spatulate (1.1 vs. 0.8 cm), and in the different coloration of the perianth (greenish cream to purple dark vs. yellowish white).

IDENTIFICATION KEY FOR *SCAPHYGLOTTIS* SPECIES KNOWN FROM THE BRAZILIAN PORTION OF THE GUIANA SHIELD

1. Leaves cylindrical *S. reflexa*
 1a. Leaves flat 2
 2. One leaf per pseudobulb *S. fusiformis*
 2a. Two leaves per pseudobulb 3
 3. Lip clearly trilobed *S. stellata*
 3a. Lip entire 4
 4. Sepals \leq 5 mm length 5
 5. Lips lilac, obovate, petals \geq 4 mm length *S. graminifolia*
 5a. Lips white-cream, elliptical or spatulate, petals $<$ 4 mm in length 6
 6. Inflorescence a raceme, lip \geq 2 mm, apex acute *S. sickii*
 6a. Inflorescence a fascicle, lip \leq 4 mm apex obtuse *S. prolifera*
 4a. Sepals $>$ 5 mm in length 7
 7. Lip with emarginate apex, purple and cream *S. punctulata*
 7a. Lip with apex acute or acuminate, red 8
 8. Pseudobulbs fusiform, lips with yellow callus *S. imbricata*
 8a. Pseudobulbs cylindrical, lips with brown callus *S. bidentata*

The first Brazilian collection of *S. punctulata* dates from almost 21 years ago but was only detected after reviewing the *Scaphyglottis* samples deposited at INPA herbarium. In Amazonia, it has been relatively common to describe new species (e.g., Damasco *et al.* 2019, Prata *et al.* 2016) and to document new records of plants (e.g., Holanda *et al.* 2015) based on samples sitting in herbaria for long periods. Such phenomena are reported by Bebbler *et al.* (2010) on a global scale but are certainly more common in hyperdiverse tropical forests, where access routes are still scarce. We stress that a more comprehensive understanding of flowering plant diversity and distribution is crucial for any conservation initiative. Our results highlight the importance of new expeditions to Amazonian highlands, where new records of plants and new discoveries are expected. Policies and funding initiatives to facilitate such expeditions would most certainly expand the likely biased (Hopkins 2007, 2019), currently known distribution of Amazonian plant species. It is also important to emphasize that taxonomic studies that unravel such novelties depend on continuous investment, not only for training qualified human resources but enabling their subsequent presence in Amazonian institutions, which currently lack adequate and desired numbers of those professionals.

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