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A new species of *Mimosa* (Mimosoideae, Leguminosae) from the inter-Andean dry valleys

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Abstract

Mimosa arturoana (Mimosoideae, Leguminosae) is described and illustrated for the first time. This species is similar to the recently published *M. lamolina* and to the allopatric, Mexican *M. deamii*, but differs by several morphological characters, such as stems armament, secondary venation of leaflets and pubescence of vegetative organs and pods. This species should be included in the *Mimosa* sect. *Mimosa* ser. *Mimosa* subser. *Lactifluae* by its characteristic habit, armament of stems, and ecology. This finding increments the diversity of Leguminosae in the dry forests of Inter-Andean valleys of Peru, a potentially center of endemism of this family.

Resumen

Mimosa arturoana (Mimosoideae, Leguminosae) es descripta e ilustrada por primera vez. Esta especie es similar a la recientemente publicada *M. lanolina* y a la especie alopátrica mexicana *M. deamii*, pero difiere por varios caracteres morfológicos, como el armamento de los tallos, el indumento, la venación secundaria y pubescencia de los folíolos y frutos. Esta especie debería incluirse en la sección *Mimosa* serie *Mimosa* subserie *Lactifluae* por su hábito de crecimiento, armamento de los tallos y ecología características. Este hallazgo incrementa la diversidad de Leguminosas en los bosques secos de los valles inter-andinos de Perú, un potencial centro de endemismo de la familia.

Introduction

The pantropical and subpantropical genus *Mimosa* Linnaeus (1753: 533) comprises ca. 540 species (Simon *et al.* 2011). Bentham (1841, 1842, 1875, 1876) performed extensive studies in this megadiverse genus, and the Neotropical species were exhaustively revised by Barneby (1991), who recognized 479 species classified in five sections: *Mimadenia* Barneby (1991: 25), *Batocaulon* DeCandolle (1825: 429), *Habbasia* DeCandolle (1825: 428), *Calothamnos* Barneby (1991: 313), and *Mimosa*. However, recent phylogenetic analyses discussed this infrageneric division (Simon *et al.* 2011; Bessega & Fortunato 2011).

Mimosa has two important centers of diversification, 1) Mexico, Central America, La Hispaniola, and Orinoco Basin; and 2) Amazonas Basin and adjacent areas of Brazilian Planalto, Argentina, Uruguay, and Paraguay (Barneby 1991).

The inter-Andean valleys of South America, in Peru and Ecuador, are especially rich in endemic Leguminosae, for example, the Río Marañón valley (Barneby 1998; Linares-Palomino 2006; Linares-Palomino *et al.* 2007; Lewis *et al.* 2010). Several authors proposed endemic *mimosas* in this area, such as sect. *Batocaulon* ser. *Andinae* Barneby (1991: 84): *M. montana* Kunth var. *sandemanii* Barneby (Barneby 1991:

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89); ser. *Bimucronatae* Barneby (1991: 160): *M. caduca* (Willd.) Poiret (1810: 83), and sect. *Mimosa* ser. *Mimosa* subser. *Lactifluae* Barneby (1991: 571): *M. incarum* Barneby (1991: 576), and subser. *Castae* (Bentham) (1842: 363) Barneby (1991: 524): *M. cuzcoana* MacBride (1943: 88).

After the revision of Barneby (1991), some new species from inter-Andean valleys were described, as *M. jaenensis* Särkinen, Marcelo-Peña & Hughes (2011: 147), from the ser. *Andinae*. Recently, Lewis *et al.* (2010) described a new species of subser. *Lactifluae* from Peru, *M. lamolina* Lewis & Hughes (2010: 217), which appears endemic of the Marañón valley and exhibits morphologic similarity to the allopatric Mexican *M. deamii* Robinson (1900: 324).

The subseries *Lactifluae* was described by Barneby (1991) and included in sect. *Mimosa* ser. *Mimosa* by its haplostemonous flowers and habit. This author grouped in this subseries ten species restricted to Mexico and Central America, and one species from dry inter-Andean valleys of Peru: *M. incarum.* This subseries was suggested to be a distinctive series of section *Mimosa* (Grether 2000) by its habit, morphology and restricted distribution.

This subseries comprises shrubs and treelets with armed or unarmed stems, and predominantly campanulate calyx (Barneby 1991). Recent phylogenetic studies (Simon *et al*. 2011) found that several species of the subseries *Lactifluae* were grouped in a monophyletic clade together. These studies also recovered a weak sistergroup relationship between this clade and the contiguous, which comprises a number of Andean endemics (for example, *M. incarum, M. lamolina*).

In this work, we described a new species of *Mimosa*, which is close to Peruvian *M. lamolina* and Mexican *M. deamii*. According to the morphologic distinctiveness, this species should be included in the subseries *Lactifluae* and seems restricted to dry, inter-Andean valleys of Amazonas Province, in Peru. Observations about ecology and taxonomy are presented.

Taxonomy

Mimosa arturoana M.Morales & Fortunato, *sp. nov.* Fig. 1.

Type:—PERU. Amazonas**:** Luya, Camporredondo, Fundo El Cedro, Ishangas, bosque primario (bosque seco), 1100-1600 m, 06º07’03’’S, 78º20’02’’W, 29 March 1997, *Campos et al. 3716* (holotype BAB!, isotype MO!).

Differs from *Mimosa deamii* by armed stems, hispid indumentum, with scaberulous or plumose setae, and craspedia with puberulent valves and scaberulous or plumose hairs in the replum (not unarmed stems, and indumentum of single setae, with uniformly antrorsely strigose craspedia).

Erect shrubs attaining 1.5 m tall. Stems armed with two infrastipular aculei, rare unarmed at some nodes. Indumentum of the vegetative organs with scaberulous or plumose setae, more dense in the apex of stems and inflorescences. Leaves bipinnate, pinnae 1-jugate; stipules 1.5–4 × 0.5 mm, linear-lanceolate or setiform, dorsally pubescent and scarcely setose, weakly 1–3-nerved; petioles 4.5–15.5 × 0.6–1 mm; rachis of pinnae 10–27 mm long; leaflets 11–13 × 3–7 mm, 3–6-jugate, strigose on both surfaces, with unbranched hairs, discontinuously setose margin, 3–4-nerved, oblong to oblanceolate, obtuse, subcoriaceous, secondary nerves not conspicuous. Pseudoracemes shortly exserted or solitary capitula in the axil of contemporary leaves, with the longest peduncles 11–22 mm long, capitula 5–7 × 3.5–5.5 mm in diameter, generally ellipsoid, tenuously hispid before the anthesis; floral bracts 1–1.5 mm long, pectinate-ciliate in the margin, glabrate dorsally, 1-nerved. Flowers sessile, haplostemonous; calyx 0.25–0.5 mm long, campanulate, sometimes with few cilia at apex; corolla 1.75–3.5 mm long, puberulent at lobes; androecium with 4 stamens, filaments (unknown when plentiful flowering) 3.5–5 mm long, free, pink; gynoecium with style 2–3 mm long and ovary 0.5–0.7 mm long, pubescent. Craspedia 16–30 × 4–5 mm, 2–5 articles, oblong to oblanceolate, frequently contracted at base into stipe up to 3 mm long, acuminate or apiculate, plane-compressed, tenuously colliculate over each seed, replum strigose with scaberulous setae; valves densely puberulent. Seeds of ripe fruits unknown.

Taxonomic notes:—*Mimosa arturoana* is included in subseries *Lactifluae*, based on the combination of the following characters: A) habit: woody shrubs; B) infrastipular aculei; C) the hispid indumentum; D) the

foliar formula (i/3–6); E) fertile haplostemonous flowers (Fig. 1). In its vegetative and reproductive traits, this species is close to several representatives of the subseries *Lactifluae* occurring in South American Andes and Mesoamerica. The study of five sheets of the type collection (four currently at MO, one at BAB), with flowers and fruits, confirms this should be a new taxonomic entity.

M. arturoana is morphologically close to *M. deamii*, but the latter has unarmed stems and uniformly antrorsely strigose craspedia, while *M. arturoana* has armed stems and craspedia with scaberulous or plumose setae in the replum and single, minute hairs in both replum and valves. In addition, the indumentum of *M. deamii* has single hairs, while the indumentum of *M. arturoana* has plumose or scaberulous hairs or setae (Fig. 1G). These differences in indumentum were frequently the basis of proposals of infrageneric categories in *Mimosa*, for example, in *Mimosa* sect. *Mimosa* ser. *Mimosa* subser. *Brevipedes* Barneby (1991: 705), and between the sections *Mimosa* and *Calothamnos* (Barneby 1991).

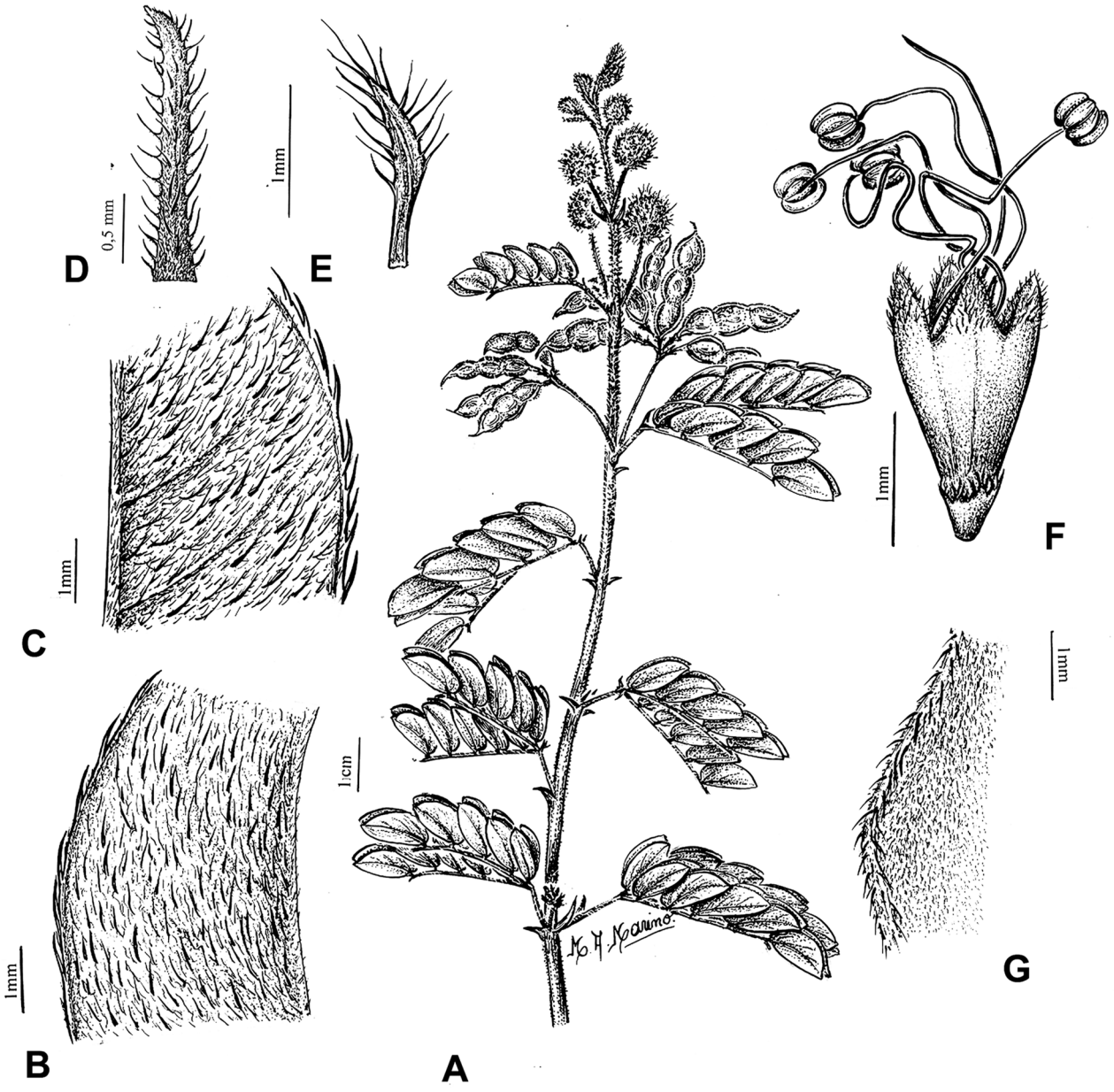

FIGURE 1. *M. arturoana* M.Morales & Fortunato. A) Flowering and fruiting branch. B) Leaflet, adaxial surface. C) Leaflet, abaxial surface. D) Stipule. E) Bract. F) Flower. G) Detail of craspedium (replum and valve's fragment). Drawn from the holotype.

TABLE 1. Morphology and distribution of species phylogenetically related of Sect. *Mimosa* Ser. *Mimosa* Subser. *Lactifluae, Polycarpae* and *Pectinatae* sympatric in Peru

	Subser. *Lactifluae*				Subser. *Polycarpae*	Subser. *Pectinatae*
	M. arturoana	*M. lamolina*	*M. deamii*	*M. incarum*	*M. polycarpa*	*M. pectinatipinna*
Habit	Erect shrub	Arborescent shrub	Erect shrub	Shrub	Erect shrub	Erect shrub
Stem armament	Armed with infrastipular aculei, sometimes unarmed	Unarmed	Armed with infrastipular aculei or unarmed	Armed with infrastipular and infranodal aculei	Armed with infrastipular aculei	Armed with infranodal aculei
Indument	Minutely scaberulous to plumose setae	Glabrous	Fuscous, pubescent and strigose	Smooth or microscopically scaberulous	Hispid–strigose	Puberulent and strigose.
Petiole length (mm)	4.5–15.5	18–30	13–29	4–12	7–40	1–2.5
Stipule size (mm)	1.5–4 × 0.5	11–12 × 2.5–4	3–5.5 × 0.75–1.5	2–4 x 0.35–6	5–11 × 1–2.4	2–3.5 × 0.2–0.4
Stipule form	Linear-lanceolate or setiform	Narrowly triangular	Lanceolate	Narrowly lanceolate	Lanceolate or lanceolate -elliptic	Subulate
Stipule primary nerves	1–3	3–5	1–3	1	1–11	1
Rachis length (mm)	10–27	Up to 50	26.5–75	20–47	30–80	6–17
Leaflet pairs	3–6	5–6	3–6	7–16	12–35	12–26
Leaflet form	Oblong to oblanceolate	Oblong	Obovate-elliptic	Oblong or ovate-oblong	Linear or linear-lanceolate	Linear
Leaflet pubescence	Strigose on both surfaces	Glabrous	Strigose on both surfaces	Puberulent and subapressed setose on both surfaces	Glabrous or only puberulent in the abaxial surface	Minutely puberulent on both faces
Longer leaflet size (mm)	11–13 × 3–7	22 × 10	18–37 × 6–22	6–12 × 2.1–4.2	6–15 × 1–3	3–5 × 0.4–0.7
Leaflet secondary venation	Not visible	Brochidodrome	Generally not visible, sometimes brochidodrome	Not visible	Not visible	Not visible
Leaflet margin	Discontinuously setose-ciliate	Setose ciliate	Discontinuously setose-ciliate	Discontinuously setose-ciliate	Discontinuously setose-ciliate	Discontinuously setose–ciliate
Leaflet primary nerves	3–4	3–5	3–5	3	1–2(3)	2

.....continued on the next page

TABLE 1. (Continued). Morphology and distribution of some species phylogenetically related of the Section *Mimosa* Ser. *Mimosa* subseries *Lactifluae, Polycarpae* and *Pectinatae*

	Subser. *Lactifluae*				Subser. *Polycarpae*	Subser. *Pectinatae*
	M. arturoana	*M. lamolina*	*M. deamii*	*M. incarum*	*M. polycarpa*	*M. pectinatipinna*
Length of longest peduncles (mm)	11–22	18–25	2–25	4–15	4–20	7–15
Inflorescence type	Pseudoraceme or or solitary capitula in the axil of contemporary leaves	Pseudoraceme	Pseudoraceme	Pseudoraceme	Pseudoraceme	Axillary to coeval leaves.
Capitula form (before antesis)	Tenuously hispid	Moriform	Moriform	Moriform	Moriform or hispid	Moriform
Capitula diameter (mm)	5–7 × 3.5–5.5	4–13 × 4–10	4–10 × 4–7	4–5	5–5.5	4–5
Calyx length (mm)	0.25–0.5	0.5	0.5	0.25–0.4	<1	0.8–1.3
Calyx type	Campanulate	Campanulate	Toothed and ciliate	Campanulate	Asymmetrically paleaceous–pappiform	Pappiform
Corolla length (mm)	1.75–3.5	±2.5	±2.7	2–2.4	2–2.8	1.8–2.1
Corolla pubescence	Puberulent	Glabrous	Puberulent	Puberulent to glabrous	Glabrous or puberulent	Glabrous
Craspedium size (mm)	16–30 × 4–5	27–34 × 6–7	17–46 × (3)5–8	8–24 × 5–6.5	10–25 × 4–5	15–24 × 4–5
Craspedium pubescence	Strigose on the replum with scaberulous or plumose hairs, and puberulent on the valves.	Strigose (unbranched hairs) in the margin and glabrous in the valves.	Antrorsely strigose (unbranched hairs or setae).	Densely puberulent (unbranched hairs or setae).	Hispid in the replum (unbranched hairs or setae).	Replum and valves puberulent and strigose (unbranched hairs or setae).
Craspedium articles	2–5	3–4	3–4	1–4	2–6	2–4
Geographic distribution	Inter-andean dry valleys from Amazonas province, Peru	Lower Hucabamba Valley	Oaxaca, Mexico	Upper Marañón Valley	South America, from Peru to Northern Argentina	Inter–andean valleys of the río Marañón basin.

Mimosa arturoana also shows affinity with *M. lamolina* (Lewis *et al.* 2010), but both can be easily distinguished. *M. arturoana* has variably armed and hispid stems, with scaberulous or plumose setae, especially in the apex, while *M. lamolina* is unarmed and almost all entirely glabrous. On the other hand, both species differ by the foliar venation: *M. lamolina* has 3–5 prominent primary nerves and brochidodrome venation, while *M. arturoana* has 1–3 tenuous primary nerves, and tenuously, eucamptodrome venation (Fig. 1B–C). The stipules of *M. lamolina* are strongly 3-nerved and glabrate dorsally, while the stipules of *M. arturoana* are nerveless or tenuously 1-nerved and puberulent dorsally (Fig. 1D). Although *M. lamolina* was reported to have whitish green corollas and white stamens, and *M. arturoana* pink corollas and stamens, these characters have doubtful taxonomic value (at least, in this particular group of *mimosas*), as was observed by several authors in the field (Barneby 1991; W. R. Anderson personal observation).

M. deamii, M. arturoana and *M. lamolina* form a characteristic group of shrubby species of subser. *Lactifluae* with exserted pseudoracemes or solitary capitula in the axil of contemporary leaves, and few, ample, generally oblanceolate to obovate distal leaflets. In spite of their similarity, the three species can be easily distinguished between them, by their variation in pubescence and venation of leaflets, indumentum of vegetative organs and stipules (Table 1).

On the basis of the studies performed in the subseries *Lactifluae* and close taxa, and previous phylogenetic studies (Simon *et al.* 2011) we do not consider *Lactifluae* with rank of series of sect. *Mimosa*. The distinctiveness of this group seems to be only the habit and geographic distribution, sharing several traits with members of sect. *Mimosa* ser. *Mimosa* subser. *Polycarpae* Barneby (1991: 516) and *Pectinatae* Barneby (1991: 522) (Table 1). In addition, the subseries *Lactifluae* is highly variable in vegetative and reproductive traits. Even more, this group does not appear to be monophyletic, but polyphyletic, related with the other two mentioned subseries (Barneby 1991; Simon *et al.* 2011).

In spite of the relationships between the three subseries, *M. arturoana* differs clearly from the sympatric representatives of *Polycarpae* and *Pectinatae, M. polycarpa* Kunth (1819: 8) and *M. pectinatipinna* Burkart (1947: 523), by the indumentum, armament of stems, leave formula, form and venation of leaflets, type of calyx and fruits. *M. polycarpa* has armed stems with infrastipular aculei, and smaller and more numerous leaflets generally glabrous or only setose in the abaxial surface; the indumentum has erect, unbranched setae, and the pods has hispid replum, with long setae. *M. pectinatipinna* is different by its leave formula, leaflet size, and calyx (Table 1).

Geographic distribution:—*Mimosa arturoana* appears to be restricted to the highland areas of northern Peru, specifically in the temperate, dry valleys of Luya province (Amazonas department), in the inter-Andean areas, at 1,100–1,600 m above sea level (Fig. 2A).

The finding of this new *mimosa* reinforces that subser. *Lactifluae* has a bicentric distribution, with most of its members in Mexico and Central America, and few species in the dry tropical valleys of the Andes Mountains in South America (Fig. 2B).

Contrarily to the expected by their morphologic affinity, the Peruvian species *M. incarum* and *M. lamolina* appear more related to other sympatric species of *Pectinatae* and *Polycarpae* than *M. deamii*, in the molecular phylogeny (Simon *et al.* 2011). It suggests that the Peruvian *Lactifluae* evolved by divergence from Mexican ancestors, but the phylogeny of these clades is not still completely resolved. In this context, molecular data from *M. arturoana* could contribute to clarify the evolution of these allopatric species.

Phenology:—*M. arturoana* was collected with flowers and immature fruits in March.

Etymology:—The specific epithet resembles Arturo Burkart, who was a distinguished Argentinean botanist and expert of Legumes in his country and around the world.

FIGURE 2. A) Geographic distribution of *M. arturoana* and *M. lamolina* in Peru. B) Geographic distribution of *M. deamii*, *M. lamolina* and *M. arturoana.* Circle: *M. arturoana*. Rectangle: *M. lamolina.* Triangle: *M. deamii.*

Key to identify *M. arturoana* and its allied species from subser. *Lactifluae*

1. Leaflets of longer pinnae 6–16-jugate, and the distal larger ones 2–15 × 2–6 mm ..... *M. incarum*
-. Leaflets of longer pinnae up to 6-jugate, and the distal larger ones 12–36 × 6–18 mm 2
2. Pods uniformly antrorsely strigose ..... *M. deamii*
-. Pods hispid or only setulose in the replum, and glabrous or puberulent in the valves. 3
3. Stems unarmed and subglabrous. Leaflets glabrous or almost, with secondary venation brochidodrome. Valves of pods glabrous. Stipules strongly 3–5-nerved, glabrous dorsally ..... *M. lamolina*
-. Stems armed, hispid and puberulent, with slender hairs and scaberulous or plumose setae, especially at apex. Leaflets densely hispid and puberulent, with secondary venation eucamptodrome. Valves of pods puberulent. Stipules weekly 1–3-nerved, densely puberulent dorsally ..... *M. arturoana*

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References

Barneby, R.C. (1991) Sensitivae Censitae: A description of the genus *Mimosa* Linnaeus (Mimosaceae) in the New World. *Memoirs of the New York Botanical Garden* 65: 1–835.

Barneby, R.C. (1998) Silk Tree, Guanacaste, Monkey's Earring. A generic system for the synandrous Mimosaceae of the Americas. Part III. Calliandra. *Memoirs of the New York Botanical Garden* 74: 1–223.

Bentham, G. (1841) Notes on Mimoseae, with a short synopsis of species. *Journal of Botany* 4: 243–392.

Bentham, G. (1842) Notes on Mimoseae, with a short synopsis of species. *Journal of Botany* 4: 393–418.

Bentham, G. (1875) Revision of the suborder Mimoseae. *Transactions of the Linnean Society of London* 30: 335–664. http://dx.doi.org/10.1111/j.1096-3642.1875.tb00005.x

Bentham, G. (1876) *Mimosa*. *In:* Martius, C.F.P., Eichler, A.W. & Urban, I. (eds.) *Flora Brasiliensis* Vol. 15, Pt. 2. F. Fleischer, Münich and Leipzig, pp. 294–390.

Bessega, C. & Fortunato, R.H. (2011) Section *Mimadenia*: its phylogenetic relationships within the genus *Mimosa* (Leguminosae, Mimosoideae) using plastid *trn*L–F sequence data. *Australian Systematic Botany* 64(2): 104–110. http://dx.doi.org/10.1071/SB10022

Burkart, A. (1947) Leguminosas nuevas o críticas. *Darwiniana* 7(4): 519–540.

De Candolle, A.P. (1825) Leguminosae. *In*: de Candolle, A.P. (ed.) *Prodromus systematis naturalis regni vegetabilis,* Vol. 2. Treuttel & Wiirtz, Paris, pp. 93–524.

Grether, R. (2000) Nomenclatural changes in the genus *Mimosa* (Fabaceae, Mimosoideae) in Southern Mexico and Central America. *Novon* 10(1): 29–37. http://dx.doi.org/10.2307/3393180

Kunth, K.S. (1819) *Mimoses et Autres Plantes Legumineuses du Noveau Continent*. Grecque-Latine-Allemande, Paris, 221 pp.

Lewis, G.P., Hughes, C.E., Daza Yomona, A., Solange Sutoyo, J. & Simon, M.F. (2010) Three new legumes endemic to the Marañon Valley, Peru. *Kew Bulletin* 65(2): 209-220.

Linares-Palomino, R. (2006) Phytogeography and floristics of seasonally dry tropical forests in Peru. *In*: Pennington, R.T., Lewis, G. P. & Ratter, J. A. (eds.), *Neotropical Savannas and Seasonally Dry Forests. Plant Diversity, Biogeography and Conservation.* CRC Press, Boca Raton, pp. 257–279.

Linares-Palomino, R. & Pennington, R.T. (2007) Lista anotada de plantas leñosas en bosques estacionalmente secos del Perú—una nueva herramienta en Internet para estudios taxonómicos, ecológicos y de biodiversidad. *Arnaldoa* 14: 149–152.

Macbride, J.F. (1943) *Mimosa*. *In*: MacBride, J.F. (ed.) *Flora of Peru* 13, 3(1). Field Museum Botanical Series, Chicago, pp. 83–96.

Poiret, J.L.M. (1810) *Acacia*. *In:* Lamarck, J.-B. & Poiret, J.L.M. (eds.) *Encyclopédie méthodique, Supplement 1*. H. Agasse, Paris, pp. 35–86.

Robinson, B.L. (1900) New Phanerogams, chiefly Gamopetalae, from Mexico and Central America. *Proceedings of the American Academy of Arts and Sciences* 35: 305–343.
http://dx.doi.org/10.2307/25129939

Särkinen, T., Marcelo-Peña, J.L., Daza Yomona, A., Simon, M.F., Pennington, R.T. & Hughes, C.E. (2011) Underestimated endemic species diversity in the dry inter-Andean valley of the Río Marañón, northern Peru: An example from *Mimosa* (Leguminosae, Mimosoideae). *Taxon* 60 (1): 139–150.

Simon, M.F., Grether, L.P., Queiroz, L.P., Särkinen T.E., Dutra, V.F. & Hughes, C.E. (2011) The evolutionary history of *Mimosa* (Leguminosae): toward a phylogeny of the sensitive plants. *American Journal of Botany* 98 (7): 1201–1221.
http://dx.doi.org/10.3732/ajb.1000520