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*Hyptidendron pulcherrimum* Antar & Harley, sp. nov.  
(Hyptidinae, Lamiaceae), a new narrowly  
endemic species from Minas Gerais, Brazil

Guilherme Medeiros ANTAR,  
Raymond Mervyn HARLEY,  
José Floriano Barêa PASTORE,  
Paulo Minatel GONELLA &  
Paulo Takeo SANÔ

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Flowering branch of *Hyptidendron pulcherrimum* Antar & Harley, sp. nov. Photo credit: P.M. Gonella.

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# ***Hyptidendron pulcherrimum* Antar & Harley, sp. nov. (Hyptidinae, Lamiaceae), a new narrowly endemic species from Minas Gerais, Brazil**

**Guilherme Medeiros ANTAR**

Universidade de São Paulo, Instituto de Biociências, Departamento de Botânica,  
Rua do Matão 277, 05508-090, São Paulo, SP (Brazil)  
guilherme.antar@gmail.com (corresponding author)

**Raymond Mervyn HARLEY**

Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, England (United Kingdom)  
rharley05@hotmail.com

**José Floriano Barêa PASTORE**

Universidade Federal de Santa Catarina, Campus de Curitiba, Rod. Ulysses Gaboardi,  
km 3, 89520-000, Curitiba, SC (Brazil)  
jfpastore@hotmail.com

**Paulo Minatel GONELLA**

Universidade Federal de São João del-Rei, Campus Sete Lagoas, Rodovia MG-424,  
km 47, 35701-970, Sete Lagoas, MG (Brazil)  
pmgonella@gmail.com

**Paulo Takeo SANO**

Universidade de São Paulo, Instituto de Biociências, Departamento de Botânica, Rua do Matão  
277, 05508-090, São Paulo, SP (Brazil)  
ptsano@usp.br

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## **ABSTRACT**

*Hyptidendron* Harley, one of the 19 genera recognized for the subtribe Hyptidinae, has some of its species with a narrow *campos rupestres* (a Brazilian vegetational formation) distribution, often restricted to a single mountain range. We report a new species, *Hyptidendron pulcherrimum* Antar & Harley, sp. nov., endemic to a single mountain in the Serra do Padre Ângelo, a disjunct area of *campos rupestres* from where some new angiosperm species have been recently described. The new species is unique due to the morphological combination of flowers arranged in dichasial cymes, indumentum composed of curved, rigid, broad-based hairs, leaves petiolate, glabrescent and bullate, corolla tomentose, with the tube curved, 7.5-10 mm long and one slightly winged nutlet per fruiting calyx. The new species is compared with *Hyptidendron vauthieri* (Briq.) Harley the most similar species morphologically. We also provide a complete description, diagnosis, illustration, distribution map with the new species and closely related species, a photograph plate, and a preliminary conservation status assessment.

## **KEY WORDS**

*Campos rupestres*,  
*Hyptis*,  
Ocimeae,  
Serra do Padre Ângelo,  
new species.

## RÉSUMÉ

*Hyptidendron pulcherrimum* Antar & Harley, sp. nov. (Hyptidinae, Lamiaceae), une espèce nouvelle microendémique du Minas Gerais, au Brésil.

*Hyptidendron* Harley, un des 19 genres reconnus pour la sous-tribu des Hyptidinae, présente, pour certaines de ses espèces, une distribution restreinte aux *campos rupestres* (une formation végétale brésilienne), souvent limitée à une seule chaîne de montagnes. Nous décrivons une nouvelle espèce, *Hyptidendron pulcherrimum* Antar & Harley, sp. nov., endémique d'une seule montagne de la Serra do Padre Ângelo, une zone disjointe de campos rupestres, de laquelle quelques nouvelles espèces d'angiospermes ont été récemment décrites. La nouvelle espèce est unique en raison de la combinaison morphologique des fleurs disposées en cymes dichasiales, d'un indumentum composé de poils courbés, rigides et à large base, de feuilles pétiolées, glabres et bullées, d'une corolle tomenteuse, avec le tube courbé, 7,5-10 mm de long et un akène un peu ailé par le calice fructifère. La nouvelle espèce est comparée à *Hyptidendron vauthieri* (Briq.) Harley, l'espèce la plus similaire sur le plan morphologique. Nous fournissons également la description complète, la diagnose, l'illustration et une carte de répartition de la nouvelle espèce et des espèces étroitement apparentées. Une planche de photographies et une évaluation préliminaire de l'état de conservation sont également proposées.

**MOTS CLÉS**  
*Campos rupestres*,  
*Hyptis*,  
 Ocimeae,  
 Serra do Padre Ângelo,  
 espèce nouvelle.

## INTRODUCTION

The *campos rupestres* (rupestrian grasslands or highland rocky grasslands) are a Brazilian montane open formation composed of herb-shrubby fire-prone vegetation associated mainly with quartzitic rock outcrops and sandy soils at elevations above 900 m (Harley 1995; Alves *et al.* 2014; Silveira *et al.* 2016; Morellato & Silveira 2018; Colli-Silva *et al.* 2019). Such vegetation is found in the ancient quartzitic mountainous formations in central and eastern Brazil and is recognized by its high biodiversity with approximately 40% of its angiosperm flora endemic (BFG 2015). The core areas of *campos rupestres* are either fully included within the Cerrado phytogeographical domain, such as in the Chapada dos Veadeiros in Goiás state, or found in the ecotone of the Cerrado, Caatinga and Mata Atlântica domains, such as in the Espinhaço Range, in the states of Bahia and Minas Gerais (Harley 1995; Fiaschi & Pirani 2009; Conceição *et al.* 2016).

Recently, the discovery of new angiosperm species and both new botanical and zoological geographical records highlighted the existence of this vegetation in smaller and undersampled mountain complexes entirely located within the Mata Atlântica domain, c. 200 km east of the Espinhaço Range, in eastern Minas Gerais. These ranges, namely the Serra do Padre Ângelo, the Pico da Aliança and the Sete Salões State Park, present quartzitic and sandstone outcrops with floristic elements typical of the *campos rupestres*, including some disjunct distributions of groups of taxa previously only known to the Espinhaço Range (e.g. Gonella *et al.* 2015; Loeuille & Pirani 2016; Lopes *et al.* 2016; Siniscalchi *et al.* 2016; Mello-Silva 2018; Andriano & Gonella in press). Analogously to the core areas of *campos rupestres*, these regions, situated in the Doce River valley, are refuges to many narrowly endemic and threatened species.

Hyptidinae (subfamily Nepetoideae, tribe Ocimeae) is a Neotropical subtribe composed of 19 genera (Pastore *et al.* 2011;

Harley & Pastore 2012) with many narrowly endemic species, particularly in the *campos rupestres* (Harley 1988a), where 127 of the approximately 400 species of the subtribe occur (Flora of Brazil 2020 under construction), making it an important component of this kind of vegetation (Harley 1988a). As botanical exploration in *campos rupestres* increases (Morim & Nic Lughadha 2015), many novelties have been revealed for the subtribe, most remarkably in the genera *Oocephalus* Harley & J.F.B.Pastore (Harley 2014a; Harley *et al.* 2019; Soares *et al.* 2019, 2020), *Gymneia* Harley & J.F.B.Pastore (Harley 2013), *Hyptis* Jacq. (Harley & Pastore 2010; Harley & Antar 2019), *Cyanocephalus* (Harley 1985a; Antar *et al.* 2019a), *Leptohyptis* (Harley 1985b), *Eplingiella* Harley & J.F.B.Pastore (Harley 2014b), *Eriope* Kunth ex Benth. (Harley & Walsingham 2014, Schlieve *et al.* 2017) and *Hyptidendron* Harley (Harley & Antar 2017; Antar *et al.* 2019b).

*Hyptidendron* is endemic to South America, occurring in Bolivia, Colombia, Ecuador, Guyana, Peru, Venezuela and especially in Brazil, where all the 19 known species occur (Harley *et al.* 2004; Harley & Pastore 2012; Harley & Antar 2017; Antar *et al.* 2019b). The genus was proposed by Harley (1988b) by combining two sections of *Hyptis* Jacq.: *Hyptis* sect. *Umbellaria* and *Hyptis* sect. *Buddleioides*. Some species of *Hyptidendron*, such as *Hyptidendron albidum* Harley & Antar, *H. clausenii* (Benth.) Harley, *H. roseum* Antar, Harley & J.F.B.Pastore, and *H. unilaterale* (Epling) Harley are endemic to *campos rupestres* vegetation, presenting narrow distributions, restricted to few localities or sometimes to a single mountain range (Harley & Antar 2017; Antar *et al.* 2019b).

During the preparation of a taxonomic revision of *Hyptidendron*, another novelty was found for Conselheiro Pena municipality. The new species, here named *Hyptidendron pulcherrimum*, is endemic to the *campos rupestres* vegetation and presents a narrow distribution disjunct from the core areas of *campos rupestres*.

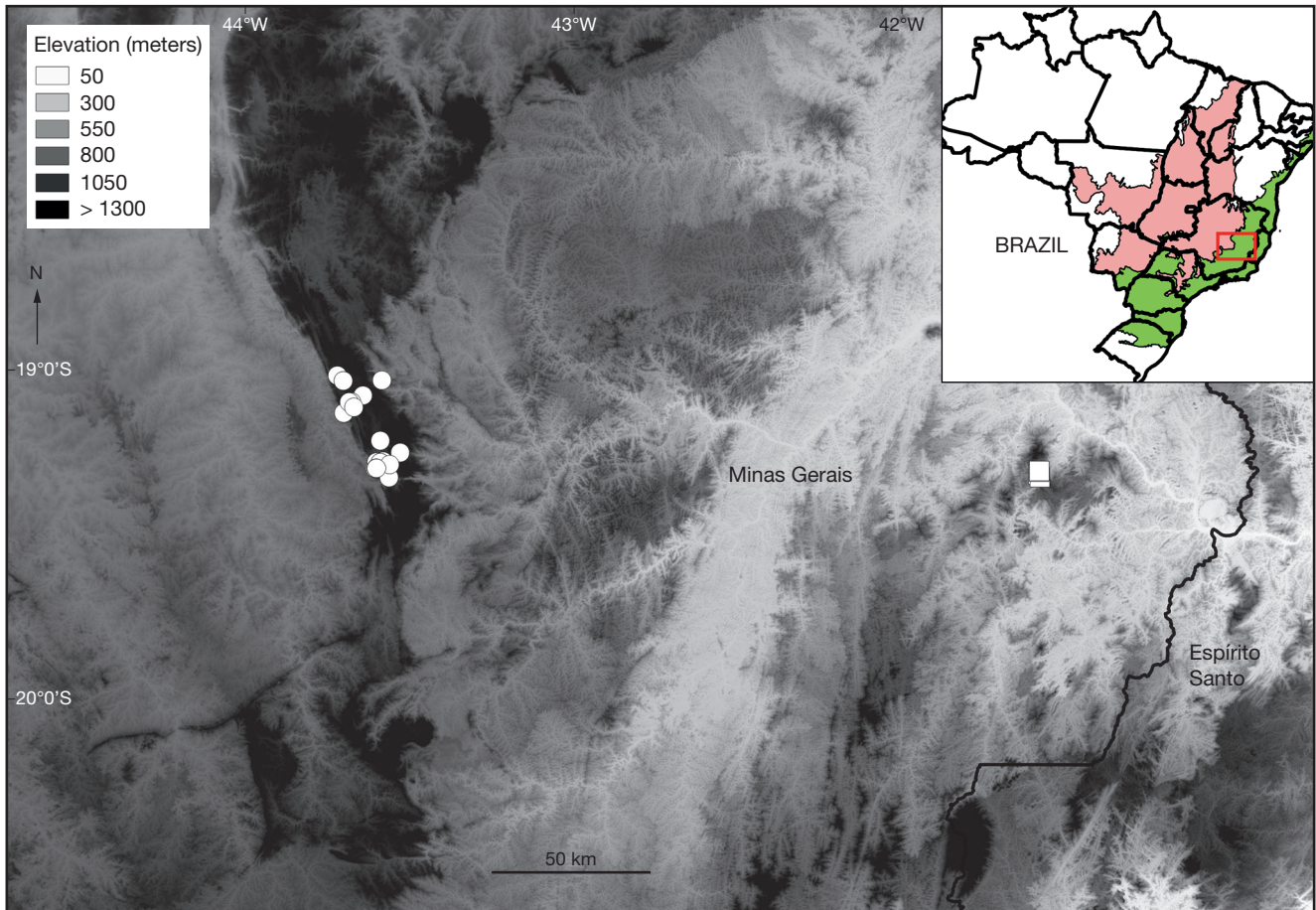


Fig. 1. — Distribution of *Hyptidendron pulcherrimum* Antar & Harley, sp. nov. (white squares) and *Hyptidendron vauthieri* (Briq.) Harley (white circles). In the small map, the pink shape shows the extension of the Cerrado domain and the green shape shows the extension of the Mata Atlântica domain.

## MATERIAL AND METHODS

The morphological description and diagnosis were drawn up after examining specimens of *Hyptidendron* analysed in the following herbaria: ALCB, BHCB, BHZB, BM, BRBA, CEN, CESJ, CGMS, COR, CTBS, DIAM, ESA, ESAL, G, HDJF, HEPH, HRB, HRCB, HUEFS, HUFJS, HXBH, IBGE, K, MBM, MBML, NX, NY, P, PAMG, R, RB, SP, SPF, SPSC, SPSF, UB, UEC, UFG, UFMT, UFOP, UPCB, US, VIES (acronyms according to Thiers, continuously updated). A 10-60 × magnification stereomicroscope was used to analyze morphological features of the specimens. Terminology follows Harris & Harris (2001) for general morphology and Hickey (1973) for leaf shape, as well as Epling (1949), Rudall (1980), Harley & Pastore (2012), Harley & Antar (2017) and Antar *et al.* (2019b) for specific terms.

IUCN criteria (2012, 2016) alongside with GeoCAT tool (Bachman *et al.* 2011) were used to infer a preliminary conservation status. GeoCAT was applied with the IUCN default values for Extent of Occurrence (EOO) and Area of Occupancy (AOO) analysis. The distribution map was produced in QGIS version 3.0.1 (QGIS Development Team 2016). In cases of herbarium specimens lacking geo-reference data, the geographic coordinates were approximated using the locality description of the specimen label.

## TAXONOMIC TREATMENT

### *Hyptidendron pulcherrimum* Antar & Harley, sp. nov. (Figs 1-3)

The new species is unique in the genus by the combination of flowers arranged in dichasial cymes, branch indumentum pubescent composed of rigid, broad-based and curved eglandular hairs, leaves petiolate, glabrescent and bullate, corolla tomentose, curved, long exerted from calyx, with the tube 7.5-10 mm long and one slightly winged nutlet per fruiting calyx. The new species shares with *Hyptidendron vauthieri* (Briq.) Harley a similar inflorescence, habitat preference and habit, but differs as it has leaves glabrescent and deeply bullate (vs leaves pubescent to pilose and not deeply bullate), calyx lobes at fruit 0.9-1.4 mm long (vs calyx lobes at fruit 1.9-3.6 mm long), corolla curved with the tube 7.5-10 mm long (vs corolla straight with the tube 4.1-5.0 mm long), and nutlets slightly winged (vs nutlets not winged).

**TYPUS.** — Brazil. Minas Gerais, Conselheiro Pena, Pico do Padre Ângelo, subida ao pico, 19°18'45.6"S, 41°34'34.7"W, alt. 1260 m, 16.XII.2016, Lopes *et al.* 453 (holo-, SPF[SPF227258]; iso-, HUEFS, K, RB).

**PARATYPES.** — Brazil. Minas Gerais, Conselheiro Pena, Pico do Padre Ângelo, subindo pela crista sul da montanha, 19°19'46.14"S, 41°34'26.43"W, alt. 1025 m, 27.XI.2013, Gonella & Rivadavia 642 (SPF); Pico do Padre Ângelo, no topo do pico, 19°19'14.2"S,



41°34'43.7"W, alt. 1530 m, 11.VI.2017, *Gonella et al.* 800 (SPF with duplicates to be sent to CEN, P, US); Serra do Padre Ângelo, Pico do Padre Ângelo, subindo pela trilha que leva ao topo, 19°18'36.7"S, 41°34'32.8"W, alt. 1165 m, 4.XII.2018, *Gonella et al.* 966 (MBML); Serra do Padre Ângelo, Pico do Padre Ângelo, platô do topo do pico, 19°19'13.6"S, 41°34'44.2"W, alt. 1500 m, 8.VI.2020, *Gonella et al.* 1232 (SPF).

ETYMOLOGY. — The specific epithet refers to the beauty of the new species, which presents remarkable conspicuous flowers and shining leaves, making it a potential species for ornamental use.

DISTRIBUTION, HABITAT AND ECOLOGY. — Endemic to the Pico do Padre Ângelo, in the Serra do Padre Ângelo in Conselheiro Pena municipality, eastern Minas Gerais (Fig. 1). It grows at elevations from 1000 to 1530 m, in *campos rupestres* vegetation among quartzitic rock outcrops, in sandy soils covered by a litter layer. The species is especially abundant in the higher areas of the Pico do Padre Ângelo, above 1400 m, where it is usually associated with the rock outcrops. The Serra do Padre Ângelo region is subjected to a marked seasonality, with rainy summers and dry winters, but water condensation in the form of fog is present year-round at higher elevations.

CONSERVATION STATUS. — The estimated Area of Occupancy is low, being just 12 km<sup>2</sup>, and the estimated Extent of Occurrence is 0.449 km<sup>2</sup>, both being likely to decline further. All of the collections were found on a single mountain: the Pico do Padre Ângelo, the second highest peak in the Serra do Padre Ângelo, which is an unprotected area that is subjected to invasion by alien grass species and uncontrolled anthropic fires. Furthermore, these mountaintop areas are highly threatened by climate change, which threatens to reduce significantly the suitable areas for the occurrence of *campos rupestres* vegetation in the next decades, threatening many of its endemic species with extinction (Barbosa & Fernandes 2016). Propelled by the flagship species *Drosera magnifica* Rivadavia & Gonella (Gonella *et al.* 2015), there is an attempt among conservationists to make the locality a Protected Area (Mello-Silva 2018). Nearby areas, most remarkably the Pico do Sossego (1550 m alt.), also in the Serra do Padre Ângelo, and the Sete Salões State Park, are currently unexplored and may also contain populations of *Hypnidendron pulcherrimum*. Although the species could be regarded as still data deficient concerning its distribution, we consider that, due to the precarious state of conservation of its suitable habitats, it should be assessed as Critically Endangered according to criteria CR B1ab(i,ii,iii)+2ab(i,ii,iii) (IUCN 2012).

#### DESCRIPTION

Shrub or treelet 1.5-2 m high, erect or somewhat decumbent, supported by nearby rocks or other plants, aromatic, branches sometimes horizontal; stems woody, 3-5 mm in diameter, younger stems quadrangular, canaliculate, pubescent with rigid, broad-based, curved eglandular hairs, small stipitate glandular hairs, and sessile glands, older stems terete and less hairy. Cauline leaves simple, opposite, decussate, not imbricate, petiolate, longer than internodes, rarely equal or shorter, diminishing in size towards stem apex; lamina 2.0-5.8 × 1.4-4.2 cm, chartaceous, discolorous, with the abaxial surface paler, elliptic, ovate or broadly elliptic, base cuneate to rounded, apex obtuse to rotund, rarely cuspidate to mucronate, margin crenulate or rarely serrulate, with the exception of the base which is entire (approximately ¼ to ½ of the leaf), 20-36 teeth on each side of leaf, the tooth apex swollen, acute, glabrous, adaxial surface bullate, shiny, glabrous to glabrescent, with the exception of the main vein which is densely covered with non-glandular curved hairs (mostly near

the base), which can be on the secondary veins as well but less densely, also some rare curved hairs can be present, margins with some curved hairs mostly near the base, the venation plane or sometimes slightly impressed, midrib and primary veins visible, other veins obscure, abaxial surface glabrous or glabrescent with rare sessile glands and rarely some indumentum on the main nerve, composed of curved hairs and sessile glands or clustered long uniseriate hairs, venation reticulate, conspicuous, midrib and secondary veins prominent; petiole 5-13 mm long, 1-2 mm wide, terete, canaliculate, pubescent with rigid, curved, eglandular hairs, sessile glands and rare glandular stipitate hairs, the indumentum is denser in the intervenous lacunae. Inflorescence a terminal or axillary cymose panicle with dichotomous or less commonly unilateral cymes subtended by foliaceous bracts, which are conspicuous, similar to the leaves, slightly smaller; bracts elliptic, ovate, rotund or orbicular, 1.4-2.6(-3.9) × 1.1-2.1 cm, petiolate, mostly shorter than the cymes; bracteoles 1.0-1.4 mm long, with the same indumentum as the pedicels; mature cymes 7-19 flowered, not or only partially obscured by the leaves, borne on peduncles 4-10 mm long, with the same indumentum as the petioles. Flowers on pedicels 3.5-11.7 mm long, pubescent with rigid, broad-based, curved eglandular hairs, stipitate glandular hairs and sessile glands, subtended by linear bracteoles; calyx at anthesis (3.5-)4.2-6.1 mm long, cylindrical to slightly infundibuliform; tube 3.4-4.7 mm long, straight, ribbed, externally pubescent with small uniseriate hairs mostly on the ribs, and with glandular stipitate hairs and sessile glands, in the margins of the lobes the hairs are longer and uniseriate, with glandular stipitate uniseriate hairs at the apex of the calyx tube, internally glabrous with the exception of sessile glands at the apex; lobes subequal, 1.1-1.6 mm long, narrowly triangular to subulate, externally with the same indumentum as the tube, internally with sessile glands and usually with some small non-glandular hairs, the margins ciliate with small eglandular hairs; fruiting calyx 7.5-8.0 mm long, less hairy, tube accrescent, 6.2-6.9 mm long, ± cylindrical, ribbed, fruiting calyx lobes 0.9-1.4 mm long, subequal, straight; corolla purple to lilac, 11-13 mm long; tube 7.5-10.0 mm long, straight, cylindrical, 2.0-2.6 mm wide, externally tomentose with simple uniseriate non-glandular hairs, less dense near the corolla base, internally glabrous with the exception of tufts of long uniseriate non-glandular hairs close to the insertion of the posterior pair of stamens in the corolla; lobes spreading, externally tomentose with simple non-glandular uniseriate hairs and sessile glands, internally glabrous; anterior lobe large, boat-shaped; stamens with posterior filaments 4.5-5.8 mm long, villous with long uniseriate entangled eglandular hairs anterior filaments 2.5-3.2 mm long, similar indumentum as the posterior pair but less hairy; anthers ca. 1 mm long; gynoecium with style 7-11 mm long, jointed and basally with a well-developed stylopodium protruding above ovary, 0.9-1.4 mm long, and apically with two unequal, short, slender stigmatic lobes. Nutlets 2.2-3.0 × 1.6-2.0 mm, 1 per fruiting calyx, ellipsoid, oblong to widely oblong, castaneous, rugulose and shining, glabrous, slightly winged, with deep abscission scars, not mucilaginous when wetted.

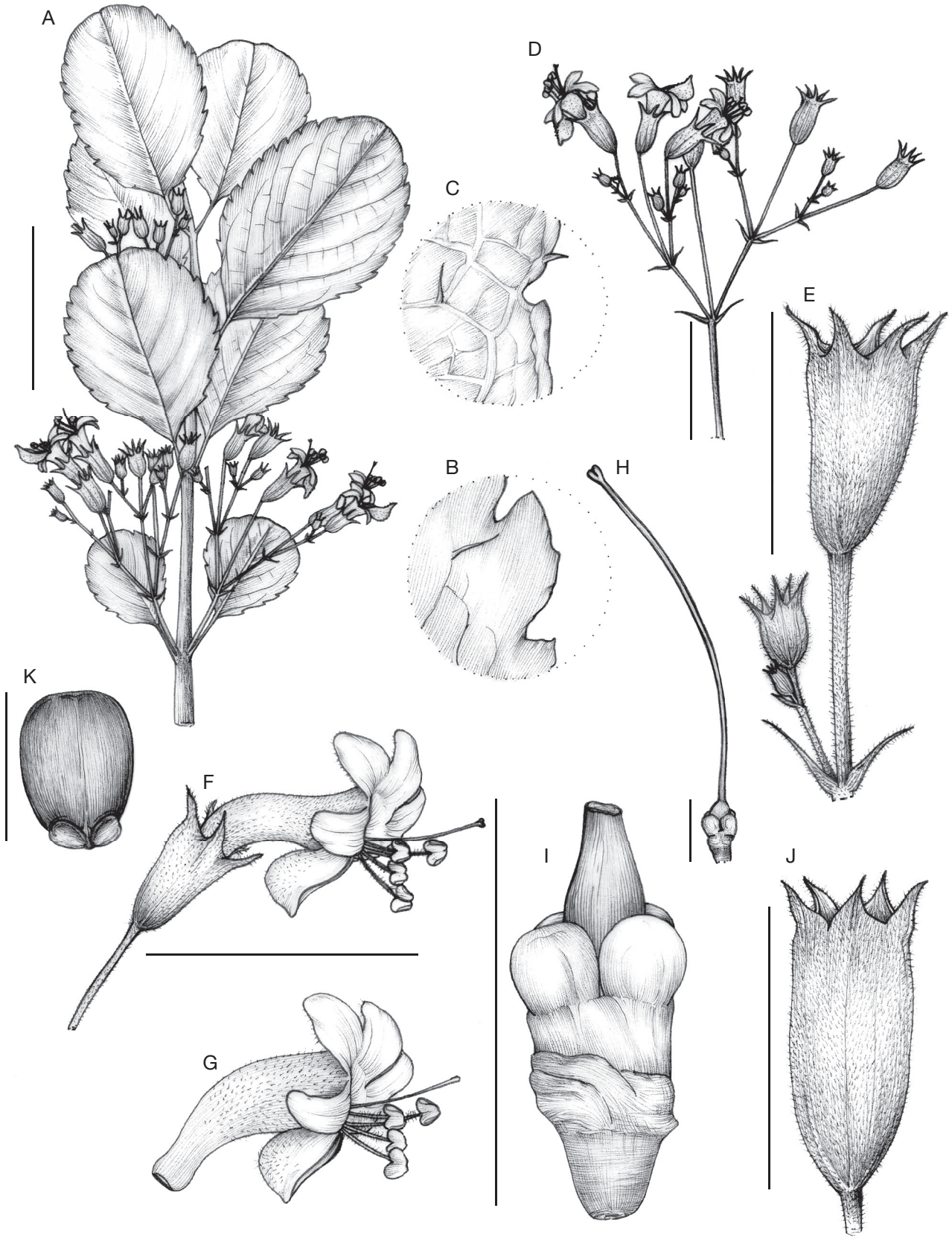


FIG. 2. — *Hyptidendron pulcherrimum* Antar & Harley, sp. nov.: **A**, branch bearing leaves and inflorescences; **B**, leaf margin, adaxial surface with indumentum detail; **C**, leaf margin, abaxial surface with indumentum detail; **D**, immature cyme; **E**, part of an inflorescence showing calyx and bracteoles; **F**, flower, side view; **G**, corolla, side view; **H**, gynoceium and style, showing stylopodium; **I**, ovary; **J**, mature calyx; **K**, nutlet. Illustration by Carla Teixeira de Lima based on *Lopes et al.* 453 (SPF). Scale bars: A, 3 cm; B, C, not to scale; D, 6 mm; E, 7 mm; F, 14 mm; G, 12 mm; H, I, 2.5 mm; J, 7.5 mm; K, 2 mm.





Fig. 3. — *Hyptidendron pulcherrimum* Antar & Harley, sp. nov.: **A**, habit and habitat; **B**, flowering branch, highlighting a flower, side view; **C**, branch; **D**, flower and inflorescence; **E**, flowering branch. Photo credits: A-C by P.M. Gonella; D, E by J.C. Lopes.

#### REMARKS

*Hyptidendron pulcherrimum* Antar & Harley, sp. nov. is similar to other species of the former *Hyptidendron* sect. *Umbellaria*, to which it seems to belong. The most similar species is *Hyptidendron vauthieri* (Briq.) Harley (see diagnosis), a species that occurs in the *campos rupestres* of the Serra do Cipó, in the southern portion of the Espinhaço Range (Fig. 1). It is also superficially similar to other species endemic to the *campos rupestres* of the Espinhaço Range, such as *Hyptidendron vepretorum* (Benth.) Harley, from which it differs by the longer peduncle size (0.5-2 mm long in *H. vepretorum* vs 4-10 mm long) and the longer corolla tube (4.8-7.0 mm long in *H. vepretorum* vs 7.5-10 mm); and *Hyptidendron unilaterale* (Epling) Harley, from which it differs by the longer corolla tube (3.5-5.0 mm long in *H. unilaterale* vs 7.5-10 mm long) and the cyme structure (unilateral or rarely dichasial in *H. unilaterale* vs dichasial or rarely unilateral).

#### DISCUSSION

As noted above, the most closely related species to *H. pulcherrimum* Antar & Harley, sp. nov. is *H. vauthieri*, which occurs more than 200 km apart, in the Espinhaço Range (Fig. 1). Such a disjunction raises biogeographical questions, mostly in view of the small, autochoric dispersed seeds of the genus (Harley *et al.* 2004), which would imply a limited dispersion range. Although both species occur in the *campos rupestres* vegetation, the latter is restricted to its core area, within the Cerrado domain, while the former occurs in an area located within the Mata Atlântica domain, surrounded mostly by a matrix of lowland semi-deciduous forests, where no closely related species of *H. pulcherrimum* Antar & Harley, sp. nov. occurs. A combination of edaphic and climatic conditions, not found in these surrounding areas, may explain the isolation of this new species in the Serra do Padre Ângelo. Yet, hypotheses about long-distance dispersal or vicariant events are in debate for the



isolation of floristic elements of the *campos rupestres* within these eastern disjunct areas (e.g. Siniscalchi *et al.* 2016). Further phylogenetic and biogeographical studies using these groups with similar distribution patterns may contribute to the understanding of the events that led to this isolation and diversification. The Serra do Padre Ângelo and other areas of *campos rupestres* in eastern Minas Gerais (e.g. Pico da Aliança and Sete Salões State Park) remain largely unexplored botanically. Further sampling effort in these areas, such as the ongoing floristic survey of Serra do Padre Ângelo, will aid in better understand their biodiversity, as well as foment appropriate conservation measures. The description of *Hyptidendron pulcherrimum* Antar & Harley, sp. nov. raises the number of endemic species of these easternmost areas of *campos rupestres* in Minas Gerais to 16 (Leme & Kollmann 2013; Campacci 2014, 2015; Leme *et al.* 2014; Leme 2015; Harding & Bohnke 2015; Gonella *et al.* 2015; Loeuille & Pirani 2016; Siniscalchi *et al.* 2016; Loeuille *et al.* 2019; Kollmann 2020; Leme *et al.* 2020), highlighting the urgency of inventory studies and the need for conservation of these areas.

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