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Typification and taxonomy in *Mimosa* subser. *Obstrigosae* (*Fabaceae*, mimosoid clade)

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Abstract: During a revision of *Mimosa* sect. *Mimosa* from southern Brazil, we noticed that *M. adpressa* Hook. & Arn., a species of *M.* subser. *Obstrigosae* (Benth.) Barneby, has never been typified and that *M. subinermis* Benth. has long been considered a synonym of *M. rupestris* Benth. We designate here a specimen from Argentina, collected by Tweedie and deposited in the Kew herbarium, as the lectotype of *M. adpressa*. Furthermore, we show that *M. subinermis* is readily distinguished from *M. rupestris* by many morphological features (e.g. habit, calyx type, fruits), supporting our hypothesis that *M. subinermis* is a distinct species.

Key words: *Fabaceae*, lectotypification, *Leguminosae*, *Mimosa*, *Mimosa* subser. *Obstrigosae*, *Mimosa adpressa*, *Mimosa rupestris*, *Mimosa subinermis*, South America, taxonomy

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Introduction

The genus *Mimosa* L. comprises more than 530 species (Bessega & Fortunato 2011; Simon & al. 2011), distributed mainly in the neotropics (Simon & al. 2011). Although *Mimosa* was studied extensively by Bentham (1841–1842, 1875, 1876) and fully revised and monographed by Barneby (1991), many new taxa have been described since then (e.g. Simon & al. 2010; Morales & al. 2012; Savassi-Coutinho & al. 2012; Dutra & Garcia 2013; Santos-Silva & al. 2013; Borges & al. 2014; Schmidt Silveira, & al. 2016; Jordão & al. 2017). Moreover, some gaps remain open in *Mimosa* (e.g. re-circumscription of sections, series and subseries based on DNA evidence; determination of controversial synonymizations; typifications; estimation of diversity and conservation status). Recently,

Borges & Pirani (2014) re-established *M. tocanina* Taub., which was considered a synonym of *M. longepedunculata* Taub. in Barneby's monograph; and Morales & Calderón (2018) lectotypified *M. obstrigosa* Burkart.

In this paper, we deal with a typification and a controversial synonymization involving taxa in *Mimosa* subser. *Obstrigosae* (Benth.) Barneby. The species of this subseries are generally aculeate shrubs, characterized by a strigose, retrorse and adpressed indumentum of trichomes that are basally dilated, dorsally compressed and minutely calcarate (Barneby 1991). Barneby (1991) recognized nine species in *M.* sect. *Mimosa* ser. *Mimosa* subser. *Obstrigosae*. More recently, Izaguirre & Beyhaut (2002) increased the number of species in the subseries by adding new taxa from Uruguay. The subseries is widespread in extratropical South America (Argentina, Uruguay and

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Rio Grande do Sul State in southern Brazil). Only one species, *M. ourobrancoensis* Burkart (1947: 533), occurs in the tropical zone (Minas Gerais State, Brazil). Furthermore, the taxonomy of *M.* subser. *Obstrigosae* is complex and needs a review based on integrative taxonomy.

One reason for this complex taxonomy is that many of the species are very similar in their vegetative phase, and it is sometimes necessary to examine the fruits to provide an accurate identification. Secondly, hybridization may occur between some species of *M.* subser. *Obstrigosae*, making it difficult to establish diagnostic characters, such as was shown in other subseries of *M.* sect. *Mimosa* ser. *Mimosa*, e.g. *M.* subser. *Brevipedes* (Morales & al. 2014) and *M.* subser. *Mimosa* (Morales & Fortunato 2010). Moreover, distinct species are sometimes treated as synonyms. For example, *M. adpressa* Hook. & Arn. (Hooker & Arnott 1833: 202) and *M. obstrigosa* Burkart (1946: 231) are commonly misidentified and have been mistakenly considered to be synonyms (e.g. by The Plant List 2013), and *M. subinermis* Benth. has long been considered a synonym of *M. rupestris* Benth. (Bentham 1875; Barneby 1991).

The difficulties of delimitation among species favours taxonomic confusion, which can lead to over- or underestimating species richness (Ely & al. 2017). In this context, typification plays an important role, in assigning the correct application of a name. If species names are used without knowledge of their status (e.g. accepted, synonyms, doubtful), this can have negative consequences in fields such as conservation biology and ecology (Dayrat 2011). Therefore, the aims of our study were: (1) to lectotypify *Mimosa adpressa* and (2) to demonstrate that *M. subinermis* is a species distinct from *M. rupestris*.

Material and methods

For the typification of *Mimosa adpressa*, we examined specimens deposited in K, E and TCD (herbarium codes according to Thiers 2018+). To corroborate that *M. subinermis* should be considered a species distinct from *M. rupestris*, we studied type material in K, P and TUB and consulted other material from southern Brazil and Uruguay in FLOR, FURB, HAS, HDCF, HUCCS, ICN, MBM, MVFA, MVJB, MVM, PACA, PEL and SMDB. Furthermore, we conducted field trips to confirm the distribution of *M. subinermis* and to provide more morphological evidence to distinguish this species.

Results and Discussion

Lectotypification of *Mimosa adpressa*

Mimosa adpressa Hook. & Arn. in Bot. Misc. 3: 202. 1833. – **Lectotype (designated here):** Argentina, Entre Rios, 1837, *Tweedie s.n.* (K K000532824! [two stems on lower half and upper right side of sheet]; isolectotypes: E E00514885! [two stems on right side of sheet],

K K000543690! [two stems at bottom and lower left side of sheet], TCD TCD0004716! [stem on left side of sheet]).

Typification — According to Art. 9.6 of the *International Code of Nomenclature for algae, fungi, and plants* (Turkland & al. 2018), a syntype is any specimen cited in the protologue when there is no holotype, or any one of two or more specimens simultaneously designated in the protologue as types; and reference to an entire gathering is considered as citation of the included specimens. In the protologue of *Mimosa adpressa*, Hooker & Arnott (1833: 202) cited two gatherings from Argentina (“Entre Rios, *Tweedie*”) and Uruguay (“Uruguay, *Baird*”). Specimens belonging to these gatherings are therefore syntypes. Barneby (1991) mentioned the existence of syntypes both in K and E. We found three specimens of the Tweedie gathering in K (barcodes K000532824, K000556935 and K000556936) and one specimen of the Baird gathering sharing its barcode (K000543690) with a fourth specimen of the Tweedie gathering. We found two further specimens of the Tweedie gathering in E (barcode E00514885) and TCD (barcode TCD0004716).

Among these syntypes, we consider the most appropriate choice of lectotype to be the Tweedie specimen in K with barcode K000532824. This specimen clearly shows the main morphological feature identifying it as *Mimosa adpressa*, i.e. sessile or subsessile inflorescences. Furthermore, the label is clear and the sheet bears only material of *M. adpressa*. The lectotype excludes the stem on the upper left side of the sheet, which is annotated as a specimen from a different gathering (Maldonado, *Capt. King s.n.*, barcode K000532823). At least one of the other syntypes of *M. adpressa* could lead to misinterpretation if selected as the lectotype. For example, the sheet in K bearing the Baird specimen (barcode K000543690) also bears a duplicate of the Tweedie specimen, as well as a fragment annotated in pencil as *M. bonplandii* Benth., but without further annotation or labels, all mounted on the same sheet and sharing the same barcode. We also have some doubts about the syntype status of two of the sheets in K: that with the barcode K000556935 appears to bear the date “1837” on its label, i.e. later than the protologue, and the sheet with barcode K000556936 could bear material from two different gatherings, according to the handwritten field notes on two of the labels.

Phenology — Flowering from autumn to spring; fruiting from autumn to the beginning of summer (Izaguirre & Beyhaut 2003).

Distribution and ecology — Argentina (Provinces of Corrientes and Entre Rios); Brazil (only in the State of Rio Grande do Sul) and Uruguay (Departments of Artigas, Canelones, Flores, Florida, Maldonado, Montevideo, Paysandú, Río Negro, Salto, Soriano and Tacuarembó), according to Izaguirre & Beyhaut (2003). The species usually occurs in soils with rock outcrops and not well drained.



Fig. 1. Morphology and habitat details of *Mimosa subinermis*. – A: habit and habitat; B: indumentum of old branch; C: aculei; D: leaflets closed at midday; E: trunk; F: habitat. – Brazil, Rio Grande do Sul, Caçapava do Sul, Cerro das Mulas, 11 December 2015; photographs: A–E by D. B. Lucas; F by F. Schmidt Silveira.

Conservation status — This taxon has not yet been assessed according to IUCN Red List categories and criteria (IUCN 2012, 2016).

Remarks — *Mimosa obstrigosa* and *M. ramulosa* Benth. are morphologically similar to *M. adpressa*, but *M. adpressa* can be distinguished by its sessile or subsessile inflorescence, whereas the other two species have long peduncles (5–20 mm long). We share the opinion of Barneby (1991: 619) in considering *M. adpressa* and *M. obstrigosa* as distinct species.

Additional specimen examined — URUGUAY: *Baird s.n.* (K K000543690! [five stems on upper part of sheet; remaining syntype of *Mimosa adpressa*]).

Taxonomic treatment of *Mimosa subinermis*

Mimosa subinermis Benth. in J. Bot. (Hooker) 4: 385. 1841. – Lectotype (designated by Barneby 1991: 615, as “presumed holotypus”): Brazil, *Sellow s.n.* (K K000532610!; isolectotypes: P P00755953!, TUB TUB-009629!). – Fig. 1 & 2.

Description — *Treelets* 2–3 m tall, almost completely unarmed except for some random conic aculei 1.5–3.5 mm long, mainly at bases of old branches and trunk. *Branches* sparsely covered by retrorse, adpressed, strigose trichomes and a secondary puberulent indumentum, principally on young branches. *Leaves* bipinnate, 1-jugate; *petiole* diminutive, 1.4–3.6 mm long, strigose and puberulent; *pinnae* 12–49 mm long, with 12–38 pairs of leaflets per pinna, sensitive to touch; *leaflets* concolorous, narrowly oblong, 3–6 × 0.6–1 mm, with 2 main veins on dorsal surface, no veins on ventral surface, both surfaces glabrous, base asymmetric, margin corneous pallid with translucent setae, apex acute. *Stipules* lanceolate, 2–3.8 × 0.4–0.7 mm, hispid or not, depending on age, with 1 or 2 main veins. *Inflorescences* capituliform, globose; *peduncle* 17–26 mm long, densely covered by retrorse, adpressed, strigose trichomes; *floral bracts* c. 2.7 × 0.3–0.5 mm. *Calyx* paleaceous, fimbriate, 1.2–1.7 mm long, covering 1/3–1/2 of corolla length, glabrous. *Corolla* tubular, 3–3.7 × 0.5–0.8 mm; lobes densely puberulent at apex. *Ovary* stipitate, obovate, 0.6–0.8 mm long; *stipe* 0.3–0.6 mm long. *Stamens* free, exserted, pink-lilac, 5–6 mm long. *Fruit* a craspedium, 3–10 per capitulum, oblong-compressed, 20–31 × 3.9–4.7 mm, (3 or) 4–7-articulated, *stipe* 0.9–1.9 mm long, valves and replum strigose, apex cuspidate. *Seeds* brown, ovoid, 3.5–4.2 × c. 2.7 mm; pleurogram present.

Phenology — Flowering from February to May; fruiting during November and December.

Distribution and ecology — Brazil, State of Rio Grande do Sul: Serra do Sudeste in Caçapava do Sul and Santana da Boa Vista. The species grows on sandstone outcrops,

in rocky grasslands and in association with forest on outcrops.

Conservation status — This species lacks information about distribution, ecology and threats because there are few records and most of them have inaccurate geographic data (absence of geographic coordinates). Almost all the excursions we undertook to delimit its distribution failed to find the species at the localities of early records. We found only one locality, but with no more than five individuals. In that regard, *Mimosa subinermis* was evaluated as Data Deficient (DD) according to IUCN categories and criteria (IUCN 2012, 2016).

Remarks — The name *Mimosa subinermis* has been considered a synonym of *M. rupestris*, but we consider it to be a distinct species, and it is therefore reinstated here after 143 years. *Mimosa subinermis* and *M. rupestris* were first described by Benth. (1841: 385), both from Sellow collections and both on the same page of Benth.’s treatment. In the protologue of *M. rupestris*, it was cited from the State of Rio Grande do Sul in southern Brazil (“Brazil, Sello; Mountains of Rio Jaquhy, Tweedie”), whereas *M. subinermis* was only generally cited as a Brazilian species (“Brazil, Sello”), without any finer detail about locality of occurrence. The major differences between the two species according to Benth. (1841) were: absence/presence of aculei, the relation of peduncle length to pinna length, leaflet morphology, and calyx length.

Years later, however, Benth. (1875) appeared to have been less certain about those differences and considered *Mimosa subinermis* to be a synonym of *M. rupestris*. Benth. clearly also had difficulty distinguishing other taxa of *M.* subser. *Obstrigosae*. For example, *M. ourobrancoensis* (Burkart 1947), from Minas Gerais State, Brazil, was not described until a century after Benth. (1841) published *M. rupestris* and *M. subinermis*, even though Benth. had access to material of *M. ourobrancoensis*. Benth. cited these early collections of *M. ourobrancoensis* as *M. rupestris* in *Flora brasiliensis* (Benth. 1876).

Barneby (1991: 616) also agreed with the synonymization by Benth. (1875) of *Mimosa subinermis* under *M. rupestris*, remarking that “*M. subinermis*, which Benth. himself eventually treated as a taxonomically negligible armed variant of *M. rupestris*, is the only specimen of its sort known to me. Except for its very few aculei, inserted on one infrastipular rib immediately below random nodes, it appears identical with genuine *M. rupestris*. Nothing exact is known of its origin or dispersal, and its status remains contingent on rediscovery.” However, here we show that *Mimosa subinermis* is readily distinguished from *M. rupestris* by its habit, presence of aculei, branches sparsely covered by strigose trichomes, paleaceous calyx covering almost half of the corolla length, and fruits covered by strigose adpressed trichomes (Fig. 2, Table 1).



Fig. 2. Comparison of morphological details of *Mimosa subinermis* (A–D), *M. rupestris* (E–H) and *M. ourobrancoensis* (I–L). – A, E, I: stem indumentum; B, F, J: leaflets, dorsal surface (left), ventral surface (right); C, G, K: flowers; D, H, L: fruits. – Scale bars: C, G, K = 0.5 mm; A, B, E, F, I, J = 1 mm; D, H, L = 5 mm. – All photographs by F. Schmidt Silveira.

Table 1. Morphological similarities and differences between *Mimosa subinermis* and *M. rupestris*.

Character	<i>Mimosa subinermis</i>	<i>Mimosa rupestris</i>
Habit	treelets 2–3 m tall	subshrubs to 1 m tall
Presence of aculei	almost completely unarmed	unarmed
Indumentum type on branches	retorse, adpressed, strigose indumentum with trichomes basally dilated, dorsally compressed and minutely calcarate	
Indumentum density on branches	sparse	very dense
Stipule shape	lanceolate	
Leaf attributes	leaves 1-jugate; petiole diminutive, 1–3.6 mm long; pinnae 8–50 mm long, with 10–40 pairs of leaflets per pinna; leaflets narrowly oblong, margin corneous	
Inflorescence shape, peduncle length	capituliform, globose; peduncle 12–30 mm long	
Calyx type and length	paleaceous, fimbriate, 1.2–1.7 mm long	membranous, ciliolate, 0.2–0.5 mm long
Corolla shape, pubescence of lobes	tubular; lobes densely puberulent at apex	
Stamens colour	pink-lilac	
Fruits per inflorescence	1–10	
Fruit form, articulation and indumentum	oblong-compressed, (3 or) 4–7-articulated, strigose	inflated, not clearly articulated, densely setose
Geographic distribution	Brazil: State of Rio Grande do Sul	Argentina; Brazil: State of Rio Grande do Sul (e.g. Porto Alegre, Guaíba, Capão do Leão, Soledade); Uruguay
Substrate	sandstone outcrops, rocky grasslands and in association with forest on outcrops	granitic outcrops

Additional specimens examined — BRAZIL: RIO GRANDE DO SUL: Caçapava do Sul, Rodovia Caçapava to Lavras, 30 May 1976 (fl), *M. L. Porto & al.* 2210 (ICN 31257); Camaquã to Caçapava do Sul, Feb 2002 (fl), *M. Sobral s.n.* (FURB 1370); Caçapava do Sul, Apr 2002 (fl), *M. Sobral* 9533 (MBM 271091); ibidem, Cerro das Mulas, Nov 1987 (fr), *M. Sobral & al.* 5718 (ICN 81497); ibidem, 11 Dec 2015 (fr), *F. Schmidt Silveira* 1050 (ICN); Santana da Boa Vista, Passo dos Neves, 14 Jan 1986 (fr), *J. N. C. Marchiori* 220 (HDCF 002172).

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