Sphinctanthus fluvii-dulcis (Rubiaceae: Gardenieae), a new species from the Rio Doce Valley, Atlantic forest of Minas Gerais, Brazil, with detailed observations on ovary morphology

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Sphinctanthus fluvii-dulcis (Rubiaceae: Gardenieae), a new species from the Rio Doce Valley, Atlantic forest of Minas Gerais, Brazil, with detailed observations on ovary morphology

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Summary. A new species of *Sphinctanthus* from the Rio Doce Valley, Atlantic forest of the state of Minas Gerais, Brazil, is here described and illustrated. The species is peculiar within the genus by having placentation entirely parietal, while in the other species of *Sphinctanthus* the placentation is basally axial and distally parietal. In addition, despite its bright orange flowers (being a plant with high potential as an ornamental), it is only known from two collections from nearby localities, indicating that it is a rare and critically endangered species.

Resumo. Uma nova espécie de *Sphinctanthus* proveniente do Vale do Rio Doce, na Floresta Atlantica do Estado de Minas Gerais, Brasil, é aqui descrita e ilustrada. A espécie é peculiar dentro do gênero por ter placentação completamente parietal, em quanto que nas outras espécies a placentação é basalmente axial e distalmente parietal. Também, apesar das flores de cor laranja vivo (sendo uma planta com alto potencial de ser cultivada como ornamental), ela é conhecida somente por duas coletas em localidades muito proximas, indicando que é uma espécie rara e criticamente em perigo.

Key Words. Brazil, *Gardenieae*, new species, placentation, Rubiaceae, *Sphinctanthus*.

Introduction

Sphinctanthus Benth. was originally described by Bentham (1841), and its generic name refers to the corolla tube constricted below the mouth of the type species. The genus comprises four or five South American species of shrubs and small trees. It has hermaphroditic flowers, cream-white, yellow, yellowish orange to bright orange corollas,corolla tube with a ring of hairs at the middle or near the base inside, corolla lobes contorted to the left, and triporate pollen grains released in monads (Persson 1993, p. 578, fig. 8A–B). The only exception to this set of characters would be *Sphinctanthus insignis* Steyerm. (Steyermark 1981), that has white corollas lacking a ring of hairs inside, and caudate lobes; however, this species most likely it belongs to the genus *Randia* (C. Gustafsson, pers. comm.). Phylogenetic analyses using molecular data confirmed that *Sphinctanthus* belongs to the tribe Gardenieae (Persson 2000) and positioned it as the sister genus of *Rosenbergiodendron* Fagerl. (Gustafsson & Persson 2002). As of today, *Sphinctanthus* has been treated only in regional floras (e.g., Schumann, 1889; Steyermark, 1972, 1974). The only taxonomic revision available for *Sphinctantus* is an unpublished undergraduate thesis, produced at the University of Gothenburg (Wallberg 1999). During routine identification of Brazilian Rubiaceae, a recent collection from the municipality of Belo Oriente, state of Minas Gerais, called our attention, because of the bright orange flowers and other morphological features that

pointed to the genus *Sphinctanthus*. In fact, another specimen from a nearby locality (Braúnas) was determined by the first author as "*Sphinctanthus* sp." more than a decade ago, but at that time he preferred not proceeding to a formal description because only one specimen was available. Both of these collection localities are from remnants of Atlantic forest in the Rio Doce Valley, several hundred kilometers from the Brazilian coast. Following these observations, we contacted the collectors, who supplied us with digital images, herbarium specimens, pickled flowers, and additional information that were useful for a better understanding of this taxon. After detailed studies we concluded that these specimens represent a species new to science, which is here described and illustrated, along with detailed observations on the placentation of its ovary.

Sphinctanthus fluvii-dulcis *Delprete & C. Persson*, **sp. nov.** Typus: Brazil, Minas Gerais, Rio Doce Valley, Mun. Belo Oriente, BR-381, from Ipatinga towards Governador Valadares, ca. 29 km from Ipatinga, in front of the Federal Police station, secondary seasonal forest at the edge of the road, canopy 15–25 m tall, 19°18'21"S, 43°23'11"W, 200 m, 22 Feb. 2012, fl., *H. Lorenzi, M. Lacerda & E. de Melo 7148* (holotypus, BHCB!; isotypi GB!, CAY [2]!, HPL [2]!, RB!).

Treelet 4–5 m tall, with leaves and inflorescences clustered at the tip of each branch; bark smooth, grayish brown, with cream-white, irregularly shaped patches; terminal branchlets cylindrical, 2–3 mm in diam., reddish brown, with distal internodes sparsely adpressed-pubescent; older internodes sparsely lenticellate, sparsely pubescent or becoming glabrate. Stipules ovate to broadly ovate, acuminate, 5–6 mm long (including the 3 mm long acumen), glabrous outside, sericeous and with sparse colleters at the base inside, exuding abundant resin at distal stipules, persistent or subpersistent. Leaves short- to long-petiolate; petioles 5–20 mm long; blades elliptic to ovate, 10–17 x (4–)5.5–9 cm, base acute-decurrent, apex obtuse to acute and acuminate at tip, acumen deltate to narrowly triangular, 5–15 mm long, chartaceous to papyraceous, faintly bullate when fresh, lucid and glabrous above, white-velvety below; dark olive-green above and greenish white below when dry; secondary veins 9–11 on each side; domatia absent. Inflorescences uniflorous or fasciculate (extremely reduced cymes), with 1–9 flowers, subsessile; peduncle to 5 mm long, sparsely pubescent or glabrous. Flower buds pale green; corolla lobes contorted to the left. Flowers without scent; pedicels 2–3 mm long, glabrous. Hypanthium oblong-obovoid, 7–10 x 5–7 mm, glabrous. Ovary bicarpellar, unilocular; placentation entirely parietal (see discussion below); ovules numerous. Calyx fleshy when fresh, glabrous throughout; tube cupular, 3–5 mm long, 6–8 mm wide at top; calyx lobes narrowly triangular to linear-lanceolate, 5–11 x 2–3 mm. Corolla hypocrateriform, 5-lobed, 53–67 mm long, somewhat fleshy when fresh, bright orange; tube funnel-shaped (basal half cylindrical and upper half obconical), 38–47 mm long, 6–7 mm wide at base, 11–13 mm wide at mouth, microscopically antrorse-puberulent (seemingly glabrous to the naked eye) outside, with a ring of erect hairs ca. 7 mm wide, at ca. 15 mm above the base of the tube, the rest of the throat glabrous; corolla lobes ovate, asymmetrical, the outer portion cordate at base and the inner portion ovate at base, 15–20 x 11–15 mm, apex obtuse, microscopically puberulent (seemingly glabrous to the naked eye) outside, glabrous inside. Stamens included (anther tips ca. 5 mm below the corolla mouth); anthers subsessile, basally attached, oblong, 9 x 3 mm (dehisced), gradually narrower toward the apex, base obtuse, apex obtuse and then minutely mucronate. Pollen grains triporate. Style included, 38–42 mm long, glabrous,

stalk smooth, ca. 2 mm in diam., style branches 2, connivent, 10–11 x 5–6 mm, 3–5 ridged abaxially. Fruits and seeds unknown.

DISTRIBUTION. To our knowledge, this species is known only from two nearby localities of the Rio Doce Valley, in the southeastern portion of the state of Minas Gerais.

ADDITIONAL SPECIMEN EXAMINED. BRAZIL. Minas Gerais, Rio Doce Valley, Braúnas [ca. 19°03'21", 42°42'57"W], 15 Oct 1997, fl., *E. Tameirão Neto 2567* (BHCB).

HABITAT. Remnants of seasonal Atlantic forest in the Rio Doce Valley of Minas Gerais; growing on sandy-clay soil, at 200–250 m altitude.

CONSERVATION STATUS. Despite its brightly colored flowers, this species is only known from two collections, ca. 76 km apart, in the nearby Municipalities of Belo Oriente and Braúnas, indicating that it is a rare species. In the site of Belo Oriente, where it has been observed for several years, after extensive search, only one individual was found. In Braúnas it is also know from one individual, and the locality is undergoing aggressive agricultural expansion. Both collections were made in remnants of seasonal Atlantic forest of the Rio Doce Valley, in the state of Minas Gerais. However, not far from these two collection sites, is located the Rio Doce State Park (Parque Estadual do Rio Doce), which is so far poorly collected, and this species might also occur there. Because this species is known from only by two individual plants at two nearby localities, which are under imminent threat, this species should be treated as "Critically Endangered" (CR) according to the IUCN criteria (IUCN 2001).

PHENOLOGY. The two flowering collections were made in October and February.

ETYMOLOGY. The specific epithet is named after the Rio Doce Valley to which this species is most likely endemic. We have opted for the specific epithet to be hyphenated, because "*fluvii*" and "*dulcis*" are two words that stand independently. Article 60.9 of the ICBN (McNeill et al., 2006) says that "The use of a hyphen in a compound epithet is treated as an error to be corrected [...] unless the epithet is formed of words that usually stand independently [...], when a hyphen is permitted" and example 21 presents several specific epithets where the hyphen is maintained.

NOTES. *Sphinctanthus fluvii-dulcis* Delprete & C. Perss. is most similar to *S. aurantiacus* (Standl.) Fagerl. (restricted to the lowland, seasonally dry, scrub vegetation of southwestern Ecuador and northwestern Peru), because of the bright orange corolla, uniflorous or fasciculate inflorescence, and calyx lobes varying from narrowly triangular to linear-lanceolate, from which it differs by having corolla tube 38–47 mm long, microscopically antrorse-puberulent outside (vs. 13–25 mm long, retrorsely pubescent outside in *S. aurantiacus*), corolla lobes ovate and obtuse at apex (vs. ovate-triangular and acuminate at apex).

The calyx lobes of *Lorenzi et al. 7148* are narrowly triangular and 5–8 mm long, while those of *Tameirão Neto 2567* are linear-lanceolate and 10–11 mm long. We regard this difference in shape and size as simple morphological variation within the species. Finally, because of the bright orange corollas, this new species is quite attractive, and has a great potential as an ornamental plant.

OBSERVATIONS ON THE OVARY AND ITS PLACENTATION. The ovary of *Sphinctanthus* has been described as "2-locular; ovules numerous in each locules, immersed in a fleshy placenta, this adnate to the medial septum" by Hooker (1873, p. 84, liberal translation from Latin) and as "bicarpellar, bilocular; placenta fleshy, attached longitudinally; ovules horizontal, biseriate, partially embedded in the placenta, anatropous, micropyle inferior" by Schumann (1889, p. 353, fig. 144; liberal translation

from Latin); however, in the figure of *S. rupestris* Benth. [= *S. striifolius* (DC.) Hook.f. ex K. Schum.], the ovary was drawn with an entirely axile placenta, and the ovules attached horizontally, directly on the placenta; this drawing is probably erroneous, and most likely this fruit belongs to a species of *Randia*. Steyermark (1974, p. 655; liberal translation from Spanish) described its ovary as "2-locular; ovules numerous in each cell, horizontal, in two series." Robbrecht and Puff (1986) pointed out that in several genera of the tribe Gardenieae the placentation is transitional, being basally axial and distally parietal. Accordingly, Persson (1996) coded the placentation of *Sphinctanthus* as intermediate and specifically as "placentas fused 3/10 to 6/10 of the lower part." As several flowers of *S. fluvii-dulcis* were available to us preserved in alcohol, we were able to study a few ovaries in longitudinal and cross sections. In our observations, the ovary of this species is bicarpellar and unilocular, with a placental extension that follows the entire perimeter of the wall along the line of the septum. The placenta extension is then divided into two short branches, and a cylindrical fleshy body that follows the whole edge of the septum is attached to each of the placental branches. In other words, the placental fleshy structures are two cylindrical bodies, lying side by side, as a continuum from the base of the ovarian chamber and with the ends nearly touching each other at the distal end of the ovarian chamber. No axile structure is present. The ovules are numerous and inserted (half-embedded) on the fleshy cylindrical bodies of the placenta, evenly spaced and generally in horizontal position, although many of them are at a slight angle with respect to the longitudinal axis of the placental bodies (i.e. not truly horizontal). Therefore, we conclude that in this species the ovary is bicarpellar, unilocular, and with an entirely parietal placenta.

Acknowledgments

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Figure legends:

Fig. 1. *Sphinctanthus fluvii-dulcis*. **A** habit of the plant from which the type specimens were collected; **B** fasciculate inflorescence; **C** uniflorous inflorescence (both B and C from the same plant); **D** longitudinal section of a flower in early stage of anthesis (Photos by Eugenio Arantes de Melo).

Fig. 2. *Sphinctanthus fluvii-dulcis*. **A** branchlet with leaves and an inflorescence clustered at the tip; **B** node with young stipules; **C-D** variation in calyx lobes shape; **E** longitudinal section of a flower at early stage of anthesis; F frontal view of a flower in anthesis; **G** longitudinal section of the ovary, with the positionof the four transversal sections displayed to the left (**G^{1}** to **G^{4}**); G^{1} transversal section at base of ovary; **G^{2}** transversal section at medio-basal portion of the ovary; **G^{3}** transversal section at medio-distal portion of the ovary; **G^{4}** transversal section at distal portion of the ovary (A-C and E-G from *Lorenzi et al. 7148*; D from *Tameirão Neto 2567*).

Figure 1.

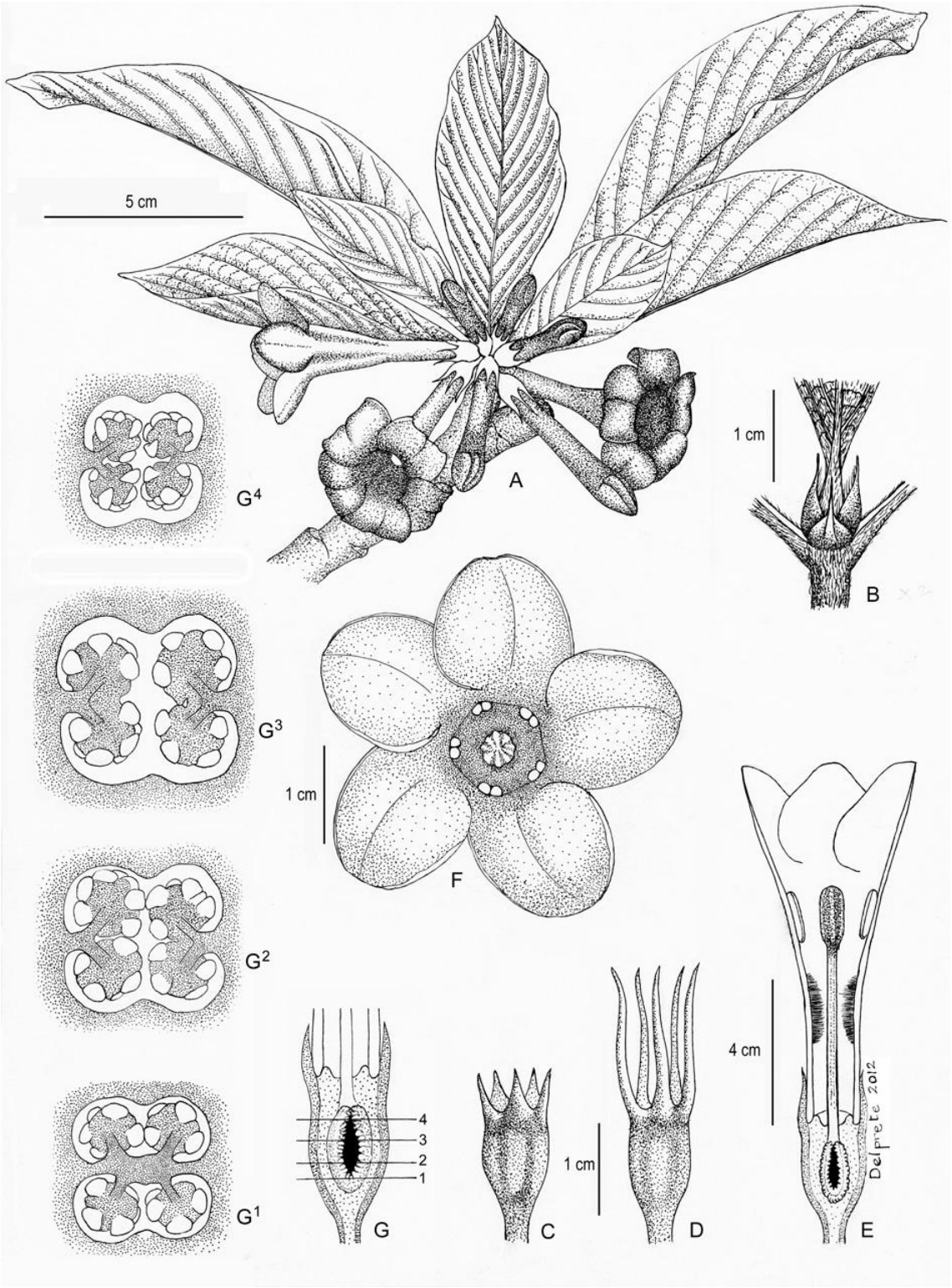

Figure 2.