



## Rediscovery of two species of *Microlicia* (Melastomataceae) in Minas Gerais, Brazil

ROSANA ROMERO<sup>1</sup> & ELIZABETH M. WOODGYER<sup>2</sup>

<sup>1</sup>Instituto de Biologia, Universidade Federal de Uberlândia, Caixa Postal 593, 38400-902, Uberlândia, Minas Gerais, Brazil.

E-mail: [romero@inbio.ufu.br](mailto:romero@inbio.ufu.br)

<sup>2</sup>Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, UK.

### Abstract

Studies carried out in Minas Gerais state have led to the rediscovery of *Microlicia maximowicziana* and *M. riedeliana*, known previously only by the type collections made 190 years ago by Ludwig Riedel. We present descriptions, comments on the affinities among closely related species and conservation assessments, as well as illustrations. Lectotypes for both species are designated and the varieties of *M. maximowicziana* are synonymised.

### Resumo

Estudos conduzidos no estado de Minas Gerais permitiram a redescoberta de *Microlicia maximowicziana* e *M. riedeliana*, conhecidas anteriormente apenas pelas coleções tipo realizadas há mais de 190 anos por Ludwig Riedel. Apresentamos descrições, comentários sobre afinidades com espécies próximas, bem como o estado de conservação e ilustrações. São designados lectótipos para as duas espécies e as variedades de *M. maximowicziana* são consideradas sinônimos.

**Key words:** *campo rupestre*, endemic, IUCN categories, lectotypes, new synonym, Microlicieae, Riedel

### Introduction

*Microlicia* D. Don is represented by 130 species in Brazil and 66 species in Minas Gerais (Romero & Woodgyer 2014). Despite the high diversity, some species are little known and/or poorly collected. Most of the species were tenuously delimited and morphological characteristics have frequently overlapped. In recent years some synonyms have been proposed (Romero 2003a; 2013a; 2013b) and eight species of *Lavoisiera* (Almeda & Martins 2001) and three of *Chaetostoma* (Koschnitzke & Martins 2007) were transferred to *Microlicia*.

Wide morphological variation within and between many species of *Microlicia* make this genus difficult to understand. A number of factors have impeded a comprehensive study of the genus. Some species are poorly represented in herbaria making identification of newly acquired material problematic. Several new species are recognized, but still cannot be published because there is not enough fertile herbarium material to provide complete descriptions and safe distinction of closely related species. Some areas of *campo rupestre* can have several sympatric species of *Microlicia* flowering at the same time, which often gives rise to mixed collections under the same collection number. Some validly published binomials were never used, but names published later for the same species were used instead, and became more widely known in herbarium collections and access to type material in European herbaria has until recently been difficult. These factors highlight the need for further extensive collecting of *Microlicia* in the states of Minas Gerais and Bahia where it is most diverse. This would also benefit the work being carried out by the first author towards a revision of *Microlicia* sect. *Microlicia* Cogn.

Intensive field work carried out in Minas Gerais during the last 20 years has led to the discovery of seven new species of *Microlicia* and material to support nomenclatural updates (Romero 2000, 2003b, 2005, 2010, 2013a, 2013b, 2013c; Romero & Woodgyer 2010, 2011; Romero & Versiane 2014), as well as the rediscovery of *M. maximowicziana* Cogn. and *M. riedeliana* Cogn., known previously only by the type collections.

During examination of material from recent field work in Minas Gerais, these two species were initially thought to be new and undescribed as they did not match collections at K or HUFU. However, during comprehensive study of herbaria in Europe by the first author, type material of *M. maximowicziana* and *M. riedeliana* collected by Ludwig

Riedel in the 1820s was examined in LE and BR and it became clear that these two species had already been described by Cogniaux (1883). The labels of the type specimens housed in LE provide locality details and date of collection, but the duplicates in BR have no label and only Cogniaux's handwritten identification. Because the original descriptions in *Flora brasiliensis* (Cogniaux 1883) were not detailed and the illustrations inadequately represented the species and varieties, more comprehensive ones are included here together with photos of the plants in the field, comments on the affinities between closely related species and conservation assessments. We designate lectotypes for both species and propose three synonyms for *M. maximowicziana*.

***Microlicia maximowicziana*** Cogniaux (1883: 94). **Type:**—BRAZIL. Minas Gerais: in saxosis ad Serra da Carassa [Serra do Caraça], January 1825, *L. Riedel 1488* [as *Microlicia maximowicziana* var. *densifolia* Cogniaux (1883: 94)] (lectotype LE! **here designated**; isolectotypes BR0000005208210!, LE!).

= *Microlicia maximowicziana* var. *densifolia* Cogniaux (1883: 94). **Type:**—BRAZIL. Minas Gerais: in saxosis ad Serra da Carassa [Serra do Caraça], January 1825, *L. Riedel 1488* (lectotype LE! **here designated**; isolectotypes BR0000005208210!, LE!), *syn. nov.*

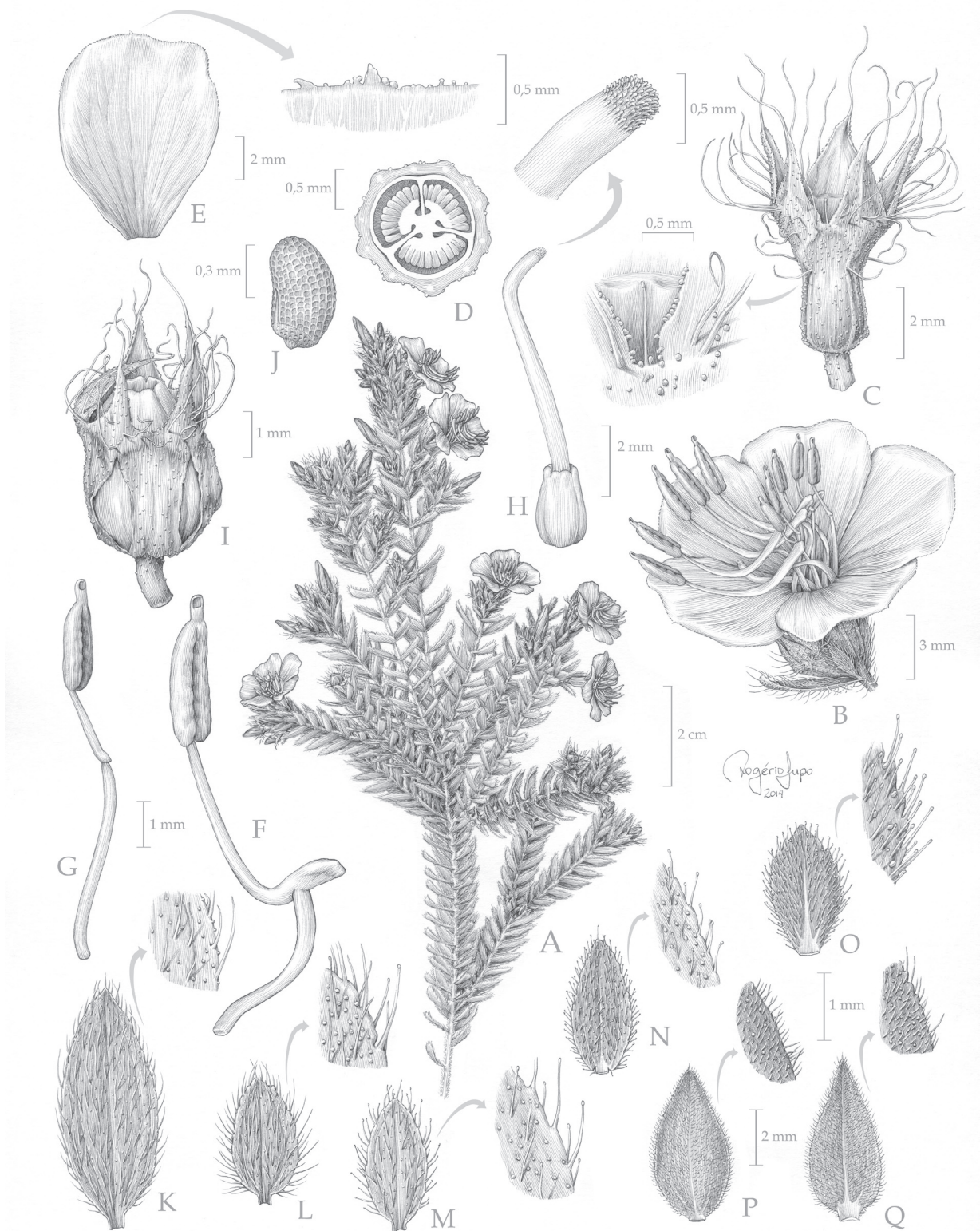
= *Microlicia maximowicziana* var. *parvifolia* Cogniaux (1883: 94). **Type:**—BRAZIL. Minas Gerais: in locis petrosis prope S. João, *L. Riedel 1688* (lectotype LE! **designated here**; isolectotypes BR0000005208562!, LE! on the right side), *syn. nov.*

= *Microlicia maximowicziana* var. *grandifolia* Cogniaux (1883: 94). **Type:**—BRAZIL. Minas Gerais: in locis glareosis arenosisque prope Tijuco [Diamantina], December 1824, *L. Riedel 1211* (holotype LE!; isotype BR0000005208234!), *syn. nov.*

Erect subshrub to shrub, 0.5–1.5 m tall, much branched. Young branches quadrangular, densely covered in sessile, spherical, golden glands and pale trichomes 1–2 mm long, rarely with glandular trichomes 1–2 mm long; older branches becoming slightly terete with age, brown to reddish-brown, without leaves at the base, leaf scars conspicuous, outer layer of bark peeling gradually to expose brownish wood; nodes with dense indumentum of brown trichomes ca. 2 mm long. Leaves horizontal to ascending, imbricate or not, concolored, abaxial and adaxial surfaces light green (dry state), becoming yellow before falling, sometimes of different sizes, internodes 1–1.5 mm long; petiole 0.4–0.5 mm long; leaf blade lanceolate or ovate-lanceolate, 4.5–8.5 × 2–4 mm, apex acute with an apical seta 0.7–1 mm long, base acute, margin crenulate, 3–5 nerved from base, both surfaces with pale trichomes, rarely with some glandular trichomes 0.8–1.7 mm long, and sessile, golden, spherical glands, indumentum on abaxial surface denser. Flower solitary, terminal and lateral, 5-merous, zygomorphic due to position of stamens and style; pedicel 0.8–1 mm long, covered in sessile, golden glands. Hypanthium oblong to oblong-campanulate, apex enlarged, slightly costate, 3.5–4 × 1.9–2.1 mm, cream (dry state), covered in sessile, spherical, golden glands, with sparse pale trichomes 1.5–3 mm long, sometimes without trichomes; calyx covered in sessile, spherical, golden glands and pale trichomes 1.5–3 mm long, tube ca. 0.3 mm long, lobes triangular, ca. 2 × 1.1–1.4 mm, apex acute with a seta ca. 2 mm long, rarely rounded without a seta, trichomes at the base. Petals 8.5–10 × 5–7 mm, pink, obovate, apex rounded to slightly retuse, margin entire, with pale trichomes, rarely glandular trichomes. Stamens 10, dimorphic: larger stamens 5, filaments 2.5–3 mm long, pink, thecae 2–2.2 mm long (including beak), ovate-oblong, polysporangiate, pink, beak 0.3–0.5 mm long, pink, connective prolonged 3–3.5 mm, pink with ventral appendage ca. 1 mm long, bicoloured, partly pink with apex yellow, truncate or acute; smaller stamens 5, filaments ca. 2.5 mm long, pink, thecae ca. 1.6 mm long (including beak), ovate, polysporangiate, yellow, beak 0.3–0.4 mm long, yellow, connective prolonged ca. 1 mm, unappendage. Ovary pyriform, ca. 2 × 1 mm, superior, 3-locular, glabrous; style 5–6 mm long, terete, pink, stigma punctiform. Capsule globose, 2.5–3.5 × ca. 2.5 mm, brown, with ovary apex exposed, dehiscing into 3 valves from the apex, covered by persistent hypanthium which gradually peels away as fruit matures. Seeds 0.5–0.6 × 0.2–0.3 mm, oblong, slightly curved to one side, pale brown, testa foveolate and areolate.

**Specimens examined:**—BRAZIL. Grão Mogol, 16°25'S–42°35'W, próximo a entrada da cidade, *R. Romero et al. 5437*, 12 June 1998 (CAS, HUFU, UEC); idem, estrada para Francisco Sá, 1 km de Grão Mogol, 16°34'50"S–42°53'58"W, *J.N. Nakajima et al. 4703* and *4705*, 13 May 2008 (HUFU); ibidem, trilha do Barão, 16°33'19"S–42°53'29"W, 867 m, *P.O. Rosa et al. 972*, 14 May 2008 (HUFU, MBM, SPF); ibidem, 16°33'16"S–42°53'31"W, 874 m, *P.O. Rosa et al. 1001* and *1012*, 14 May 2008 (HUFU, RB); estrada Grão Mogol-Cristália, 16°35'57"S–42°54'34"W, *F.N.A. Mello et al. 173*, 15 May 2008 (HUFU, US); Diamantina, Parque Estadual do Biribiri, 18°12'69"S–43°37'24"W, 1172 m, *R. Romero et al. 8332* and *8336*, 21 September 2010 (HUFU); idem, *P.K.B. Hemsinger et al. 238*, 21 September 2010 (HUFU); Alto do Jabatobazeiro, 18°08'52"S–43°34'30"W, 1236 m, *D. Marques et al. 319*, 4 October 2011 (BHCB, HUFU, P); ibidem, Serra do Carimbo, *D. Marques et al. 356*, 5 October 2011 (HUFU, K, SPF); ibidem, Cachoeira dos Cristais, 18°10'50.8"S–43°37'08.3"W, 1049 m, *A.F.A. Versiane & K.R. Silva 352*, 3 December 2012 (DIAM, HUFU).

**Phenology:**—Collected with flowers and fruits in May, June, September, October and December.



**FIGURE 1.** A–M *Microlicia maximowicziana* (Rosa et al. 1001). A. Flowering branch. B. Flower. C. Hypanthium and calyx lobes, with the petals, stamens and style removed, with detail of calyx lobes. D. Ovary in cross section. E. Petal. F. Lateral view of large stamen. G. Lateral view of small stamen. H. Pistil and detail of stigma. I. Capsule showing the hypanthium which gradually peels away at maturity. J. Seed. K. Leaf adaxial surface, showing indumentum of pale trichomes and sessile glands. L. Leaf adaxial surface (Marques 319). M. Leaf adaxial surface (Marques 356). N–O Leaf adaxial surface, showing indumentum of glandular trichomes and sessile glands. N. *Microlicia graveolens* (Romero 8345). O. *Microlicia regeliana* (Romero 8382). P. *Microlicia stricta*, leaf adaxial surface, showing indumentum of sessile glands and shorter pale trichomes (Romero 8819). Q. *Microlicia fasciculata*, leaf adaxial surface, showing indumentum and short petiole (Versiane 59). (Illustration: Rogério Lupo).

**Distribution, habitat and conservation status:**—*Microlicia maximowicziana* is endemic to the Espinhaço mountain range in Minas Gerais, where it occurs in *campo rupestre* vegetation. After about 190 years it was recollected around Diamantina; the same area as the type collection. Although this species was not reported for Grão Mogol by Martins *et al.* (2009), we found at least seven collections from this region.

Due to the restricted extent of occurrence and area of occupancy (AOO= 28 km<sup>2</sup>), *M. maximowicziana* should be considered endangered EN B1ab(iii)+2ab(iii) according to the IUCN categories and criteria (2001, 2014). A large population of *M. maximowicziana* was found also in Biribiri State Park, a natural reserve maintained by the state government.

**Taxonomy:**—Cogniaux (1883) described *M. maximowicziana* with three varieties: *M. maximowicziana* var. *densifolia*, *M. maximowicziana* var. *grandifolia* and *M. maximowicziana* var. *parvifolia*, based on the relation of the length of the internodes and leaves, leaf size and colour of the petals. These characteristics are insufficient to maintain the varieties, and we propose them as synonyms. This author indicated one collection for each variety. According to article 26.3 of the International Code of Nomenclature (McNeill *et al.* 2012), this publication automatically established the corresponding autonym *M. maximowicziana* var. *maximowicziana*. Since Cogniaux (1883) did not mention any original material for an autonym, we designate *L. Riedel 1488* as lectotype (Articles 9.2 and 26.2), as this specimen matches the protologue well. The collection *L. Riedel 1488* is also designated as the lectotype of *M. maximowicziana* var. *densifolia*. We also designate a lectotype for *M. maximowicziana* var. *parvifolia* because there are two collections in LE with the same label and with Cogniaux's handwritten identification.

**Discussion:**—Digital images of collections *L. Riedel 1211*, *1488*, and *1688* from BR are available from JSTOR (2014). An illustration (Fig. 1 A–M) is presented here to show the remarkable characteristics of *M. maximowicziana* and its relatives (Fig. 1 N–Q), as well as a photograph of a population in *campo rupestre* vegetation from Grão Mogol, with details of habitat, branches and leaves (Fig. 2 A–C).



**FIGURE 2.** A–C *Microlicia maximowicziana*. A. Habitat in Grão Mogol. B. Flowering branch. C. Vegetative branch, showing horizontal to ascending leaves. D–E *Microlicia riedeliana*. D. Santana de Pirapama. E. Branch with 5- and 6-merous flowers. (Photos: P.O. Rosa A–B, A.F.A. Versiane C & W. Milliken D–E).

*Microlicia maximowicziana* is related to *M. fasciculata* Martius ex Naudin (1845: 180) by having pink petals, dimorphic stamens with bicolorous and polysporangiate anthers, cream hypanthium (in dry material), calyx lobes shorter than the length of the hypanthium, and pale trichomes and sessile glands covering branches and leaves (Fig. 1 Q). However, *M. fasciculata* differs in having sessile leaves and a hypanthium with dense pale trichomes. *Microlicia maximowicziana* also has some affinity with *M. graveolens* De Candolle (1828: 119), which occurs in Goiás and Minas Gerais states, by having pink petals, dimorphic stamens with bicolorous and polysporangiate anthers and calyx lobes shorter than the length of the hypanthium. *Microlicia graveolens* however has sessile leaves and glandular trichomes 0.8–2 mm long (Fig. 1 N). *Microlicia regeliana* Cogniaux (1883: 92), which occurs from Ouro Preto to Serro, also has pink petals and dimorphic stamens with bicolorous and tetrasporangiate anthers. The leaves however are sessile, with slightly attenuate bases and both surfaces covered with sessile glands and glandular trichomes 0.5–1 mm long (Fig. 1 O). Furthermore, flowers are terminal, solitary or in clusters; the hypanthium is globose and covered by a dense indumentum of glandular trichomes 1–1.5 mm long. *Microlicia stricta* Cogniaux (1883: 93), endemic to Diamantina and environs, differs from *M. maximowicziana* by sessile leaves covered by sessile glands and shorter and sparser pale trichomes (Fig. 1 P).

***Microlicia riedeliana*** Cogniaux (1883: 80). **Type:**—BRAZIL. Minas Gerais: habitat in locis saxosis et pratis arenosis ad Serra da Lapa prov. Minas Geraës, *L. Riedel 1098* (lectotype LE!, **designated here**; isolecotypes BR!, K!, NY00229476, S).

Unbranched subshrub with short, procumbent stems to 9 cm long or branched shrub with erect stems to 40 cm in height. Young stems strongly quadrangular, internodes 2–3 mm long, each side deeply grooved, leaf scars distinct, glabrous with sessile, spherical glands, bark pinkish to reddish-brown, older branches without leaves, becoming terete with age, bark grey, blackened in places, peeling to expose underlying pale pinkish-brown wood. Leaves imbricate, ascending to appressed, glutinous (fresh state), both surfaces dark green (fresh state), sessile; blade mostly obovate, sometimes elliptic to narrowly elliptic (*Zappi 2612*), 5.5–11.5 × 2–6 mm, apex mostly obtuse to rounded, sometimes acute (*Zappi 2612*), slightly mucronulate, base cuneate, margin entire (fresh state) or minutely crenulate (dry state), 1(– faintly 3)-nerved, glabrous, both surfaces moderately to densely impressed glandular punctate. Flowers terminal, solitary or in clusters, 5(–6)-merous, zygomorphic due to position of stamens and style; pedicel ca. 1 mm long. Hypanthium oblong-campanulate, ca. 5 × 4.5 mm, with dense sessile, spherical glands, green; calyx tube ca. 1 mm long; calyx lobes triangular, 5–5.5 × ca. 3 mm, with sessile, spherical glands, inner surface red to pink, outer surface red to pink or green and tinged pink around margins, apex narrowly acuminate with a seta ca. 0.5 mm long, margin entire. Petals 15–17 × 10–12 mm, obovate, magenta, glabrous, apex asymmetrically acute. Stamens 10(–12), strongly dimorphic: large stamens 5, filament ca. 6.5 mm long, pink, anthers ca. 3.7 mm long (including beak), dark red, tetrasporangiate, beak ca. 0.8 mm long, pink, connective prolonged 5–5.5 mm, pink, ventral appendage 1.8–2 × ca. 1.2 mm, yellow; small stamens 5, filament ca. 6.5 mm long, pink, anthers ca. 2.8 mm long (including beak), yellow, tetrasporangiate, beak ca. 0.4 mm long, white, connective prolonged 1–1.2 mm long, yellow, ventral appendage ca. 0.6 mm long, yellow. Ovary superior, ca. 4 × 2.7 mm, obovoid with flattened apex, 3-locular, glabrous; style 14–15 mm long, horizontal when flower fully open, pink, stigma punctiform. Capsule ca. 6 × 6 mm, spheroid, pinkish brown to dark brown (dry state), dehiscent into 3 valves from apex. Seeds not seen.

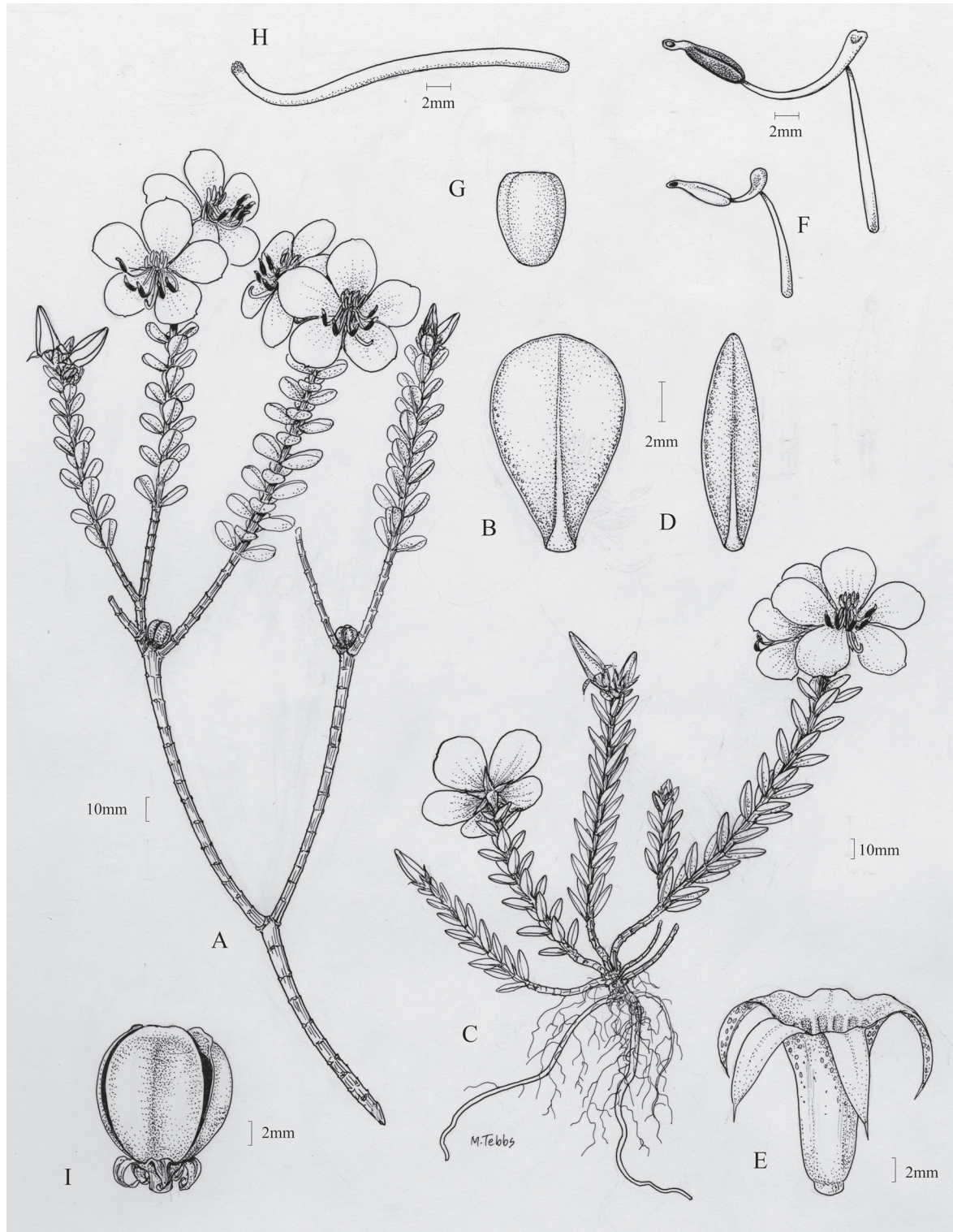
**Specimens examined:**—BRAZIL. Minas Gerais: Santana de Pirapama, Serra do Cipó, Capela de São José, Trilha da Senhorinha, caminho a Congonhas do Norte, 1337 m, 18°54'57.76"S, 43°44'57.75"W, 24 November 2009, *D.C. Zappi et al. 2570* (K, SPF); 1429 m, 18°57'35.79"S, 43°44'42.46"W, 25 November 2009, *D.C. Zappi et al. 2612* (K, SPF).

**Phenology:**—Collected with flowers and fruits in November.

**Distribution, habitat and conservation status:**—endemic to Serra do Cipó, Minas Gerais, Brazil. Rocky outcrops in *campo rupestre*, between 1337–1429 m.

The Toucan Cipó project (*Zappi et al. 2014*) has focused on a less visited part of the Serra do Cipó, comprising the northwest region of the massif, within the municipalities of Santana de Pirapama and, to a lesser extent, Santana do Riacho, a region of high biodiversity. Between 2009 and 2011, an inventory with over 1,150 species of vascular plants, including more than 10 new species, was prepared. Part of the expedition by Prussian botanist Ludwig Riedel (1823–1826) that resulted in abundant collections of new species from the Serra da Lapa (= Serra do Cipó) crossed the same paths through the mountains that were intensively explored during the Toucan Cipó project, leading to the rediscovery of *Microlicia riedeliana* and other poorly known species, such as *Lychnophora humillima* Schultz-Bipontinus (1863: 371) and *Gaylussacia riedelii* Meisner (1863: 139). Most botanical activity in the Serra do Cipó (*Giulietti et al. 1987*) has taken place on its southeastern side, within the municipality of Santana do Riacho.

Despite recent and thorough botanical explorations of the northwest region of the Serra do Cipó, only two modern collections have been made of this species from a single locality in the last 190 years. It is clear that this species has an extremely restricted geographical range with an area of occupancy of 8 km<sup>2</sup>, in an area which receives no environmental protection. Human induced threats from agriculture and charcoal extraction are greater at lower elevations, but higher elevations are under sporadic risk of an increased frequency of fires and disturbance from diamond and crystal mining (Zappi 2010; Zappi *et al.* 2014). As *Microlicia riedeliana* has an area of occupancy of less than 500 km<sup>2</sup>, it exists in less than five locations and its habitat is under threat from fire and mining, it should be considered endangered EN B1ab(iii)+2ab(iii) according to the IUCN categories and criteria (2001, 2014).



**FIGURE 3.** A–I *Microlicia riedeliana*. A. Erect, branched habit. B. Obovate leaf. C. Unbranched, procumbent habit. D. Narrowly elliptic leaf. E. Hypanthium and calyx lobes. F. Large and small stamen. G. Ovary. H. Style with horizontal orientation (attachment to ovary not observed). I. Capsule. A–B, E–I from Zappi *et al.* 2570; C–D from Zappi *et al.* 2612. (Illustration: Margaret Tebbs).

**Taxonomy:**—Cogniaux (1883) described *Microlicia riedeliana* citing material of *Riedel 1098* deposited in several herbaria (*Herb. Hort. Petrop.*, *Acad. Petrop.*, *Berol.*, *Monac. et Vindob.*). The specimen at LE is designated here as lectotype of this species, since the vegetative and reproductive parts are in agreement with the protologue of the species, the specimen is of good quality and the label gives locality details and date of collection.

**Discussion:**—Digital images of *L. Riedel 1098* from BR and NY are available on JSTOR (2014). An illustration (Fig. 3) is presented here to show the characteristics of *M. riedeliana* and photographs of the flowers (*Zappi 2570*) and the habitat in Serra do Cipó where the specimens *Zappi 2570* and *2612* were collected are also included (Fig. 2 D–E).

The collection *Zappi 2612* is interesting as it has a creeping habit with short, unbranched, procumbent stems rather than an erect habit with branched stems as is the case with the type material and the collection *Zappi 2570*. According to Daniela Zappi (pers. comm.) the plants were growing in very poor soil, almost pure sand in very exposed locations and this could have affected their growth.

*Microlicia riedeliana* bears some resemblance to *M. tetrasticha* Cogn. (1883: 80), which occurs in Serra do Cipó, Serra da Moeda, Serra do Cabral, Itacambira, Grão Mogol, Diamantina and Gouveia, in Minas Gerais. Both are branched subshrubs to shrubs with grooved stems, glutinous, impressed glandular punctate, imbricate, sessile leaves, flowers in clusters at tips of branches, purple/magenta petals and dimorphic stamens with tetrasporangiate, bicolorous anthers. *Microlicia tetrasticha* differs in having leaves 2–5 × 1–3.5 mm, blades elliptic to ovate and apices acuminate, calyx lobes acute, ca. 2 mm long and petals ca. 11 × 5 mm.

*Microlicia riedeliana* also resembles *M. longipedicellata* Almeda & A.B. Martins (2001: 3), a species endemic to Diamantina, Minas Gerais. They are both branched shrubs with glutinous, impressed glandular punctate, imbricate, sessile leaves and dimorphic stamens with tetrasporangiate, bicolorous anthers. *Microlicia longipedicellata* differs in having leaves 15–20 × 8–10 mm, blades ovate to elliptic with 3–5-nerve, elongate pedicels 5–10 mm long, 8–10-merous flowers and a 5-locular ovary.

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