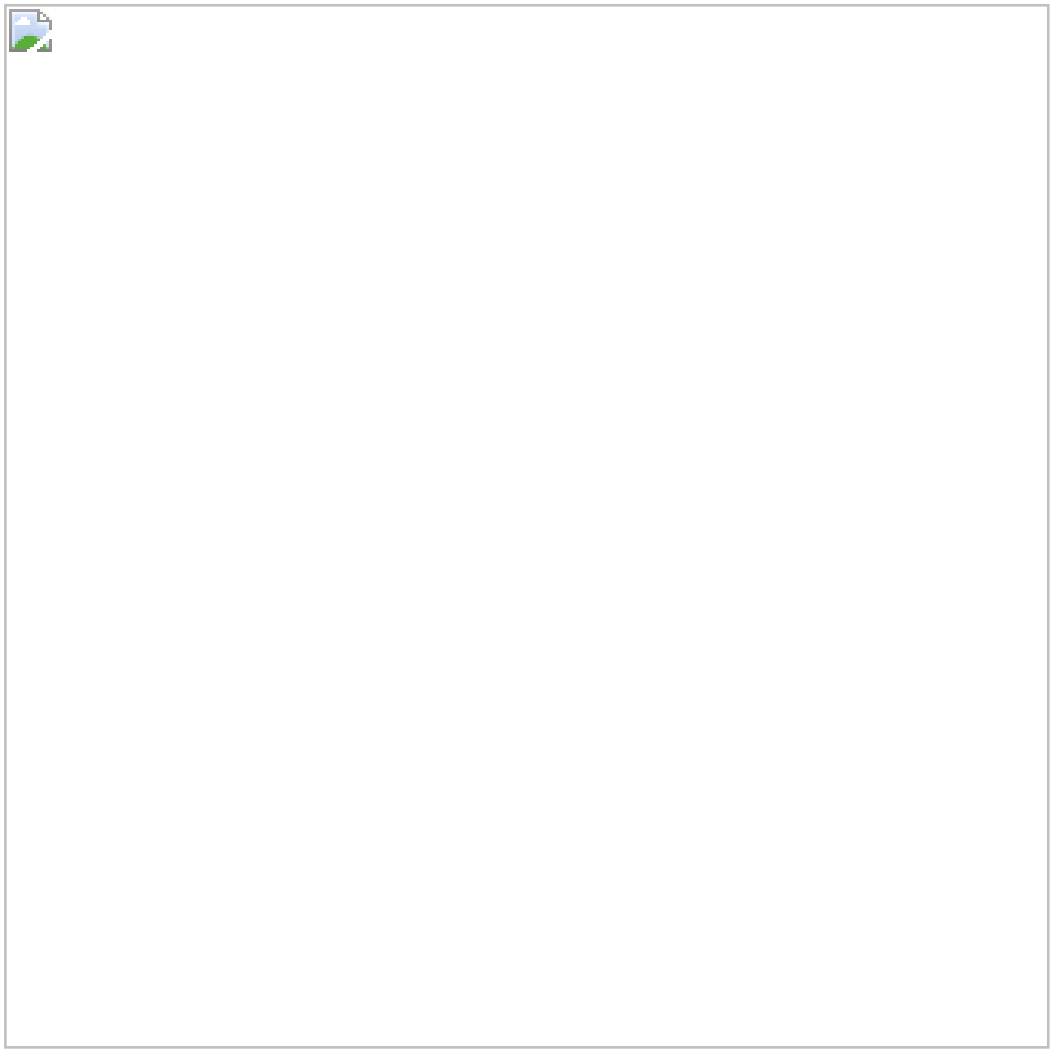

Three new species of Sinningia (Gesneriaceae) endemic to Espírito Santo, Brazil

Authors: Chautems, Alain, Dutra, Valquíria F., Fontana, André P., Peixoto, Mauro, Perret, Mathieu, et al.

Source: Candollea, 74(1) : 33-41

Published By: The Conservatory and Botanical Garden of the City of Geneva (CJBG)

URL: https://doi.org/10.15553/c2019v741a5

Three new species of Sinningia (Gesneriaceae) endemic to Espírito Santo, Brazil

Alain Chautems, Valquíria F. Dutra, André P. Fontana, Mauro Peixoto, Mathieu Perret & Josiene Rossini

Abstract

CHAUTEMS, A., V.F. DUTRA, A.P. FONTANA, M. PEIXOTO, M. PERRET & J. ROSSINI (2019). Three new species of Sinningia (Gesneriaceae) endemic to Espírito Santo, Brazil. *Candollea* 74: 33–42. In English, English abstract. DOI: http://dx.doi.org/10.15553/c2019v741a5

Three new species of *Sinningia* Nees *(Gesneriaceae)* occurring in eastern Brazil and endemic to the state of Espírito Santo are described and illustrated: *Sinningia flammea* Chautems & Rossini, *Sinningia hoehnei* Chautems, A.P. Fontana & Rossini and *Sinningia stapelioides* Chautems & M. Peixoto. *Sinningia flammea* is unique within the genus by its tubular bright orange corolla with a greenish-yellow throat. *Sinningia hoehnei* is characterized by white corollas that are laterally and ventrally inflated for most of their length with a yellow throat marked by vinaceous streaks. *Sinningia stapelioides* strikingly differs from any other species by the combination of a pauciflorous inflorescence borne directly on the tuber that produce large tubular-campanulate corollas, dull red orange outside, inside greenish-cream with a dense network of vinaceous streaks. Comments on morphologic and phylogenetic relationships within the subtribe *Ligeriinae* are provided, as well as a distribution map and the IUCN conservation status.

Keywords

GESNERIACEAE – *LIGERIINAE* – *Sinningia* – Neotropical flora – Atlantic forest – Biodiversity – Taxonomy

Addresses of the authors:

AC, MPer: Conservatoire et Jardin botaniques de la Ville de Genève, C.P. 71, 1292 Chambésy, Switzerland. E-mail: **alain.chautems@ville-ge.ch**

VFD: Universidade Federal do Espírito Santo, Centro de Ciencias Humanas e Naturais, Departamento de Ciências Biológicas. Av. Fernando Ferrari, 514 CCHN/Setor de Botânica, Goiabeiras, 29075910 Vitória, ES, Brazil.

APF: Núcleo de Ecologia e Monitoramento Ambiental/NEMA, Universidade Federal do Vale do São Francisco/UNIVASF. Campus de Ciências Agrárias, BR 407, Km 12, Lote 543, Distrtito de Irrigação Senador Nilo Coelho, Zona Rural, 56300-990 Petrolina-PE, Brazil.

MPei: Jardim Botânico Plantarum, Av. Brasil 2000, 13460-000 Nova Odessa, São Paulo, Brazil.

JR: Instituto Nacional da Mata Atlântica, Av. José Ruschi 4, 29650-000 Santa Teresa, Espírito Santo, Brazil.

Submitted on May 9, 2018. Accepted on August 15, 2018. First published online on March 28, 2019.

ISSN: 0373-2967 – Online ISSN: 2235-3658 – *Candollea* 74(1): 33–42 (2019)

Introduction

Sinningia Nees described in 1825 (Nees, 1825), with over 70 species (Moeller & Clark, 2013) is the fourth largest genus among the neotropical members of the family *Gesneriaceae*. The vast majority of species are endemic to Brazil (BFG, 2015; Flora do Brasil, 2018) and diversified mostly in the Atlantic Forest (Perret et al., 2006). The genus *Sinningia* is characterized by a wide range of growth forms from minute plants to subshrubs. Most species arise from a perennial tuber and produce annual flowering shoots. They are usually found growing on rocky substrate in rather shady and humid environment. Corolla shapes are either tubular, funnel or campanulate with regular or bilabiate lobes; corolla colors are as diverse as white, purple, orange, red or pink. Espírito Santo state harbors a highly diverse and still ill-known flora (Dutra et al., 2015). In recent years, expeditions to several localities in Espírito Santo have resulted in the discovery and description of new species of *Sinningia* (Chautems et al., 2010, 2015), including the three species that are added here (Fig. 1). With these newly described taxa, 75 *Sinningia* species are now recognized in Brazil.

Sinningia flammea Chautems & Rossini, **spec. nova** (Fig. 2A, 3).

Holotypus: Brazil. Espírito Santo: Itaguaçu, Cachoeirão, propriedade Sr. Hilário Lopes, trilha da cachoeira, 8.IX.2006, fl., *R.C. Britto et al. 134* (MBML-39758!).

This species resembles Sinningia aghensis Chautems by the habit, the leaves nearly whorled and the long ascending peduncles, but differs by having smaller leaf blades that are vinaceous abaxially and by the narrow tubular bright orange corollas with a greenish-yellow throat (vs. leaves green abaxially and wide tubular funnel-shape and purple corollas, with a darker purple and white marbled throat).

Herb rupicolous, arising from perennial tuber, 2–9 × 3–10 cm in diam. *Stems* erect, 8–30 cm tall, usually unbranched, reddish to vinaceous with some green streaks, villose, trichomes 3–4 mm long. *Leaves* usually 2 pairs, decussate, isophyllous, condensed in an apparent whorl of 4 toward the apex of the stem, petiole 0,3–1 cm long, blade ovate to obovate 2.2–9 × 1.6–6.7 cm, dark green and pubescent on adaxial face, vinaceous and incanous-tomentose abaxially, base obtuse, apex obtuse, margin crenate-denticulate, 7–9 pairs of veins, vinaceous abaxially. *Inflorescence* 1–2 pair(s) of ascending peduncles, in the axils of upper leafs or small bracts below the leafs, 10–27 cm long, vinaceous with greenish dots, villose, each peduncle carrying at their apex 4–12 flowers organized in pair-flowered cymes. *Flowers* borne on erect to horizontal pedicels, 1.3–4.7 cm long, vinaceous, villose. *Calyx* campanulate, sepals fused at base for 3 mm, green with reddish apex, 9 × 3 mm, triangular to lanceolate, pubescent with glandular trichomes. *Corolla* tubular, 4.2–4.5 cm long, outside dark vinaceous at young buds stage, brightly orange with touch of yellow at maturity, pubescent with longer eglandular and shorter glandular trichomes, tube at the very base enlarged forming two dorsal bulges that are the nectary chambers, c. 7 mm diam., then, briefly constricted to around 3–4 mm in diam., widening progressively to about 8 mm in diam., throat greenish yellow, lobes equal, patent, internally greenish yellow at base, orange at the apex with yellow veins. *Stamens* 4, included, filaments 3.9–4.2 cm long, white or yellowish, puberulous, anthers 3 × 2 mm, coherent by their apex and side, star-shaped, pollen white; nectary formed by five separate glands of 1–2 × 1 mm; ovary conical, 5–7 mm long, whitish, puberulous, style 4.5–4.8 cm long, white, puberulous, barely exserted at maturity, stigma stomatomorphic. *Fruit* a conical capsule, beaked at the apex, fully dehiscent, 8–10 × 4–5 mm, seeds fusiform to prolate, dark brown, 0.5–0.6 mm.

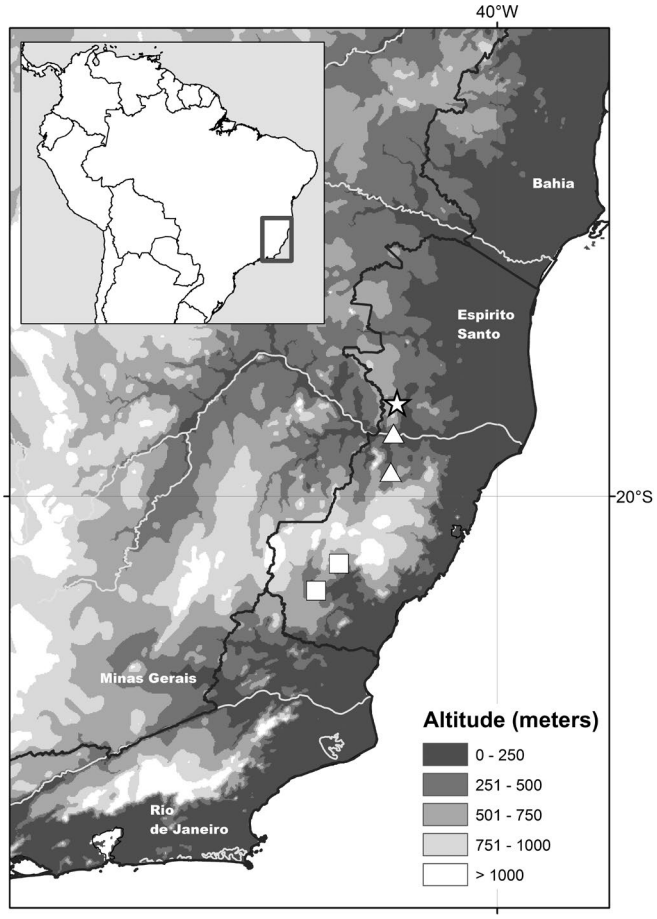

Fig. 1. – Distribution map of *Sinningia flammea* Chautems & Rossini (triangles), *S. hoehnei* Chautems, A.P. Fontana & Rossini (squares) and *S. stapelioides* Chautems & M. Peixoto (star).

Etymology. – The name refers to the bright and vivid yellow-orange color of the corolla that evokes fire flames.

Fig. 2. – Photographs of *Sinningia* Nees. **A.** *Sinningia flammea* Chautems & Rossini; **B–C.** *Sinningia hoehnei* Chautems, A.P. Fontana & Rossini; **D.** *Sinningia stapelioides* Chautems & M. Peixoto.
[Pictures: **A–C:** A. P. Fontana; **D:** M. Peixoto]

Distribution and ecology. – This species is endemic to the eastern part of Espírito Santo State (Fig. 1). It has only been encountered on inselbergs above 700 m alt. in the Municipalities of Itaguaçu and Colatina. Scattered populations have been found growing on sun exposed and steep granitic rock, among clumps of large *Bromeliaceae* and *Velloziaceae*.

Phenology. – Flowers were observed between July and September. Mature fruits were registered on cultivated material around November-December.

Conservation status. – The new species has been observed so far in only two localities representing two locations. None of them are part of the protected area network. Populations are composed of a few scattered individuals. Threats in those locations are granite extraction from the inselbergs and extension of monoculture of coffee or *Eucalyptus* L'Hér. in the immediate surroundings. With an EOO < 5000 km^2, an AAO < 500 km^2, two known locations coupled with a continuous decline in area, extent and quality of habitat, *Sinningia flammea* is assigned a preliminary assessment as "Endangered" [EN B1ab(iii)] using the IUCN Red List (IUCN, 2012).

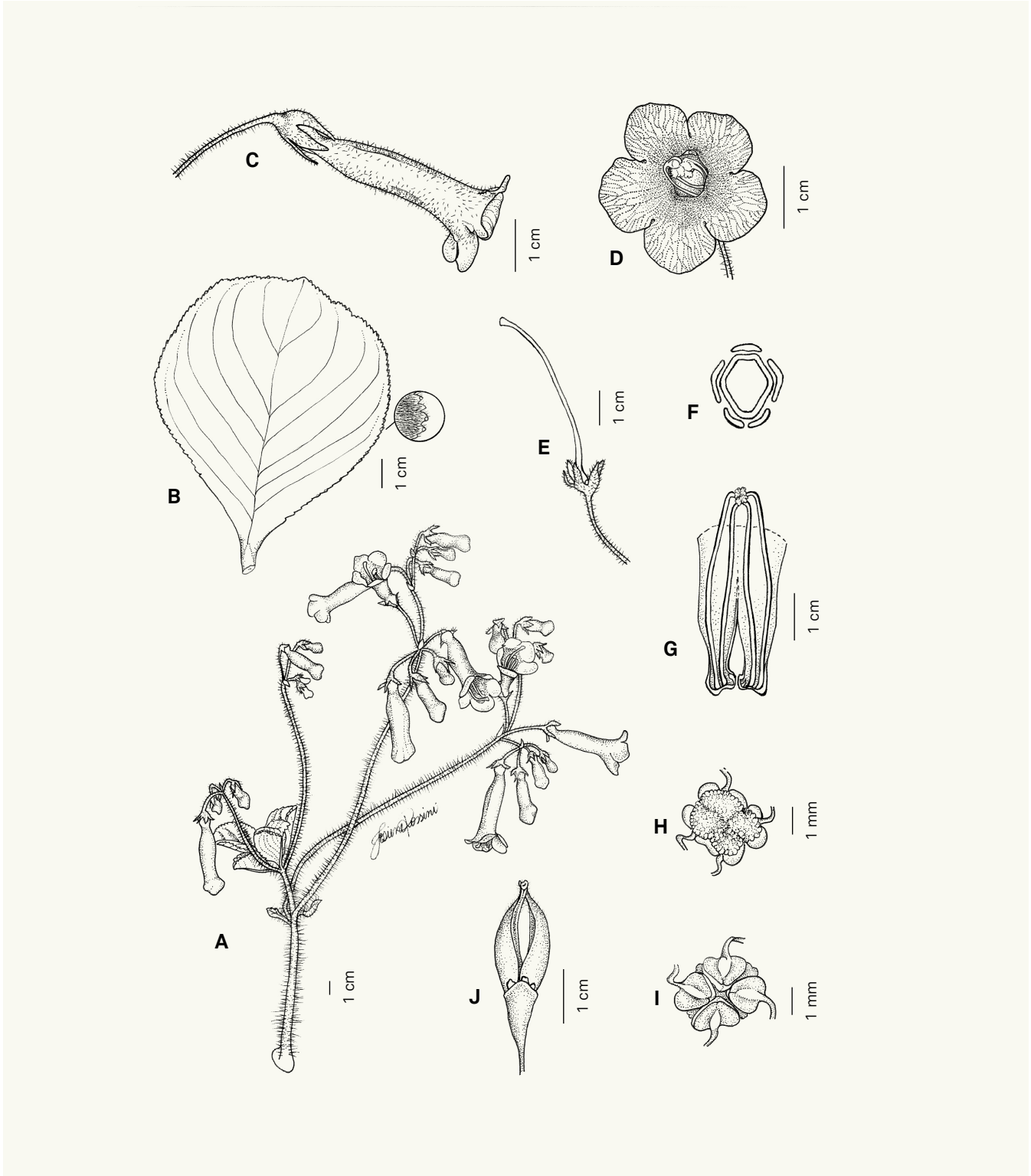

Fig. 3. – *Sinningia flammea* Chautems & Rossini. **A.** Habit; **B.** Adaxial leaf surface and margin detail; **C.** Lateral view of flower with calyx; **D.** Frontal view of corolla; **E.** Calyx and style; **F.** Schematic arrangement of the nectary glands; **G.** Insertion of stamens in the corolla; **H.** Ventral surface of anthers; **I.** Dorsal surface of anthers showing the star shape; **J.** Fruit.
[*Fontana & Menini Neto 6076*, MBML] [Drawing: J. Rossini]

Notes. – The new species is morphologically related to *S. aghensis*, sharing similarities in the whorled phyllotaxis, the leaf blade shape and the very long peduncles. Nevertheless, it differs by having much smaller leaf blades and narrow tubular bright orange corollas (vs tubular-campanulate dark purple corollas). Although flowers arise from long peduncles above a leafy stem and not directly from the tuber, the long tubular corollas resemble *S. helioana* Chautems & Rossini, but color and size differ (bright orange tube 4.2–4.5 cm long with greenish hues in throat vs tube red 2.5–3 cm long with throat cream). Preliminary phylogenetic data place the new species in close relationship with the two above mentioned taxa within the clade "Corytholoma" (Perret et al. 2003, 2007).

Material of this species was introduced in cultivation under the provisional name *Sinningia* sp. "Itaguassu".

Paratypus. – **Brazil. Espírito Santo:** Colatina, Itapina, morro do Maquiji, Córrego Maquiji, Fazenda Pedra Grande, 27.VII.2009, fl., *A.P. Fontana & L. Menini Neto 6076* (MBML-47808).

Sinningia hoehnei Chautems, A.P. Fontana & Rossini, **spec. nova** (Fig. 2B–C, 4).

Holotypus: Brazil. Espírito Santo: Castelo, [20°32'34"S 41°16'42"W], 29.V.2012, fl., *A.P. Fontana & R.P. Fontana 7421* (MBML-48993!; iso-: CEPEC, G [G00426964]!, K, NY [NY01404566] image seen, RB-631055 image seen, SPF).

Flowers of this species resemble those of Sinningia barbata (Nees & Mart.) G. Nicholson, but differ by ovate leaf blade (vs elliptic-obovate), pedicel 1,5–3 cm long (vs 5–8 cm long), corolla laterally and ventrally inflated for most of its length (vs corolla with the basal portion tubular and strongly bent downward and then ventrally inflated), slightly constricted at mouth (vs noticeably constricted), throat yellow with vinaceous streaks (vs plain white or cream, rarely with vinaceous dotted lines), pubescent outside (vs hirsute).

Herb rupicolous or terrestrial, arising from perennial tuber, 1–2 × 1–3 cm in diam. *Stems* erect, 25–40 cm tall, usually unbranched, green, glabrescent, internodes 3–6 cm long. *Leaves* 4–8 pairs, decussate, isophyllous, petiole 1.5–5.5 cm long, green, slightly vinaceous at the apex, puberulous, blade ovate 4,5–10 × 2.1–6 cm, light green adaxially, sparsely pubescent with uni- and multicellular trichomes, pale green abaxially, glabrescent, base obtuse, apex acute, margin crenate-denticulate, 5–8 pairs of veins. *Inflorescence* a frondose florescence with cymes reduced to 1 flower in the axils of the 2–3 large and upper leaf pairs. *Flowers* borne on erect pedicels, 1.5–3.2 cm long, light green, puberulous. *Calyx* campanulate, fused at base for 3–4 mm, 1.4–2.3 × 0.7–1.3 cm, broadly ovate, subcordate at base and forming a wing at their junction, acuminate at the apex, green, puberulous abaxially, glabrous adaxially. *Corolla* obliquely inserted in the calyx, tubular-campanulate, ventricose, 3.2–4 cm long, outside white and finely pubescent, tube at the very base forming a nectary chamber, c. 7 mm diam., then, briefly constricted to around 5 mm in diam., widening ventrally and laterally to about 2 cm at the widest section, around the middle, dorsally forming 2 longitudinal grooves, throat yellow with fine vinaceous streaks ventrally, ventral lobe pale purple, lateral lobes purplish around the base. *Stamens* 4, included, filaments 1.4–1.7 cm long, white, puberulous, anthers coherent by their apex and side, forming a rectangle, pollen white; nectary formed by five separate glands, c. 1 mm long; ovary conical, whitish, puberulous, style inserted, up to 1.5–1.7 cm long, white, puberulous, stigma stomatomorphic. *Fruit* a semi-fleshy capsule, 1.3–1.6 cm long, greenish outside, dehiscent, the two valves opening 180° at maturity, cream inside, seeds fusiform to prolate, dark brown.

Etymology. – The name refers to the Brazilian botanist F.C. Hoehne (1882–1959) who dedicated part of his career to the study of Brazilian *Gesneriaceae*. An illustration of the species, misidentified as *Sinningia barbata*, was published as table 238 in his *Iconografia das Gesneriáceae do Brasil* (Hoehne, 1970). This book was organized and published after Hoehnes's death by A.R & C.B. Teixeira, based on notes and documents left at the "Instituto de Botânica" in São Paulo.

Distribution and ecology. – The species was found in a unique locality in the southern part of the state of Espírito Santo, on the side of the road ES-379 in a stretch connecting the cities of Castelo and Muniz Freire. *Sinningia hoehnei* was recorded in a fragment of Seasonal Semi-deciduous Forest at around 330 m above sea level (Fig. 1). Plants were observed in a population of less than 50 individuals that did not exceed 5 m² of occupation area. They were growing as saxicolous, living on a thin layer of organic matter, among herbs like *Commelina* sp., *Pitcairnia flammea* Lindl., under trees, with the most frequent species being *Tabernaemontana hystrix* Steud., *Ramisia brasiliensis* Oliv., *Gallesia integrifolia* (Spreng.) Harms and *Anadenanthera colubrina* var. *cebil* (Griseb.) Altschul.

Phenology. – Flowers were observed in May and also in November-December (in cultivation). Fruits were registered reaching maturity in May and February (in cultivation).

Conservation status. – The new species has been observed and collected in a single locality, i.e. EOO < 100 km², and AAO < 10 km² along an unpaved road. Projects of improving and paving this section of road ES-379 were scheduled in 2014. Nevertheless, those projects seem so far paralyzed. Therefore, the locality remains strongly at risk of being destroyed. *Sinningia hoehnei* is assigned a preliminary assessment as "Critically Endangered" [CR B2ab(iii)] using the IUCN Red List (IUCN, 2012).

Fig. 4. – *Sinningia hoehnei* Chautems. A.P. Fontana & Rossini. **A.** Habit; **B.** Lateral view of flower with calyx; **C.** Calyx and style; **D.** Dorsal view of nectary glands; **E.** Schematic arrangement of the nectary glands; **F.** Dorsal surface of anthers; **G.** Ventral surface of anthers; **H.** Fruit split open. [*Kollmann & Fontana 12720*, MBML] [Drawing: J. Rossini]

Notes. – Clearly, this species is morphologically related to *S. barbata*, which was confirmed by preliminary phylogenetic analysis (M. Perret, unpubl. data). We present in Table 1 the main morphological differences between *S. hoehnei* and *S. barbata*.

Material of this species was introduced in cultivation under the provisional name *Sinningia* sp. "Castelo".

Paratypi. – **Brazil. Espírito Santo:** Castelo, Rodovia ES-379, 29.V.2013, fl., *L. Kollmann & A.P. Fontana 12720* (MBML-46244); Alegre, Reeve [Rive], 9.XII.1924, *J. Vidal 72* (R-2094).

Sinningia stapelioides Chautems & M. Peixoto, **spec. nova** (Fig. 2D, 5).

Holotypus: [Brazil. Espírito Santo]: cult. in CJBG under Acc. nº AC-3518 originating from Pancas, Pedra da Agulha, 17.I.2012, fl., *A. Chautems 555* (VIES!; iso-: G spirit!).

Sinningia stapelioides resembles S. defoliata (Malme) Chautems, S. helioana Chautems & Rossini and S. tuberosa (Mart.) H.E. Moore in having inflorescences and leaves arising separately and successively from the tuber with rarely more than one leaf blade produced by a petiole-like stem. It differs however by a pauciflorous inflorescence with distinctive flowers having a large (5–6 cm) tubular-campanulate corolla, dull red orange outside with a peculiar throat that is greenish-cream with a dense network of vinaceous streaks that extends on the inner face of the lobes (vs long, up to 3–4 cm, tubular and bright red corollas).

Herb, arising from perennial tuber, saxicolous; tuber spheroidal, 4–12 cm in diam., leaves and inflorescences produced separately and successively, 1- rarely 2-petiole-like stems, obliquely arising from the tuber upper surface, 4–12 cm long, 3–4 mm in diam., vinaceous, pubescent, blade attachment swollen abaxially, 1–2 pairs of linear-lanceolate bracts just below blade insertion. *Leaves* forming an angle of nearly 90° with the petiole-like stem, usually reduced to one large blade at maturity (during first growing cycle from seed seedlings produce 2–3 pairs of opposite leaves, followed on subsequent growing cycles from tuber by a phase with a second and small leaf blade, 1–5 mm long, produced in opposite position), ovate (3–)9–24 (–36) × (1–)4–11(–18) cm, apex acute-acuminate, base shortly attenuate to truncate, green above, green or reddish beneath, finely puberulous-velutinous, margin slightly crenate, 10–15 pairs of veins. *Inflorescences* organized in well-developed pair-flowered cymes of 1–3 flowers borne on a peduncle, 5–8 cm long, 1–2 mm in diam., greenish to vinaceous, emerging from 1–2 points of the tuber upper surface, bracts linear, 1–2 mm long. *Flowers* nodding, borne on pedicels, 2–4 cm long, greenish to vinaceous, puberulous. *Calyx* campanulate, sepals fused at base for 2–3 mm, narrowly triangular, 13–15 × 6–7 mm, wide at base, greenish to reddish, margin entire, puberulous. *Corolla* slightly oblique in the calyx, tubular, 5–6 cm long, nectary chamber composed of 5 swellings, green, 9–10 mm wide at base, tube enlarged then towards the middle reaching 16–20 mm in diam., vinaceous in bud, dull red orange outside (RHS color chart # 35 B-C) at maturity, puberulous with simple and glandular trichomes, lobes 9–10 × 18–20 mm, throat cream to greenish towards bottom, lobes spreading with a network of vinaceous streaks and dots on inner face. *Stamens* 4, included, filaments ca. 50 mm, greenish, glabrous, anthers coherent, star-shaped, pollen cream; nectary formed of five glands, equals in size, greenish; ovary vinaceous, style included, 40–50 mm long, vinaceous, puberulent, stigma greenish. *Fruit* a capsule, subulate at the apex, dark brown at maturity, 14–18 × 9–11 mm, seeds ellipsoid, 7–9 mm long.

Etymology. – The specific epithet refers to the color pattern of the corolla that resembles flowers of some members of the genus *Stapelia* L. *(Apocynaceae)*.

Table 1. – Comparisons of morphological characters for *Sinningia hoehnei* Chautems, A.P. Fontana & Rossini and the related species *S. barbata* (Mart.) Benth. & Hook.

Characters	*S. hoehnei*	*S. barbata*
Plant height [cm]	25–40	40–70
Leaf blade shape	ovate	elliptic to obovate
Inflorescences	1 flower in the axils of the 2–3 large and upper leaf pairs	1–3 flowers in the axils of leaf pairs near the apex
Pedicel length [cm]	1.5–3	5–8
Pedicel indument	puberulous	glabrous
Corolla throat color	yellow with fine vinaceous streaks in the ventral part	white, including the ventral part
Corolla lobes color	ventral lobe pale purple, lateral lobes purplish around base	white lobe or with vinaceous scoring
Anthers	coherent forming a rectangle	coherent forming a disc

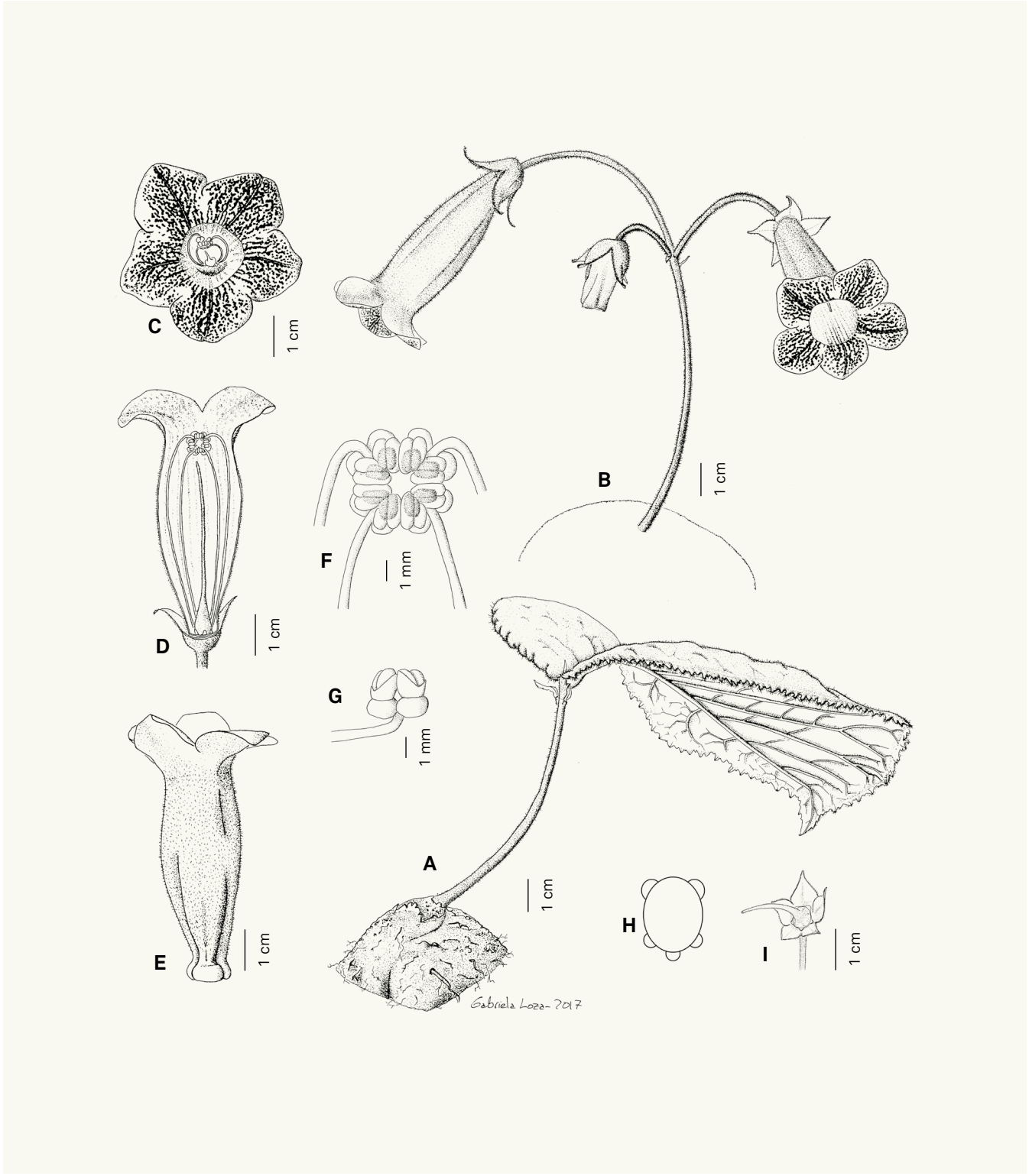

Fig. 5. – *Sinningia stapelioides* Chautems & M. Peixoto. **A.** Habit, leaf stage; **B.** Habit, flowering stage; **C.** Frontal view of corolla; **D.** Longitudinal cut of corolla showing androecium and gynoecium; **E.** Lateral view of corolla; **F.** Dorsal surface of anthers; **G.** Ovary and nectary, corolla removed; **H.** Schematic arrangement of the nectary glands; **I.** Calyx, ovary and style.
[*Chautems 555*, G] [Drawing: G. Loza]

Distribution and ecology. – Only known so far from the type locality in the region of the "Pontões Capixabas", an area classified as National Monument around the small town of Pancas, in the northern part of the state of Espírito Santo, Brazil (Fig. 1). The area is famous for large rock inselbergs, some reaching several hundred meters in height. A few tubers were observed growing on a vertical side of a granite block measuring ca. 5 m in height in shady situation, not far from a forested fragment partially converted to cocoa trees cultivation, within a small farm.

Phenology. – Flowers observed in August (in cultivation in Brazil) or December (in cultivation in Geneva) and mature fruits in October (in cultivation in Brazil).

Conservation status. – Less than ten individuals were observed in a single population growing on a large granitic block within a fragment of humid forest, with the understory partly planted with cocoa trees. This single location lies within a farm at a few hundred meters from the farmer residence. Most of the land is already converted to tropical crops, like banana and coffee. This reduced plant population is then heavily threatened by any change in the surroundings, like tree felling or extension of any other tropical crop. With an EOO < 100 km2 and AAO < 10 km², *S. stapelioides* is assigned a preliminary assessment as "Critically Endangered" [CR B2ab(iii)] using the IUCN Red List (IUCN, 2012).

Notes. – This species generates leaves and inflorescences separately and successively on the tuber surface, following the tuber dormancy period during the dry season (May-September). This feature is also present in three other *Sinningia* species, i.e., *S. defoliata* (Malme) Chautems, *S. helioana* and *S. tuberosa* (Mart.) H.E. Moore. This separate and successive development of vegetative and fertile shoots could have evolved at least twice independently in the genus. Indeed, preliminary phylogenetic data place this new taxon in the clade *Corytholoma*, together with *S. defoliata* and *S. helioana*, whereas *S. tuberosa* belongs to clade *Sinningia* (Perret et al. 2003; M. Perret, unpubl. data). Nevertheless, *S. stapelioides* produces large (5–6 cm) tubular-campanulate corollas with a peculiar throat and lobes coloration pattern that differ from the long (up to 3–4 cm) tubular and bright red corollas displayed by these three species.

Live material of this species was first obtained from the late R.A. Kautsky (later established to have been originally collected in the type locality within Sr. Adriano Romais' property). It was introduced in cultivation under the provisional name *Sinningia* sp. "Pancas".

The only available material collected in the wild is a sterile gathering, as all individuals at the time of the collection were in a vegetative phase. This sample is designated as a paratype. Fertile material could only be observed at a different period on a plant cultivated in Geneva originating from the same locality. A flower was then collected and designated here as the holotype.

Paratypus. – **Brazil. Espírito Santo:** Pancas, base da Pedra da Agulha, propriété do Sr. Adriano Romais, 4.V.2012, ster., *Perret, Chautems, Peixoto & Duarte 55* (VIES-026563).

Acknowledgments

We are most grateful to Dr. Harri Lorenzi (Instituto Plantarum) for generously providing a vehicle that greatly facilitated a field trip through Bahia and Espírito Santo in 2012, to the director and staff of the Biology Museum Prof. Mello Leitão (now inserted in the National Institute of the Atlantic Forest) in Santa Teresa for allowing access to their herbarium and live collections, to Sr. Adriano Romais for giving us access to his property and letting us collect *Perret et al. 55*, to Yvonne Menneret, Vincent Goldschmid and the team of the greenhouses gardeners at the CJBG for the propagation and maintenance of the *Gesneriaceae* live collection, to Nicolas Wyler for the preparation of the distribution map and to Anne Morel for improving the lay-out of the color plates. We acknowledge also the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNpQ) (Brazil) for granting authorization of scientific expedition (proc. CNPq nº 000745/2012-0). Mathieu Perret received funding from the Swiss National Science Foundation (grant no. 31003A_175655/1). We also thank the reviewers (Andréa O. de Araujo and Laura Clavijo) for their comments on an earlier version of this manuscript.

References

BFG [Brazil Flora Group] (2015). Growing knowledge: an overview of Seed Plant diversity in Brazil. *Rodriguésia* 66: 1085–1113. DOI: https://dx.doi.org/10.1590/2175-7860201566411

Chautems, A., T.C.C. Lopes, M. Peixoto & J. Rossini (2010). Taxonomic revision of Sinningia Nees (Gesneriaceae) IV: six new species from Brazil and a long overlooked taxon. *Candollea* 65: 241–266. DOI: https://doi.org/10.15553/c2010v652a6

Chautems, A., M. Peixoto & J. Rossini (2015). A new species of Sinningia Nees (Gesneriaceae) from Espírito Santo and Rio de Janeiro states, Brazil. *Candollea* 70: 231–235. DOI: https://doi.org/10.15553/c2015v702a8

Dutra, V.F., A. Alves-Araújo & T.T. Carrijo (2015). Angiosperm Checklist of Espírito Santo: using electronic tools to improve the knowledge of an Atlantic Forest biodiversity hotspot. *Rodriguésia* 66: 1145–1152. DOI: https://dx.doi.org/10.1590/2175-7860201566414

Flora do Brasil (2018). Jardim Botânico do Rio de Janeiro. [http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB7879].

IUCN (2012). *IUCN Red List Categories and Criteria: Version 3.1* ed. 2. IUCN Species Survival Commission, IUCN, Gland & Cambridge.

Moeller, M. & J.L. Clark (2013). The state of molecular studies in the family Gesneriaceae: a review. *Selbyana* 31: 95–125.

Perret M., A. Chautems, R. Spichiger, G. Kite & V. Savolainen (2003). Systematics and evolution of tribe Sinningieae (Gesneriaceae): Evidence from phylogenetic analyses of six plastid DNA regions and nuclear ncpGS. *Am. J. Bot.* 90: 445–460.

Perret, M., A. Chautems & R. Spichiger (2006). Dispersal-Vicariance Analyses in the Tribe Sinningieae (Gesneriaceae): A Clue to Understanding Biogeographical History of the Brazilian Atlantic Forest. *Ann. Missouri Bot. Gard.* 93: 340–358.