

MICROLICIA CRENATIFOLIA (MELASTOMATACAE), A NEW SPECIES
FROM THE WESTERNMOST LIMITS OF THE DIAMANTINA PLATEAU,
MINAS GERAIS, BRAZIL

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ABSTRACT

Microlicia crenatifolia is described from the Diamantina Plateau, a well-known hotspot of plant endemism in southeastern Brazil. It can be recognized by its small leaves (up to 8.3 mm long) that are conspicuously crenulate to slightly serrate, short floral pedicels (0.7–1.0 mm long), and linear calyx lobes that are externally glandular-punctate and covered with short gland-tipped trichomes 0.1–0.3 mm long. We provide line drawings, SEM photos of leaves, seeds and indumentum, a distribution map, and an identification key to *M. crenatifolia* and putative relatives (*M. canastrensis*, *M. pabstii*, *M. serratifolia*, and *M. thomazii*).

KEY WORDS: Cadeia do Espinhaço, campo rupestre, Lavoisierae, Parque Nacional das Sempre-Vivas

RESUMO

Microlicia crenatifolia é descrita como uma nova espécie do Planalto de Diamantina, um conhecido centro de endemismo de plantas no sudeste do Brasil. A espécie pode ser reconhecida por suas folhas pequenas (até 8.3 mm compr.) que são conspicuamente crenuladas a levemente serreadas, pedicelos florais curtos (0.7–1.0 mm compr.), lacínias do cálice lineares externamente pontuado-glandulosas e cobertas com tricomas glandulares curtos de 0.1–0.3 mm compr. São fornecidas ilustrações, fotos de Microscopia Eletrônica de Varredura de folhas, sementes e indumento, um mapa de distribuição geográfica, e uma chave de identificação para *Microlicia crenatifolia* e prováveis espécies relacionadas (*M. canastrensis*, *M. pabstii*, *M. serratifolia*, e *M. thomazii*).

INTRODUCTION

With around 1,500 species, Brazil stands out as a major center of diversity for the family Melastomataceae (Ulloa Ulloa et al. 2022). *Microlicia* D. Don is the second largest genus of Melastomataceae in the Neotropics, comprising approximately 260 species, over 90% of which are endemic to Brazil (Versiane et al. 2021; Pacifico & Almeda 2022a; Ulloa Ulloa et al. 2022). Species of *Microlicia* can be recognized by their perennial woody habit associated with diplostemonous, typically heterantherous flowers, rostrate anther thecae, well-developed anther pedoconnectives, elongate to somewhat reniform seeds with a reticulate-foveolate testa, and a base chromosome number of $x = 12$ (Versiane et al. 2021; Pacifico & Almeda 2022).

The major diversity center of *Microlicia* is the the Cadeia do Espinhaço (or “Espinhaço Range”), a Brazilian mountain range that is the largest Precambrian orogenic belt in eastern South America, extending from north of the Iron Quadrangle (in Minas Gerais), to Chapada Diamantina (Bahia) (Rapini et al. 2008; Alves et al. 2014; Pacifico et al. 2020a; Pacifico & Almeda 2022). Characterized by habitat heterogeneity and isolation on mountaintops with nutrient-poor soils, the *campo rupestre* vegetation of the Cadeia do Espinhaço stands out by its high rates of endemism (Rapini et al. 2008; Alves et al. 2014; Silveira et al. 2016). Most of the endemic *campo rupestre* vegetation grows on quartzite, sandstones, or ironstones, which are exposed seasonally dry habitats, where Melastomataceae are one of the most diverse flowering plant families (Rapini et al. 2008; Alves et al. 2014; Silveira et al. 2016).

The Espinhaço Meridional, also known as the “Serra do Espinhaço,” represents the southernmost segment of the Cadeia do Espinhaço, spanning approximately 1200 km in a North-South orientation (Magalhães Junior

et al. 2015). It is one of the most remarkable geographic formations within the state of Minas Gerais, south-eastern Brazil (Magalhães Junior et al. 2015). Its greatest topographic relief feature is the Diamantina Plateau, which reaches a width of about 90 km and an average elevation of 1,300 m (Magalhães Junior et al. 2015). Both the Diamantina Plateau and the Espinhaço Meridional are important centers of plant diversity (Giulietti & Pirani 1997; Echternacht et al. 2011; Colli-Silva et al. 2019; Pacifico et al. 2020a). In the last ten years, numerous species have been discovered and described from the Espinhaço Meridional, of which more than 30 occur on the Diamantina plateau (e.g., Martins & Almeda 2017; Almeda & Fidanza 2020; Loeuille 2021; Bueno & Heiden 2022, and references therein). Several of the recently described species are Melastomataceae (e.g. Romero 2013; Romero & Castro 2014; Romero et al. 2016; Martins & Almeda 2017; Pacifico & Fidanza 2017; Almeda & Fidanza 2020; Pacifico et al. 2020b, 2021; Guimarães et al. 2022; Meyer et al. 2022; Versiane & Romero 2022). These discoveries highlight the need for further studies to better understand the diversity of that region.

During a field expedition to the Diamantina plateau, a morphologically distinct species of *Microlicia* was collected that could not be placed in any previously described species of the genus. It is known from little-explored *campo rupestre* sites on the road between the district of Curimataí and the Cachoeira da Santa Rita, Minas Gerais, Brazil. Here, we describe it as a new species.

MATERIALS AND METHODS

Taxonomic studies.—This study was conducted using herbarium specimens from CAS, HUEM, HUFU, MBM, NY, RB, SPF, UEC, and US (acronyms according to Thiers 2023), as well as field observations on Serra do Cipó, Diamantina Plateau, Serra do Cabral, Grão Mogol and Serra da Canastra. Types of all species treated in this manuscript were examined in the herbaria listed above. Morphological characters used in the species comparisons were obtained from: Brade (1962) [*Microlicia pabstii* Brade], Romero (2000) [*Microlicia canastrensis* Naudin], Fidanza et al. (2013) [*Microlicia serratifolia* Versiane & R. Romero, as *Trembleya serrulata* Fidanza, A.B. Martins & Almeda], Pacifico and Fidanza (2015) [*Microlicia thomazii* (R.B. Pacifico & Fidanza) Versiane & R. Romero, as *Trembleya thomazii* R.B. Pacifico & Fidanza], and study material from the mentioned herbaria. The term “glandular-punctate” is used to describe surfaces covered with gland-tipped trichomes on peduncles too short to be observed with a 40× magnification stereoscope (see Carmo et al. 2019). Seed measurements were done using ImageJ (Schneider et al. 2012) based on calibrated Scanning Electron Microscopy photos.

Scanning Electron Microscopy (SEM) photos.—SEM studies were carried out to illustrate in detail some ultra-structural features of *Microlicia crenatifolia*. Leaves, calyx lobes, and seeds were affixed to SEM aluminum stubs (15 mm) with copper conductive tape, sputtered-coated with gold, and photographed with a Hitachi SU3500 microscope in the SEM Laboratory at the California Academy of Sciences.

Mapping and conservation assessment.—The software QGIS 3.4.6 (QGIS Development Team 2023) was used to prepare the distribution map based on coordinates obtained from specimen labels; these were manually curated. The Informal conservation assessment is based on IUCN (2022) guidelines and criteria.

RESULTS AND DISCUSSION

Microlicia crenatifolia R.B. Pacifico & Almeda, **sp. nov.** (Figs. 1, 2, 3). TYPE: BRAZIL. MINAS GERAIS: Buenópolis, estrada para a Cachoeira Santa Rita, 17°58'52"S, 43°58'50"W, 1,169 m, 10 Aug 2020, fl., fr., R. Pacifico 483 & I.V. Castro (HOLOTYPE: HUEM!, ISOTYPES: CAS!, RB!).

Diagnosis.—Differs from *Microlicia pabstii* by the modally shorter internodes up to 8.8 mm long (vs. up to 44.1 mm long) and leaf blades up to 8.3 mm long (vs. up to 38.7 mm long), flowers on shorter pedicels 0.7–1.0 mm long (vs. 2.0–3.7 mm long), hypanthia and calyx lobes that are externally glandular-punctate and covered with gland-tipped trichomes 0.1–0.3 mm long (vs. only glandular-punctate), and calyx lobes linear (vs. narrowly triangular) that are 3.4–3.8 mm long (vs. 2.4–2.6 mm long).

Openly-branched, erect shrubs 0.5–1.2 m tall, externally glutinose. Branchlets quadrangular, glandular-punctate, sometimes also beset with scattered gland-tipped trichomes 0.1–0.2 mm long, the stem angles not winged or with inconspicuous wings up to 0.1 mm wide, internodes 2.4–8.8 mm long. Leaves spreading,

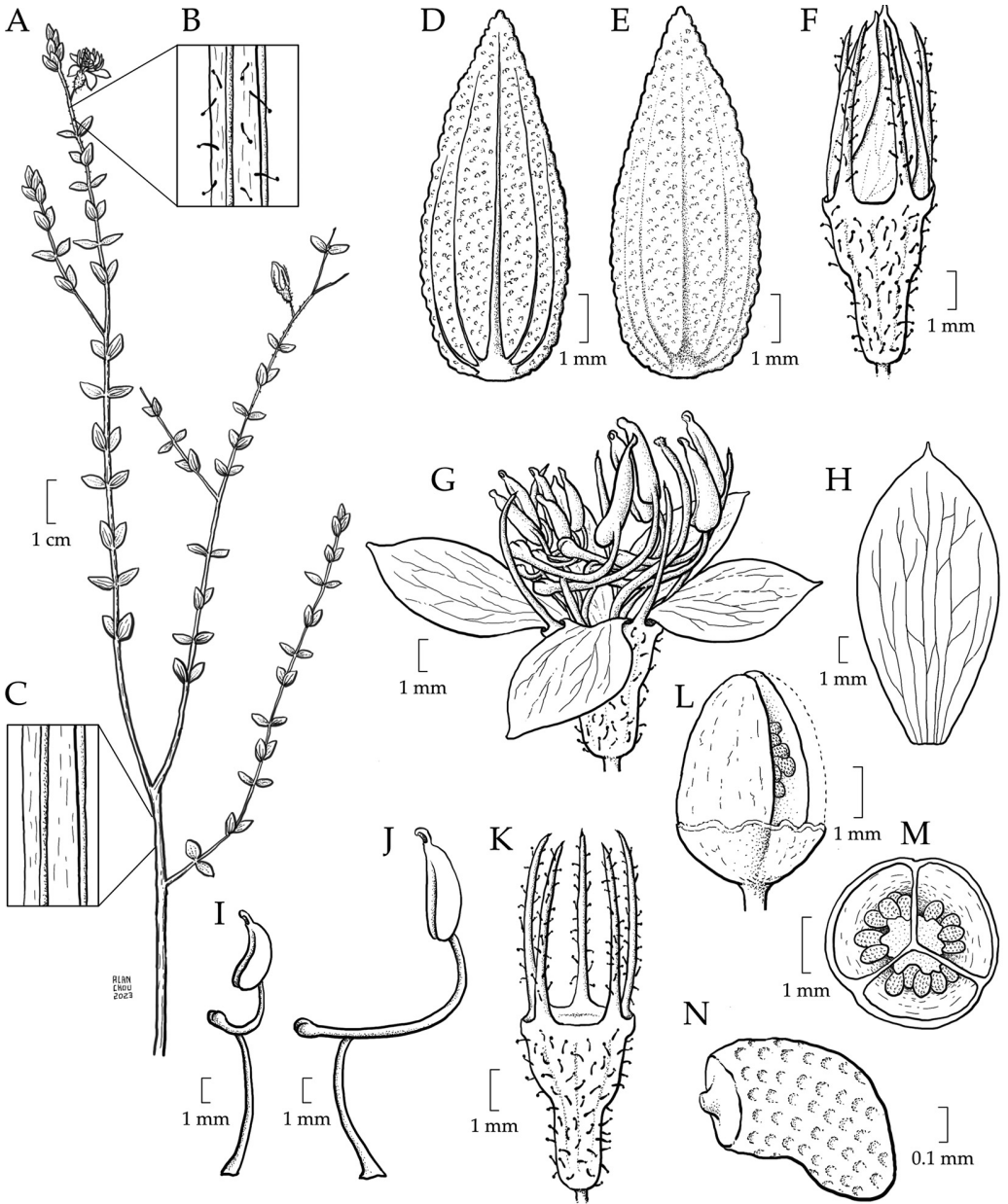


FIG. 1. *Microlicia crenatifolia*. A. Habit. B. Detail of a distal internode showing the sparse indument of gland-tipped trichomes. C. Detail of a proximal internode. D. Leaf abaxial surface. E. Leaf adaxial surface. F. Floral bud. G. Flower in lateral view. H. Petal adaxial surface. I. Antepetalous stamen. J. Antesepalous stamen. K. Immature capsule enveloped by the hypanthium and calyx lobes. L. Capsule in lateral view. M. Capsule in cross-section. N. Seed in lateral view. Drawn from R. Pacifico & I.V. Castro 483.

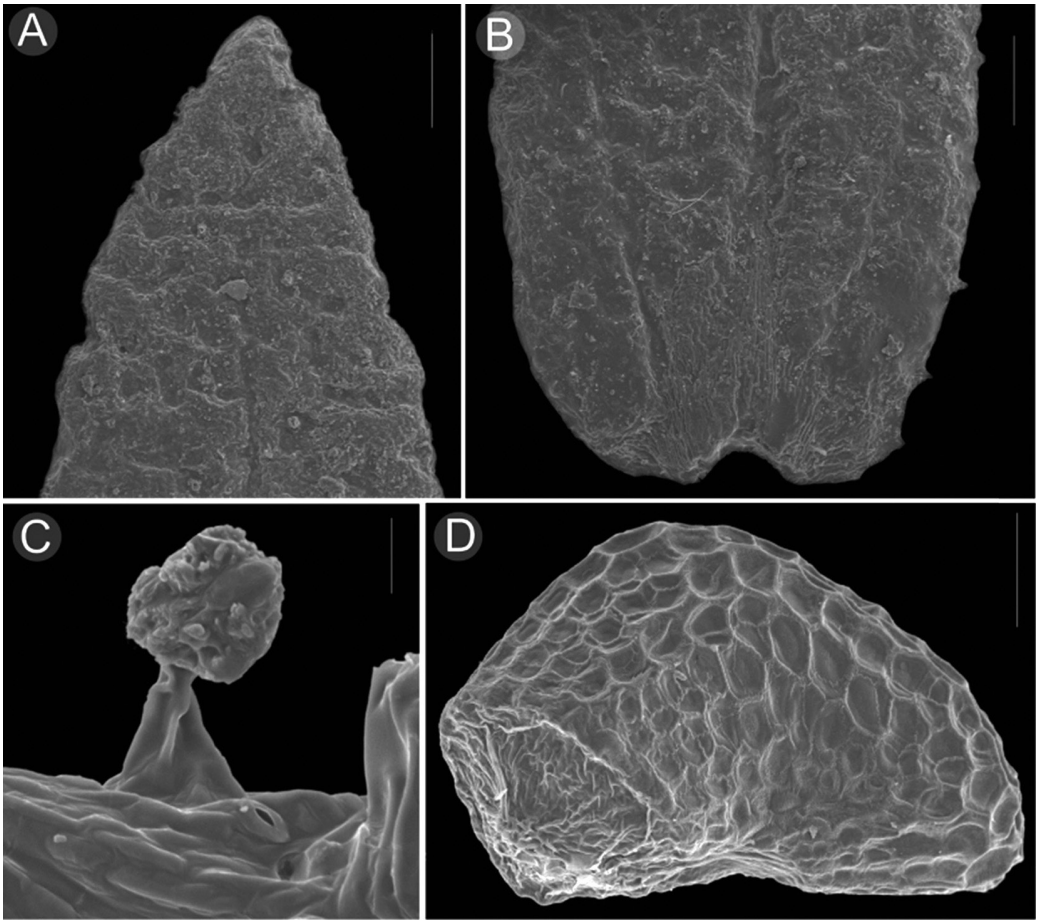


FIG. 2. Scanning Electron Microscopy photos of *Microlicia crenatifolia*. **A.** Apex of leaf adaxial surface. **B.** Base of leaf adaxial surface. **C.** Detail of gland-tipped trichome on the adaxial surface of a calyx lobe. **D.** Seed in lateral view. Photographed from *R. Pacifico & I.V. Castro 483*. Scale bars: A and B, 250 μ m; C, 100 μ m; D, 25 μ m.

moderately ascendant (when dry), decussate, sessile, flat, not imbricate, 1–2 two times the length of the internodes; blades 4.2–8.3 \times 1.4–5.0 mm, ovate-lanceolate, chartaceous, pale green and discolored (when dry), base rounded, apex acute, both surfaces densely glandular-punctate, rarely also beset with a few gland-tipped trichomes 0.1–0.2 mm long on the adaxial surface, margin crenulate to slightly serrate, eciliate or rarely ciliate with a few gland-tipped trichomes 0.1–0.2 mm long, 3–5-nerved from the base, veins impressed on the adaxial surface, flat and not prominent on the abaxial surface, the midvein stout and becoming faint towards the leaf apex, the lateral veins less conspicuous and becoming faint along the distal third of the blade, tertiary veins not evident. Flowers axillary, bracteolate, solitary or grouped at the apex of the branches. Bracteoles 2.4–3.5 \times 0.9–1.5 mm, sessile, persistent, ovate-lanceolate, base rounded, apex acute, the indumentum like that of the leaves, 1– to inconspicuously 3-nerved. Flowers 5-merous, pedicels 0.7–1.0 mm long; hypanthia (at anthesis) 3.2–3.3 long, 2.7–3.3 mm wide at the torus, typically campanulate and enlarged along the upper third, \pm equaling the capsule in length at maturity, reddish to brownish (when dry), externally glandular-punctate and covered with gland-tipped trichomes 0.1–0.3 mm long; calyx tubes ca. 0.4 mm long; calyx lobes (at anthesis) 3.4–3.9 mm long, 0.5–0.6 mm wide at the base, linear, reddish to brownish (when dry), apex



Fig. 3. *Microlicia crenatifolia*. Photo of isotype at CAS.

acuminate-aristate, terminating in a rigid eglandular trichome 0.1–0.2 mm long, externally and at the entire margins with an indumentum like that of the hypanthium, petals 7.3–11.6 × 4.3–6.4 mm, obovate, pink, margins entire and glabrous, apex acuminate, both surfaces glabrous. Stamens 10, entirely yellow, dimorphic; antesealous (larger) stamens with filaments 3.8–5.4 mm long, glabrous, thecae (excluding rostra) 2.5–2.9 × 0.6–0.8 mm, oblong, externally smooth, tetrasporangiate, rostra 0.45–0.55 mm long, the ventrally inclined pores 0.24–0.29 mm wide, nearly circular, pedoconnectives 4.8–6.0 mm long, the appendages 0.8–1.5 mm long, apex truncate to emarginate; antepetalous (smaller) stamens with filaments 3.2–4.7 mm long, glabrous, thecae (excluding rostra) 2.0–2.3 × 0.5–0.6 mm, oblong, smooth, tetrasporangiate, rostra 0.32–0.36 mm long, the ventrally inclined pores 0.16–0.23 mm wide, nearly circular, pedoconnectives 1.2–1.7 mm long, the short appendages 0.3–0.6 mm long, apex rounded-truncate. Ovary (at anthesis) ca. 1.4 × 1.2 mm, superior, globose, glabrous, 3-locular; styles ca. 2 mm long, glabrous, sigmoid, stigma punctiform. Fruit at maturity an ovoid loculicidal capsule 3.8–4.8 × 2.5–3.0 mm, pale brown, ovoid, 3-valvate, enveloping hypanthia, rupturing and flaking away with age, dehiscent from the apex to the base (basipetal), columellas deciduous. Seeds 0.49–0.55 × 0.25–0.31 mm, yellow, reniform, testa foveolate, raphal zone nearly circular, 34–38% the length of the seed.

Additional specimens examined (paratypes).—BRAZIL. Minas Gerais. Augusto de Lima: Estrada para a Cachoeira Santa Rita, 17°59'36"S, 43°58'32"W, 1,146 m, 10 Aug 2020, fr., R. Pacifico 478 & I.V. Castro (CASI, HUEMI, RB!). Buenópolis: Curimataí, estrada para a Cachoeira Santa Rita, 1,078 m, 8 Aug 2020, sterile, R. Pacifico 452 & I.V. Castro (CASI, HUEMI, RB!); estrada para a Cachoeira Santa Rita, 17°58'52"S, 43°58'50"W, 1,169 m, 10 Aug 2020, fl., R. Pacifico 485 & I.V. Castro (CASI, HUEMI, RB!).

Distribution, habitat and conservation.—*Microlicia crenatifolia* is known only from the road between the district of Curimataí and the Cachoeira da Santa Rita ("Santa Rita Waterfall") in central-northern Minas Gerais, Brazil (Fig. 4). This road starts in the district of Curimataí and crosses *campo rupestre* in both Buenópolis and the neighboring municipality of Augusto de Lima, where *M. crenatifolia* was collected in undisturbed *campo rupestre* sites at 1,078–1,069 m. These little-collected sites are located at the westernmost limits of the Diamantina Plateau, a well-known hotspot of plant endemism in southeastern Brazil (Echternacht et al. 2011; Colli-Silva et al. 2019; Pacifico et al. 2020a). We sampled a total of three populations of *M. crenatifolia*, but only two collections are georeferenced. The known area of distribution of this species is close to but outside the southeastern limits of the Parque Nacional das Sempre-Vivas (124,154.47 hectares). It is likely that other populations of *M. crenatifolia* grow within that conservation unit. Until more information about its distribution is gathered, we consider *M. crenatifolia* as Data Deficient (DD).

Phenology.—Collected flowering and fruiting in August.

Notes.—By having bracteolate flowers borne on inflorescences, antepetalous stamens with well-developed pedoconnective appendages, 3-locular ovaries and capsules that dehisce from the apex to the base, *M. crenatifolia* fits the morphological delimitation of *Trembleya* s.l. of Martins (1997, unpl. data). Pacifico and Fidanza (2020) recognized 18 species in *Trembleya* s.l., all of which were transferred to *Microlicia* by Versiane et al. (2021). A subset of 11 species previously treated in *Trembleya* s.l. are currently recognized in the *Trembleya* s.s. clade, within *Microlicia* s.l. (Pacifico et al. 2022). *Microlicia crenatifolia* does not fit into the *Trembleya* s.s. clade because of its sessile leaves, antesealous stamens with evident pedoconnective appendages, and 3-locular ovaries (vs. petiolate leaves, antesealous stamens with inconspicuous appendages and generally 5-locular ovaries in the *Trembleya* s.s. clade). At least eight other species with a somewhat similar set of characters have been recently described in *Microlicia* (see Pacifico et al. 2020b; Romero & Versiane 2021).

Overall, *Microlicia crenatifolia* is morphologically close to *M. pabstii* (see diagnosis) and *Microlicia thomazii*. It differs from *M. thomazii* by the modally smaller leaves up to 8.3 mm long (vs. up to 25.5 mm long) that are conspicuously crenulate to slightly serrulate (vs. typically entire to slightly crenulate), flowers on shorter pedicels 0.7–1.0 mm long (vs. 1.9–2.7 mm long), hypanthia and calyx lobes that are externally glandular-punctate and covered with gland-tipped trichomes 0.1–0.3 mm long (vs. only glandular punctate), and calyx lobes that are linear (vs. narrowly triangular) and are 3.4–3.8 mm long (vs. 1.7–2.6 mm long). Other morphologically similar species are *M. serratifolia* and *M. canastrensis*. There is no overlap in the distribution of *M. crenatifolia*

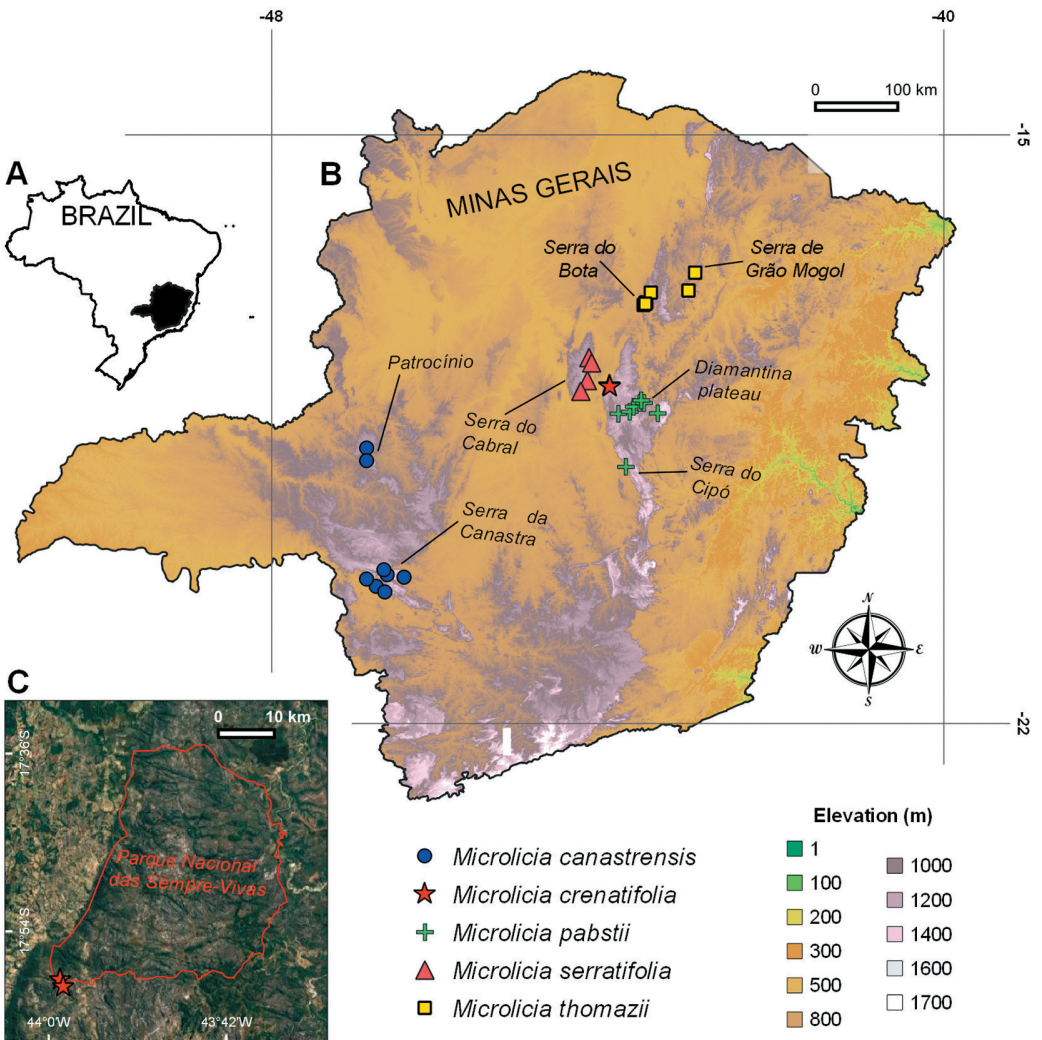


Fig. 4. Distributions of *Microlicia crenatifolia* and putative relatives in the state of Minas Gerais, Brazil. **A.** Brazil highlighting the state of Minas Gerais. **B.** Minas Gerais with the records of *M. crenatifolia* and putative relatives. **C.** Distribution of *M. crenatifolia* in relation to the nearest conservation unit, the Parque Nacional das Sempre-Vivas in northern Minas Gerais, Brazil.

and the similar species (Fig. 4). *Microlicia pabstii* is restricted to the region that encompasses the northeastern section of the Serra do Cipó (in Santana de Pirapama) and the Diamantina plateau (Fig. 4). It has never been collected in the westernmost limits of the Diamantina plateau, i.e., in Augusto de Lima and Buenópolis, and at the Parque Nacional das Sempre-Vivas. *Microlicia thomazii* is apparently endemic at the Serra do Bota (in Itacambira) and the Serra de Grão Mogol (in Grão Mogol and Botumirim), whereas *M. serratifolia* is known only from the Serra do Cabral (Fig. 4). Finally, *M. canastrensis* is known only from the Serra da Canastra and Triângulo Mineiro (in Patrocínio), western Minas Gerais (Fig. 4). *Microlicia crenatifolia* and similar species can be identified using the following key.

KEY TO *MICROLICIA CRENATIFOLIA* AND MORPHOLOGICALLY SIMILAR SPECIES

1. Principal leaves 3–5-nerved; hypanthia and calyx lobes glandular-punctate and covered with gland-tipped trichomes 0.1–0.8 mm long; calyx lobes 3–4 mm long.
 2. Leaf margins entire; floral pedicels 1.5–2 mm long; calyx lobes narrowly-triangular to subulate, 0.8–1.4 mm wide; hypanthia covered with gland-tipped trichomes up to 0.8 mm long _____ **M. canastrensis**
 2. Leaf margins crenulate to slightly serrate; floral pedicels 0.7–1.0 mm long; calyx lobes linear, 0.5–0.6 mm wide; hypanthia covered with gland-tipped trichomes up to 0.3 mm long _____ **M. crenatifolia**
1. Principal leaves 5–7-nerved; hypanthia and calyx lobes only glandular-punctate; calyx lobes 0.8–2.6 mm long.
 3. Leaf surfaces glandular-punctate and sparsely covered with gland-tipped trichomes ca. 0.5 mm long; leaf margins serrate and glandular-ciliate (serrations ca. 1 mm long); calyx lobes triangular, 0.8–1.1 mm long _____ **M. serratifolia**
 3. Leaf surfaces only glandular-punctate; leaf margins entire to crenulate, eciliate; calyx lobes narrowly-triangular to subulate, 1.7–2.6 mm long.
 4. Vegetative internodes typically longer than 20 mm long; leaf blades membranaceous with the margins crenulate; inflorescences laxly ramified; floral pedicels typically surpassing 3 mm long (Diamantina Plateau and Serra do Cipó) _____ **M. pabstii**
 4. Vegetative internodes up to 15 mm long; leaf blades chartaceous with the margins typically entire; inflorescences densely ramified; floral pedicels 1.9–2.7 mm long (Serra do Bota and Grão-Mogol) _____ **M. thomazii**

ACKNOWLEDGMENTS

We thank Isabela V. Castro for assistance during fieldwork activities, Alan Chou for preparing the line drawings, Ricardo Kriebel for photographing the isotype of *Microlicia crenatifolia* at CAS, Rafaela Forzza (RB) for herbarium-related logistical support, and Ana Flávia A. Versiane and Renato Goldenberg for their comments on an earlier version of this manuscript. RP thanks the M. Stanley Rundel Charitable Trust (U.S.A.), the Lakeside Foundation (U.S.A.), and Benjamin Hammett for providing funds that made his postdoctoral studies possible at CAS.

REFERENCES

- ALVES, R., N.G. SILVA, J.A. OLIVEIRA, & D. MEDEIROS. 2014. Circumscribing *campo rupestre*–megadiverse Brazilian rocky montane savannas. *Braz. J. Biol.* 74:355–362.
- ALMEDA, F. & K. FIDANZA. 2020. A new *Microlicia* (Melastomataceae: Microlicieae) from the Southern Cadeia do Espinhaço, Minas Gerais, Brazil. *Phytotaxa* 438:182–188.
- BRADÉ, A.C. 1962. Algumas espécies novas do gênero *Microlicia* (Melastomataceae) da flora do Brasil. *Arq. Bot. Estado São Paulo* 3:249–261.
- BUENO, V.R. & G. HEIDEN. 2022. *Calea sessilifolia* (Asteraceae, Neurolaeneae), a new species from the Diamantina plateau, Minas Gerais, Brazil. *Syst. Bot.* 47:586–592.
- CARMO, A., R. PACIFICO, R. GONÇALES-SILVA, P.G. SBAS, K. FIDANZA, & L.A. DE SOUZA. 2019. Epidermal micromorphology and venation patterns of *Microlicieae* (Melastomataceae) leaves: Looking for new characters for the taxonomy of this Neotropical tribe. *Flora* 261:151494.
- COLLI-SILVA, M., T.N., VASCONCELOS, & J.R. PIRANI. 2019. Outstanding plant endemism levels strongly support the recognition of *campo rupestre* provinces in mountaintops of eastern South America. *J. Biogeogr.* 46:1723–1733.
- ECHTERNACHT, L., M. TROVÓ, C.T. OLIVEIRA, & J.R. PIRANI. 2011. Areas of endemism in the Espinhaço range in Minas Gerais, Brazil. *Flora* 206:782–791.
- FIDANZA, K., A.B. MARTINS, & F. ALMEDA. 2013. Four new species of *Trembleya* (Melastomataceae: Microlicieae) from Serra do Cabral, Minas Gerais, Brazil. *Brittonia* 65:280–291.
- GIULIETTI, A.M. & J.R. PIRANI. 1997. Espinhaço Range Region, Eastern Brazil. In: S.D. Davis, V.H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos, & A. C. Hamilton, eds. *Centres of plant diversity: a guide and strategy for their conservation*. Vol. 3. (The Americas). IUCN Publications Unit, Cambridge, United Kingdom. Pp. 397–404.
- GUIMARÃES, P.J.F., D.N. DA SILVA, I.M. ARAÚJO, & R. ROMERO. 2022. A new species of *Pleroma* (Melastomataceae) from the Southern Espinhaço, Minas Gerais, Brazil. *Webbia* 77:247–256.
- IUCN. 2022. Guidelines for using the IUCN Red List categories and criteria. Version 15.1. (<https://www.iucnredlist.org/resources/redlistguidelines>) accessed Sept 2023.
- LOEUILLE, B. 2021. Three new species of *Piptolepis* (Vernoniaeae, Asteraceae) from the Diamantina Plateau, Minas Gerais, Brazil. *Syst. Bot.* 46:493–503.

- MAGALHÃES JUNIOR, A.P., L.F. DE PAULA BARROS, & M.F. FELIPPE. 2015. Southern Serra do Espinhaço: the impressive plateau of quartzite ridges. In: B.C. Vieira, A.A.R. Salgado, & L.J.C. Santos, eds. *Landscapes and Landforms of Brazil*. Springer Dordrecht. Pp. 359–370.
- MARTINS, A.B. & F. ALMEDA. 2017. A monograph of the Brazilian endemic genus *Lavoisiera* (Melastomataceae: Microlicieae). *Phytotaxa* 315:1–194.
- MEYER, F.S., R. PACÍFICO, & F. ALMEDA. 2022. A new species of *Pleroma* (Melastomataceae: Melastomateae) endemic to Southern Cadeia do Espinhaço, Minas Gerais, Brazil. *Phytotaxa* 560:30–42.
- PACÍFICO, R., F. ALMEDA, A. FROTA, & K. FIDANZA. 2020a. Areas of endemism on Brazilian mountaintops revealed by taxonomically verified records of Microlicieae (Melastomataceae). *Phytotaxa* 450:119–148.
- PACÍFICO, R., F. ALMEDA, & K. FIDANZA. 2020b. Seven new species of *Microlicia* (Melastomataceae: Microlicieae) from Minas Gerais, Brazil. *Syst. Bot.* 45:277–293.
- PACÍFICO, R., F. ALMEDA, & K. FIDANZA. 2021. Two new species and new synonyms in Microlicieae (Melastomataceae) from Minas Gerais, Brazil. *Brittonia* 73:106–115.
- PACÍFICO, R. & F. ALMEDA. 2022. Lavoisierae: A Neotropical tribe with remarkable endemism on eastern Brazilian mountaintops. In: R. Goldenberg, F.A. Michelangeli, & F. Almeida, eds. *Systematics, Evolution, and Ecology of Melastomataceae*. Springer, Cham. Pp. 385–408.
- PACÍFICO, R., F. ALMEDA, D.S. PENNEYS, & K. FIDANZA. 2022. Systematics of the *Trembleya* sensu stricto clade of *Microlicia* (Melastomataceae, Lavoisierae). *PhytoKeys* 216:1–101.
- PACÍFICO, R. & K. FIDANZA. 2015. Three new endangered species of *Trembleya* DC. (Melastomataceae: Microlicieae) from Minas Gerais, Brazil. *Phytotaxa* 238:163–173.
- PACÍFICO, R. & K. FIDANZA. 2017. *Microlicia sciophylla* (Melastomataceae: Microlicieae), a new micro-endemic species from the rocky fields of Minas Gerais, Brazil. *Kew Bull.* 72:1–8.
- QGIS Development Team (2023) QGIS Geographic Information System. Open Source Geospatial Foundation Project. <http://qgis.org> Accessed July 2023.
- RAPINI, A., P.L. RIBEIRO, S. LAMBERT, & J.R. PIRANI. 2008. A flora dos campos rupestres da Cadeia do Espinhaço. *Megadiversidade* 4:16–24.
- ROMERO, R. 2000. A família Melastomataceae no Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Ph.D. Thesis. Universidade Estadual de Campinas. Campinas, Brazil.
- ROMERO, R. 2013. A new species of *Microlicia* (Melastomataceae) from the Espinhaço Range, Minas Gerais, Brazil. *Phytotaxa* 88:1–5.
- ROMERO, R., K.R. SILVA, & D.G. SIMÃO. 2016. *Microlicia cogniauxiana* and *Microlicia naudiniana* (Melastomataceae), two new species from the Espinhaço Range, Brazil. *Syst. Bot.* 40:1012–1021.
- ROMERO, R. & N.M. CASTRO. 2014. *Microlicia longicalycina* (Melastomataceae), a new species from the state of Minas Gerais, Brazil, with notes on leaf anatomy. *Syst. Bot.* 39:1177–1182.
- ROMERO, R. & A.F.A. VERSIANE. 2021. Taxonomic and nomenclatural novelties in *Microlicia* (Melastomataceae) with an updated checklist to the genus in the Serra do Cipó, Minas Gerais, Brazil. *Syst. Bot.* 46:812–827.
- SCHNEIDER, C.A., W.S. RASBAND, & K.W. ELICEIRI. 2012. NIH Image to ImageJ: 25 years of image analysis. *Nat. Methods* 9:671–675.
- SILVEIRA, F.A.O., D. NEGREIROS, N.P.U. BARBOSA, E. BUISSON, F.F. CARMO, D.W. CARSTENSEN, A.A. CONCEIÇÃO, T.G. CORNELISSEN, L. ECHTERNACHT, G.W. FERNANDES, Q.S. GARCIA, T.J. GUERRA, C.M. JACOBI, J.P. LEMOS-FILHO, S. LE STRADIC, L.P.C. MORELLATO, F.S. NEVES, R.S. OLIVEIRA, C.E. SCHAEFER, P.L. VIANA, & H. LAMBERS. 2016. Ecology and evolution of plant diversity in the endangered *campo rupestre*: A neglected conservation priority. *Pl. & Soil* 403:129–152.
- THIERS, B. 2023. [continuously updated]. Index herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's virtual herbarium. <https://sweetgum.nybg.org/science/ih/> Accessed July 2023.
- ULLOA ULLOA, C., F. ALMEDA, R. GOLDENBERG, G. KADEREIT, F.A. MICHELANGELI, D.S. PENNEYS, R.D. STONE, & M.C. VERANSO-LIBALAH. 2022. Melastomataceae: Global diversity, distribution, and endemism. In: R. Goldenberg, F.A. Michelangeli, & F. Almeida, eds. *Systematics, Evolution, and Ecology of Melastomataceae*. Springer, Cham. Pp. 3–28.
- VERSIANE, A.F.A., R. ROMERO, M. REGINATO, C.A.D. WELKER, F.A. MICHELANGELI, & R. GOLDENBERG. 2021. Phylogenetic analysis of Microlicieae (Melastomataceae), with emphasis on the re-circumscription of the large genus *Microlicia*. *Bot. J. Linn. Soc.* 197:35–60.
- VERSIANE, A.F.A. & R. ROMERO. 2022. *Microlicia schwackeana* (Melastomataceae), a new species from *campo rupestre* in Minas Gerais, Brazil. *Phytotaxa* 539:186–194.