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## *Lychnophora pseudovillosissima* (Asteraceae: Vernoniaeae: Lychnophorinae), a new species restricted to Minas Gerais, Brazil

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**Abstract.** *Lychnophora pseudovillosissima*, a new species from the State of Minas Gerais, Brazil, is here described and illustrated. The new species is unique because of the combination of petiolate linear leaves with revolute margins, reticulodromous venation, and 3–5 florets per capitulum. The new species is compared to a morphologically similar species, *L. villosissima*, resembling in habit, leaves, venation, and number of florets per capitulum, but differing by the shape and size of the leaf and petiole. Both species may occur sympatrically, but are uniform in their morphology with diagnostic features that differentiate them. Accompanying the description and the illustration, we provide a photographic plate, a first assessment of the species' conservation status, as well as comments on the geographic distribution, ecology, and identification of the new species.

**Keywords:** Campo rupestre, Compositae, Espinhaço Range, neotropical flora, taxonomy.

### INTRODUCTION

The Neotropical *campos rupestres* are a type of open vegetation, mostly shrubby and herbaceous, found in nutrient-poor quartzite and ironstone soils and outcrops, in elevations above 900 m a.s.l., rarely lower (Silveira et al. 2016; Miola et al. 2021). This physiognomy in Brazil occurs in Central and Eastern portions, in Bolivia and in the Guyana Shield, with the core area concentrated in the uplands of the Espinhaço Range, a mountain range that extends over 1000 km along the central parts of Minas Gerais and Bahia states, in a North-South axis (Miola et al. 2021). *Campos rupestres* are well-known for having a

high diversity of plants, including several endemic species, among which some families are quite diverse and stand out as characteristics of this vegetation, such as Eriocaulaceae, Velloziaceae and Asteraceae (BFG 2015; Colli-Silva et al. 2019). Within Asteraceae, the subtribe Lychnophorinae (tribe Vernoniae) stands out for the high number of species endemic to *campos rupestres*, particularly of the genus *Lychnophora* Mart. (Loeuille et al. 2019).

*Lychnophora* is restricted to Brazil, with ca. 30 species distributed almost exclusively in the *campos rupestres* of the Brazilian Central Plateau, especially in the Espinhaço Range, which makes the genus a distinct taxon of this physiognomy (Loeuille et al. 2019; Marques et al. 2020, 2021). Recently, the genus delimitation has been subject to several changes to recognize only monophyletic genera, including the synonymization of *Lychnophoriopsis* Schultz-Bip. under *Lychnophora*, the description of *Lychnophorella* Loeuille, Semir & Pirani, and the re-establishment of *Lychnocephalus* Mart. ex DC. (Loeuille et al. 2015, 2019).

Species of *Lychnophora* have a distinctive morphology, with a candelabriform habit, thick indumentum covering leaves and stems, and a large syncephalium (secondary capitulum) that can protect against herbivory and enhance reproductive success (Loeuille et al. 2019). Additionally, some species are used in folk medicine (known as “arnica”) due to their diversified secondary compounds (Keles et al. 2010; Semir et al. 2011). These unique features aroused the curiosity of the 19<sup>th</sup> century naturalists that collected in Brazil, resulting in the description of the genus and several new species (e.g., Martius 1822; Gardner 1846). Nonetheless, systematic evaluations of the genus have only been carried out much later by Coile and Jones (1981) and Semir (1991), Semir et al. (2011), and with a recent synopsis (Loeuille et al. 2019). Among these studies, the work by Semir (Semir 1991; Semir et al. 2011) stand out as the most complete taxonomic assessment ever made of *Lychnophora*.

Based on morphological evidence, we describe and illustrate a new species of *Lychnophora* from the *campos rupestres* of Minas Gerais State, Brazil. The new species was previously recognized by João Semir (1937–2018) in his unpublished thesis (Semir 1991). In addition, we characterize the new species, discuss its morphological affinities, and provide a first assessment of the species conservation status.

#### MATERIAL AND METHODS

Morphological descriptions were based on specimens analyzed in the following herbaria: BHCB, DIAM,

HUFU, K, MBM, SAMES, SPF, UEC and UFP (acronyms according to Thiers, continuously updated). In addition, the online databases Re flora Virtual Herbarium (Re flora, 2022) and SpeciesLink (2022) were consulted. A 10–60 × magnification stereomicroscope was used to examine morphological features of the specimens. Terminology follows Harris and Harris (2001) for general morphology, Hickey (1973) for leaf shape, and Roque et al. (2009) and Loeuille et al. (2019) for specific terms.

A first assessment of the species’ conservation status was made based on the IUCN criterion B, following the IUCN categories and criteria (2012) and guidelines (2022). This analysis was made in the Geospatial Conservation Assessment (GeoCAT) tool (Bachman et al. 2011) using the IUCN default values for Extent of Occurrence (EOO) and Area of Occupancy (AOO). A geographic distribution map was produced in QGIS version 2.18.15 (QGIS Development Team 2018). For all non-georeferenced herbarium specimens, geographic coordinates were approximated using the locality described on the specimen label.

#### TAXONOMIC TREATMENT

*Lychnophora pseudovillosissima* Semir ex Antar, M.Monge & Loeuille, **sp. nov.**

Type: Brazil. Minas Gerais: Diamantina, km 184 da MG220 na direção de Conselheiro Mata, 18°17’30”S, 43°44’15”W, elev. 1300 m, 7 February 2009, J.R. Pirani et al. 5834 (holotype SPF [barcode SPF 203228], isotypes CTES, HUFU, NY, UEC, UFP).

#### Diagnosis

Species *Lychnophorae villosissimae* habitu, foliis breviter petiolatis, venation reticulodroma et floribus 3-5 similis, sed petiolo 1–2.4 mm longi (non usque 6 mm), basi expansa (non angustata), foliis linearibus (non angustissime lanceolatis vel angustissime ellipticis), plerumque glaucis, in sicco brunneolis ad cinerascencia (non nunquam glaucis, in sicco viridulis ad cinerascencia), lamina apice acuto (non apice acuto vel obtusato), basi attenuata vel truncata (non attenuata vel rotundata), longitudine foliorum maiore pro ratione ad latitudinem 1: (8.7–)14–57 (non 1:5–12.2(–17)) differt.

#### Description

Treelet, candelabriform, 1–3 m tall. Stems highly branched at apex, densely lanate, glabrescent, whitish, greyish, or ochraceous, surface tessellate, mamillated; leaf-scars circular, punctiform. Leaves alternate, simple,

patent and reflexed at base of stem, densely imbricate, and ascendant near apex; subsessile, petiole 1–2.4 mm long, concealed by lanose indumentum, base expanded; lamina linear, (2.2–)4.5–12.7(–15) × 0.15–0.4 cm, discolorous, coriaceous, base attenuate or truncate, margins entire, revolute, apex acute, frequently with a short, blunt mucron, ca. 0.5 mm long, abaxial surface whitish to greyish in sicco, whitish in vivo, lanate, denser near base, peeling off, midrib slightly prominent, venation obscured by indumentum, adaxial surface greyish in sicco, green in vivo, glabrescent, midrib impressed or slightly canalliculate, pubescent, sometimes restricted to base, secondary veins slightly prominent, venation obscurely reticulodromous. Inflorescence a syncephalium with capitula fused, solitary, terminal or lateral; syncephalium 15–21 × 20–31 mm diam., hemispherical, surrounded by secondary leaf-like bracts. Capitula 30–40, homogamous, discoid, sessile, slightly appressed at base, interspersed by leaf-like subinvolucral bracts; involucre 10–11.2 × 2.9–3.5 mm in diam., cylindrical; phyllaries imbricate, 4–6-seriate, light stramineous, apex acute, outer phyllaries 6.1–6.6 × 0.8–1 mm, lanceolate, glabrous or glabrescent, except for apex with a tuft of long white trichomes sometimes extending to base, inner phyllaries 10.2–11 × 0.7–1 mm, narrow oblanceolate, lanceolate, linear or very narrow elliptic, glabrescent; receptacle scrobiculate, glabrous, epaleaceous. Florets 3–5 per capitulum, bisexual, fertile; corollas actinomorphic, deeply 5-lobed, corolla tube (5.5–)7.1–10.2 × 0.9–1.2 mm, glabrous, corolla lobes (3.5–)4.5–5.6 × 0.6–0.9 mm, glabrous, apex acute, purple or magenta; anther calcarate, 3.7–4.1 × 0.2–0.4 mm, whitish, or magenta, apical appendages lanceolate, apex acute, anther base sagittate; style white or pale lilac, shaft 12–12.6 mm long, glabrous throughout except for pubescent upper 2.5–3.5 mm beneath style-arms, style-base glabrous, nectariferous disc present, style-arms 1.6–2.0 mm long, apex acute, pubescent outside throughout, hairs acute. Cypsela cylindrical or narrow obconical, 3.2–3.6 × 1.2–1.7 mm, 10-ribbed, castaneous, glandular-punctate; carpodium inconspicuous; pappus setae biseriate, paleaceous, whitish to stramineous, apex acute, outer series, 0.9–2.0 mm long, persistent, free, margins erose, inner series 7.5–9.6 mm long, caducous, barbellate, twisted. Figures. 1–3.

#### Etymology

The specific epithet refers to its morphological similarity with *Lychnophora villosissima*.

#### Distribution and habitat

*Lychnophora pseudovillosissima* is restricted to Minas Gerais State, Brazil (Figure 4). Its occurrence is known from two localities alongside the Meridional por-

tion of the Espinhaço Range, corresponding to its southern distribution limit in *Quadrilátero Ferrífero*, near Belo Horizonte, and its northern distribution limit in Diamantina plateau (Colli-Silva et al. 2019). The species inhabits *campo rupestre* physiognomies, alongside rocks or in *campo rupestre/cerrado* ecotone zones, at elevations between 1,010 and 1,400 m.

#### Phenology

Flowering and fruiting between November and August.

#### Preliminary assessment of conservation status

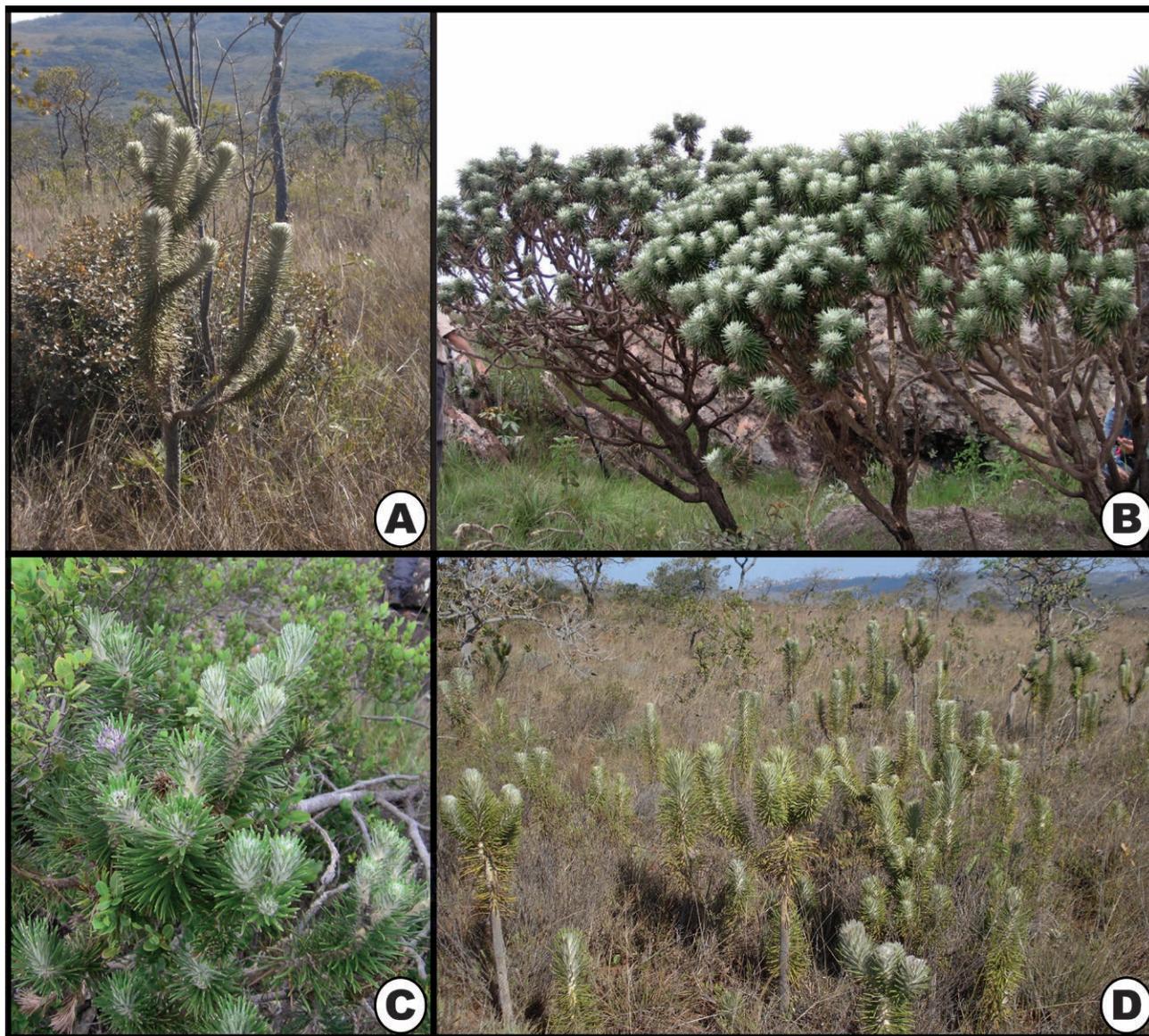
*Lychnophora pseudovillosissima* has an Extent of Occurrence (EOO) of 7,505 km<sup>2</sup> and an Area of Occupancy (AOO) of 80 km<sup>2</sup> (Figure 3). Most of the known populations are located along the road that connects the cities of Diamantina to Conselheiro Mata. This is an area very rich in plant species, many of which are endemic and little known (e.g., Antar et al. 2019; Cavallari et al. 2006; Konno et al. 2006; Semir et al. 2011). According to the national action plan for conservation of biodiversity in southern Espinhaço, this is an area of conservation priority, yet still unprotected as it does not currently possess any conservation units (Pougy et al. 2015). Current threats to the plant diversity in the area are agriculture, cattle raising, and quartzite mining (Pougy et al. 2015). The southern populations from the *Quadrilátero Ferrífero*, where the first known collection record of the new species came from (specimen *Roth 1660*, from Belo Horizonte), are located in or near areas subject to significant habitat destruction from increasing urbanization and iron mining. Additional collection efforts in these areas are necessary to evaluate better the conservation status of the southern populations. *Lychnophora pseudovillosissima* has populations protected only in the Parque Estadual do Biribiri, in Diamantina, and in the Parque Nacional das Sempre Vivas, in Buenópolis. Despite having the threshold for being assessed as Vulnerable due to its limited EOO or Endangered due to its AOO, the species occurs in more than 10 locations and does not seem to present extreme fluctuations, what preclude the assessment in categories of higher risk of extinction. Therefore, according with these data, *Lychnophora pseudovillosissima* should be assessed as Near Threatened (NT).

#### Comments and affinities

*Lychnophora pseudovillosissima* disjunction (*Quadrilátero Ferrífero* and Diamantina plateau—Figure 4) is noteworthy as the range break is considerable in its extension and there are several cases of endemic species



**Figure 1.** *Lychnophora pseudovillosissima* Semir ex Antar, M.Monge & Loeuille: (A) Treelet habit. (B) Flowering branch with syncephalia at apices. (C) Stem indumentum detail. (D) Leaf, adaxial (l) and abaxial (r) surfaces. (E) Outer to inner phyllaries, the outer ones smaller, the inner ones larger. (F) Floret. (G) Detail of style arms. (H) Stamen. (I) Style. (J) Cypsel with pappus, some elements of the pappus have been removed for clearer view. Illustration by Klei Souza based on J.R. Pirani et al. 5834 (SPF).

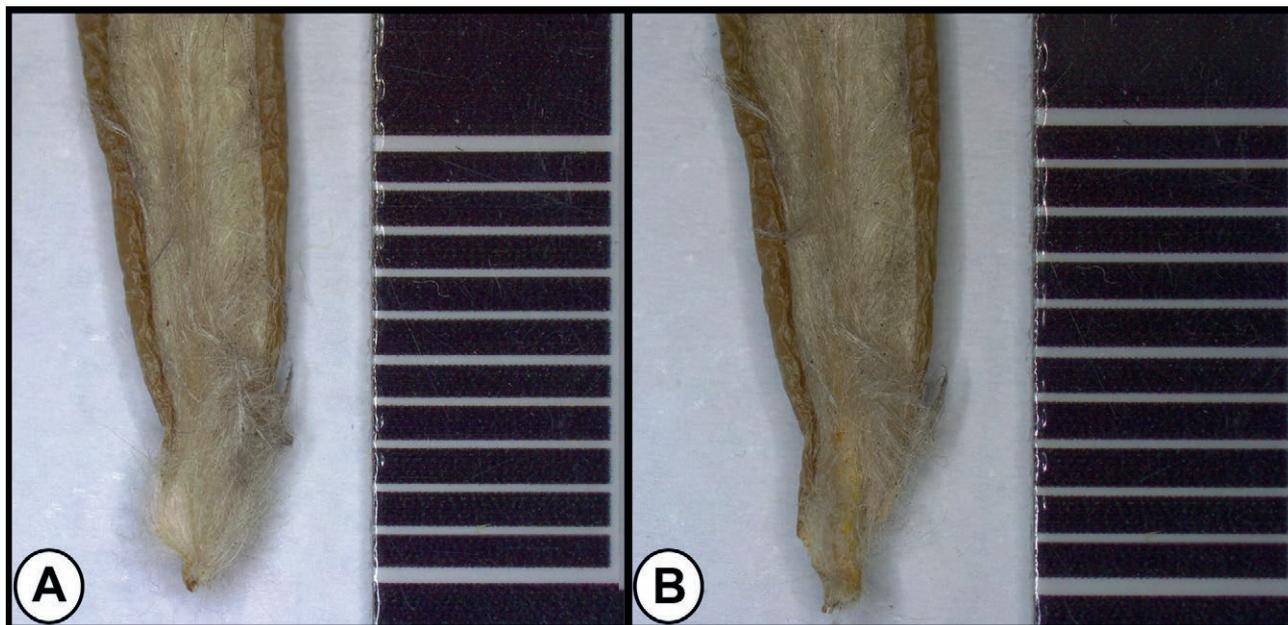


**Figure 2.** *Lychnophora pseudovillosissima* Semir ex Ant. & Loeuille: (A) Treelet habit. (B) Treelet habit. (C) Branches bearing immature inflorescences (capitulescences). (D) Dense population growing in campo rupestre. A–D. Photos by B. Loeuille.

from both localities (e.g. Carmo et al. 2018; Cota et al. 2020). There are very few examples of plants presenting the same disjunctive pattern, e.g. *Chamaecrista itabiritoana* (H.S.Irwin & Barneby) H.S. Irwin & Barneby (Cota et al. 2020). This disjunction is basically due to the absence of records of these species in the *campos rupestres* of Serra do Cipó, a well-studied area (Zappi et al. 2013; Pirani et al. 2015). Nevertheless, several species of Lychnophorinae frequently recorded in the *Quadrilátero Ferrífero* and Diamantina plateau are known from very few recent collections in the Serra do Cipó, e.g. *Chronopappus bifrons* (DC. ex Pers.) Pers., *Heterocoma albida*

(DC. ex Pers.) DC. and *Piptolepis ericoides* Sch.Bip. (Loeuille et al. 2019). The evolutionary history of several plant lineages from Serra do Cipó is strongly marked by environmental filters (e.g., edaphic factors, elevation and microenvironmental aspects) (Mattos et al. 2021), this may explain the difficulty for these cited species (incl. *L. pseudovillosissima*) to establish permanent population in the Serra do Cipó.

Although both localities (*Quadrilátero Ferrífero* and Diamantina plateau) share a similar *campo rupestre* physiognomy, the ones from *Quadrilátero Ferrífero* are usually composed of ferruginous soils, which par-



**Figure 3.** *Lychnophora pseudovillosissima* Semir ex Antar, M.Monge & Loeuille: (A) Detail of the petiole covered by dense indumentum. (B). Detail of the petiole, with indumentum removed for clearer view. Each rectangle corresponds to 1 cm in scale bar. Photos of the specimen Loeuille et al. 81 (K).

tially explain its unique flora (Carmo et al. 2018). For *Lychnophora pseudovillosissima*, we found just some differences between gatherings from both localities. The specimens from Diamantina Plateau usually dry greyish and have a higher blade length/wide ratio and the specimens from *Quadrilátero Ferrífero* dry brownish and have a slightly smaller blade length/wide ratio. Despite of that, gatherings from both localities are clearly representatives of the same taxon, having solid differences from other species. Future phylogeographic studies with the species are desired in order to better understand its genetic diversity as well as further expeditions to uncover other localities for the species and better understand its distribution.

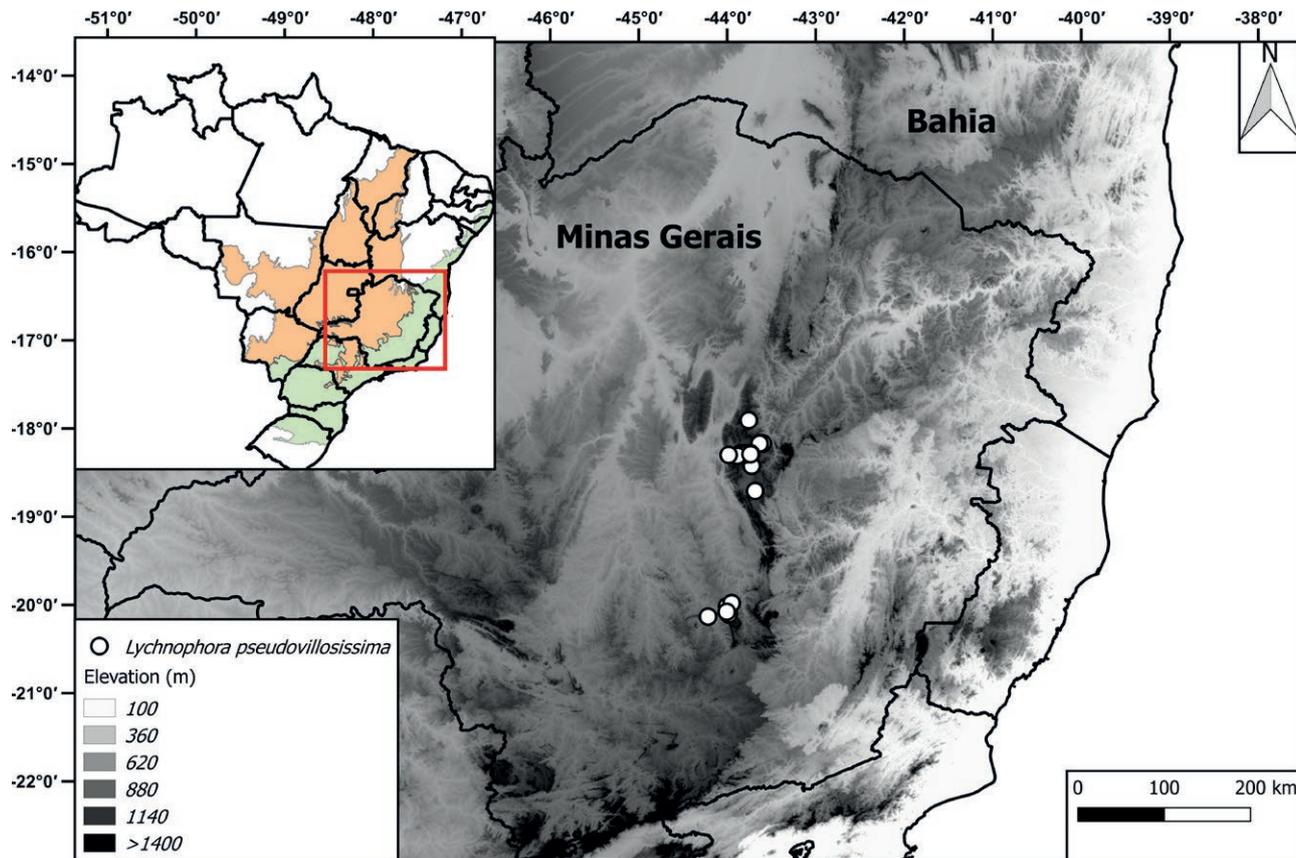
The new species is distinguished from other *Lychnophora* species by petiolate leaves (Figure 3), with the petiole obscured by lanose trichomes, long linear lamina usually drying glaucous, leaves with acute apex, frequently with a short blunt mucron, ca. 0.5 mm long, reticulodromous venation, and 3–5 florets per capitulum.

As stated in the diagnosis, the morphologically closest species is *Lychnophora villosissima*. The new species shares with it a similar habit, leaves shortly petiolate, reticulodromous venation and 3–5 florets per capitulum, but differs in the combination of mature leaves linear (vs. mature leaves narrow lanceolate or very narrow elliptic in *L. villosissima*), usually glaucous, with leaves drying greyish or brownish (vs. leaves dry-

ing brownish or greenish), apex acute (vs. apex acute or obtuse), base attenuate or truncate (vs. attenuate or rounded), blade length/wide ratio 1:(8.7–)14–57 (vs. 1:5–12,2(–17)), and petiole 1–2.4 mm long with expanded base (vs. petiole up to 6 mm long, with narrowed base). Furthermore, individuals of *L. pseudovillosissima* seem to possess less robust stems (Figure 2) when compared to *L. villosissima*; it should be noted, however, that due to variation in collection procedures, sometimes only the apical part of the stems was sampled, and no measurements were taken.

In addition, *Lychnophora pseudovillosissima* is morphologically similar to *L. ericoides* Mart. and *L. pinaster* Mart. which also possess linear leaves but it differs from both species by having shortly petiolate leaves (vs. sessile in *L. ericoides* and *L. pinaster*), reticulodromous venation (vs. broquidodromous), and lanose or villose trichomes fully covering the midrib abaxially (vs. midrib glabrous or tomentose partially covering the midrib). The main morphological differences among *L. pseudovillosissima* and related species are summarized in Table 1.

Semir (1991) in his unpublished thesis recognized 68 species in *Lychnophora* (with a different circumscription), 27 of which were proposed as new to science. Some of Semir's proposed new species have already been published (Semir et al. 2014; Loeuille et al. 2019; Gomes and Loeuille 2021), but other clearly recognizable taxa



**Figure 4.** Geographic distribution of *Lychnophora pseudovillosissima* Semir ex Antar, M.Monge & Loeuille (white circles). In the smaller map, the green shaded area represents the Atlantic Forest domain and the orange shaded area represents the Cerrado phytogeographic domain.

remained unpublished. Here, we described and illustrated another new species previously recognized in João Semir’s (1937–2018) thesis (Semir 1991), then named *L. pseudovillosissima* and also treated in Semir et al. (2011) as *Lychnophora* sp. 5. Although *L. pseudovillosissima* has never been formally described before, the name is present in the IPNI (IPNI 2022) and in The Plant List (The Plant List 2013), which makes the formal publication of the species name urgent. This is especially important in view of the recent and diverse threats of *campo rupestre* areas, including open pit mining, wood extraction, agriculture, altered fire regimes, and invasive species (Silveira et al. 2016).

We understand that the value of the *campo rupestre* vegetation can be better understood from the description and recognition of its floristic diversity. This recognition can subsidize conservationist actions by the regional and national governments and lead to advances in specific legislation for the protection of the vegetation of Brazilian *campos rupestres*.

*Additional specimens examined (Paratypes)*

**BRAZIL:** Minas Gerais: Belo Horizonte, Serra do Curral, BR3, a 15 km de Belo Horizonte, 1300 m, 16, July 1956, *L. Roth 1660* (HUFU, MBM, RB). Buenópolis, Parque nacional das Sempre Vivas, ao lado da Serra do Landi, 1306 m, 01 May 2007, 17°54'27.7"S, 43°45'24.2"W, *T.E. Almeida et al. 974* (BHCB). Brumadinho, Serra da Calçada (Serra da Moeda), Retiro das Pedras, caminho para o Forte de Brumadinho, depois da descida da escada de pedras, à direita e terrenos na divisa da EXPLO perto da mina de cristal, 20°08'S, 44°13'W, February 1989, *L.A. Martens 93* (SPF, UEC); *ibid*, nas proximidades da mina de cristal, 20°08'S, 44°13'W, February 1990, *L.A. Martens 372* (K, SPF, UEC); arredores do condomínio Retiro das Pedras, 14 September 1999, *J.R. Stehmann & M. Gonçalves 2543* (BHCB); Serra da Moeda, Retiro das Pedras, campo de quartzito, 20°05'35"S, 43°59'01"W, 20 August 2001, *P.L. Viana 162* (BHCB); Serra da Moeda, 20°06'28"S, 43°59'02"W, 17 February 2012, *C.V. Vidal & J. Paula-Souza 915* (BHCB). Con-

**Table 1.** Diagnostic morphological characters of *Lychnophora pseudovillosissima* and related species.

Character	<i>L. pseudovillosissima</i>	<i>L. villosissima</i>	<i>L. ericoides</i>	<i>L. pinaster</i>
Leaf petiole	shortly petiolate	shortly petiolate	sessile	sessile
Leaf arrangement	dense	dense	dense	lax, rarely dense
Blade shape	linear	narrow lanceolate or very narrow elliptic	linear	linear
Blade length	up to 15 cm	rarely exceeding 10 cm	up to 15 cm	rarely exceeding 6 cm
Venation	reticulodromous	reticulodromous	broquidodromous	broquidodromous
Leaf color (when dry)	greyish or brownish, rarely greenish	brownish or greenish	greyish	brownish or greenish
Blade apex	acute	acute to obtuse	acute	obtuse to rounded
Mucron	short blunt, ca. 0.5 mm long, rarely absent	inconspicuous, less than 0.2 mm, commonly absent	short blunt, ca. 0.5 mm long, rarely absent	inconspicuous, less than 0.2 mm, commonly absent
Blade base	attenuate or truncate	attenuate or rounded	rounded, rarely truncate	rounded to auriculate, rarely attenuate
Indumentum midrib abaxially	lanose or villose	lanose or villose	glabrous or tomentose	glabrous or tomentose

gonhas do Norte, estrada para Costa Sena, ca. 15 km de Congonhas do Norte, 18°42'33.8"S, 43°41'04.8"W, 1010 m, 21 January 2007, *B. Loeuille et al.* 81 (K, SPF). Diamantina, 15 km S. de Diamantina, rodovia para Conselheiro Mata, 17 May 1977, *P.E. Gibbs et al.* 5264 (UEC); 18°18'S, 43°59'W, *J.E.M. Brazão* 239 (RB); estrada Guinda-Conselheiro Mata, km 178, 4 June 1985, *H.F. Leitão-Filho* 17340 (UEC); *ibid.*, *H.F. Leitão-Filho* 17350 (UEC); estrada Diamantina-Conselheiro Mata, km 185 próximo à grande inselberg, 23 February 1986, *J. Semir et al.* CFCR 9492 (UEC); 20–26 km WSW de Diamantina, camino a Conselheiro Mata, MG-220, 18°17'S, 43°49'W, 1270–1300 m alt., 18, May 1990, *M.M. Arbo et al.* 4355 (CTES, SPF, UEC); km 183–184 estrada de terra para Conselheiro Mata, margem esquerda, 11 September 1999, *N.P. Lopes* 213 (UEC); estrada para Conselheiro Mata, 10 km do asfalto, 18°17'28"S, 43°45'27"W, 29 November 2000, *Mansanares et al.* 00/27 (UEC); estrada para Conselheiro Mata, 17.2 km do asfalto, afloramento lado D, 18°18'00"S, 43°48'48"W, 29 November 2000, *M.E. Mansanares et al.* 00/28 (UEC); estrada para Conselheiro Mata, 18 km, 20 October 2007, *J.N. Nakajima et al.* 4673 (HUFU); estrada Diamantina-Conselheiro Mata (km 176), 10 km do trevo, 31 March 2001, *J.N. Nakajima & R. Romero* 3096 (DIAM, HUFU, MBM); *ibid.*, *J.N. Nakajima & R. Romero* 3098 (HUFU); estrada Diamantina-Conselheiro Mata, km 164, 18°18'36.5"S, 43°53'11.9"W, 20 June 2001, *J. Semir et al.* 01/108 (UEC); *ibid.*, *J. Semir et al.* 01/112 (UEC); estrada pra Conselheiro Mata, km 176.5, ao lado direito da estrada, 18°17'S, 43°47'W, 14 November 2002, *F. Feres et al.* 74 (UEC); estrada para Conselheiro Mata, 8 July 2004, *M.E.*

*Mansanares et al.* 412 (UEC); estrada para Conselheiro Mata, km 172, 8 July 2004, *Mansanares et al.* 414 (UEC); estrada Diamantina-Conselheiro-Mata, km 184, 2.5 km da estrada Diamantina-Gouveia (BR 259), 18°17'30"S, 43°44'10"W, 22 January 2007, *B. Loeuille et al.* 87 (K, MBM, MO, SPF, UFP, US); *ibid.*, 1280 m, *B. Loeuille et al.* 89 (K, SPF); Parque Estadual do Biribiri, estrada para Pinheiro, mirante da Guinda, 10 August 2010, *B. Loeuille et al.* 532 (SPF); *ibid.*, 18°10'20.5"S, 43°38'2.1"W, 10 August 2010, *I.M. Franco et al.* 584 (DIAM, HUFU); Conselheiro Mata, Estrada Diamantina-Conselheiro Mata, ca. 5 km da BR, 22 January 2012, *D. Gonçalves et al.* 381 (UEC); Parque Estadual do Biribiri, Alto do Guinda, 18°10'9.5"S, 43°35'54.6"W, 15 March 2012, *D. Marques et al.* 444 (BHCB, DIAM, HUFU); Serra do Pasmarr, 18°17'53"S, 43°45'16"W, 24 February 2010, *I.M. Franco et al.* 48 (DIAM, HUFU). Gouveia, morro da torre de televisão, alto do morro, entrada a oeste da rodovia Gouveia-Diamantina (BR 259), a 3,3 km norte de Gouveia, 18°25'24"S, 43°43'24"W, 1280 m elev., 22 January 2007, *B. Loeuille et al.* 85 (SPF, UFP). Nova Lima, campo rupestre perto da BR040 próximo ao BH Shopping e Copasa, 22 February 1990, *A.M.G. Anjos* 125 (BHCB, UEC).

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