Four New Species of *Mimosa* (Leguminosae) from the Central Highlands of Brazil

Author(s): Marcelo F. Simon, Colin E. Hughes, and Stephen A. Harris
Published By: The American Society of Plant Taxonomists

BioOne (www.bioone.org) is a nonprofit, online aggregation of core research in the biological, ecological, and environmental sciences. BioOne provides a sustainable online platform for over 170 journals and books published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Web site, and all posted and associated content indicates your acceptance of BioOne’s Terms of Use, available at www.bioone.org/page/terms_of_use.

Usage of BioOne content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.
Four New Species of *Mimosa* (Leguminosae) from the Central Highlands of Brazil

Marcelo F. Simon, Colin E. Hughes, and Stephen A. Harris

1Department of Plant Sciences, University of Oxford, South Parks Road, Oxford, OX1 3RB United Kingdom
2Embrapa Recursos Genéticos e Biotecnologia, PqEB, Caixa Postal 02372, Brasília, Distrito Federal, 70770-917 Brazil
3Author for correspondence (msimon@cenargen.embrapa.br)

Abstract—Four new species of *Mimosa* are described and illustrated: *M. kalunga*, *M. pseudosetosa*, *M. vipherina*, and *M. diminuta* (all from section *Habbaasia*, series *Pachycarpae*). All of them are apparently narrowly restricted endemics from the Chapada dos Veadeiros in Goiás, central Brazil. In addition, more complete data and an illustration are presented for *M. pycnocoma* Benth., previously incompletely known only from the type collection. The new species described here, as well as the new data on *M. pycnocoma*, provide interim increments to our knowledge of a group of around 55 *Mimosa* species, combining Barneby’s (1991) series *Setosae* and *Pachycarpae*, that remains poorly and incompletely understood.

Keywords—cerrado, Chapada dos Veadeiros, endemism, Mimosoideae.

*Mimosa* L., with around 530 species, is one of the most diverse genera in the Leguminosae, and one of around 57 large angiosperm genera with more than 500 species (Frodin 2004). High levels of species diversity, including many narrowly restricted endemic species of *Mimosa*, are found in the incompletely botanically explored Central Brazilian highlands (Simon and Proença 2000; Simon and Hay 2003). It is thus not surprising that new species of *Mimosa* continue to be described, and poorly known species rediscovered from this region (Barneby 1993; Barneby 1997; Queiroz and Lewis 1999; Simon and Amaral 2003), despite the availability of a relatively recent monographic treatment of the genus (Barneby 1991).

Nowhere is this dense local endemism more apparent than on the rocky hills of the Chapada dos Veadeiros in Goiás, (Simon and Proença 2000; Simon and Amaral 2003), where the four new species described here were collected in the municipality of Cavalcante, in a northern extension of the Chapada dos Veadeiros. This region is characterized by elevations often above 1,000 m, where open campo rupestre vegetation grows on rocky and acidic soils. This article adds additional taxa to an already species-rich region (Simon and Proença 2000), where many narrow endemics in *Mimosa* series *Pachycarpae* Benth. proliferate in open formations of cerrados and campo rupestre. *Mimosa* is frequently a conspicuous element in the woody layer at the Chapada dos Veadeiros region, and it is common to find several species growing in close sympatry. These new discoveries highlight just how poorly known the regional flora remains; field studies are likely to reveal additional new taxa in these extremely endemic-rich and poorly collected areas of northern Goiás (Munhoz and Felfili 2006).

These new species are all based on what appear to be first field collections, since they were not found in an extensive survey of *Mimosa* holdings in Brazilian and other key herbaria (Simon and Proença 2000). In addition to the description of the new species, data are presented on *M. pycnocoma* Benth., a species previously known only from type material collected more than 180 yr ago, which was rediscovered at the same site in Cavalcante. Photographs of some of the species described here are presented in Fig. 1.

All four new species, as well as the rediscovered *M. pycnocoma*, show affinities to the morphologically and ecologically adjacent series *Pachycarpae* and *Setosae* Barneby of section *Habbaasia* DC. Barneby (1991) distinguished these two series essentially on fruit morphology, the crucial unifying diagnostic character for series *Pachycarpae* being a tough-walled, valvately dehiscent pod with a stout non-indentated replum at least 1–7 mm wide, while series *Setosae* have typical craspedia breaking into one-seeded articles. However, more recent molecular data indicate that while species of series *Pachycarpae* and *Setosae* are placed together as a well supported monophyletic group, neither series is in itself monophyletic (Bessegia et al. 2008; Simon et al. 2009). The four new species described here are placed in this combined *Setosae/Pachycarpae* clade (Fig. 2). Furthermore, it is also clear that valvate fruit dehiscence does not provide the unique diagnostic, apomorphic character envisaged by Barneby for series *Pachycarpae*. At the time of Barneby’s (1991) revision, pods of 17 of the 39 species of series *Pachycarpae* remained unknown or insufficiently known to infer mode of dehiscence. After re-evaluating Barneby’s monograph and more recent herbarium material, including recent findings of segmented craspedia in *M. humivagans* Barneby (M. F. Simon 737), *M. pycnocoma* (M. F. Simon 867, see below) and *M. kalunga* (M. F. Simon 451, see below), it is now clear that fruits of several species of series *Pachycarpae* do not have valvate fruit dehiscence. In addition, other *Pachycarpae* and some *Setosae* have valves that break entire except for a segment at the base that is retained (Barneby 1991 describes these pods as “reluctantly breaking into articles”). *Mimosa* section *Habbaasia* DC. Barneby (1991) distinguished these two series essentially on fruit morphology, the crucial unifying diagnostic character for series *Pachycarpae* being a tough-walled, valvately dehiscent pod with a stout non-indentated replum at least 1–7 mm wide, while series *Setosae* have typical craspedia breaking into one-seeded articles. However, more recent molecular data indicate that while species of series *Pachycarpae* and *Setosae* are placed together as a well supported monophyletic group, neither series is in itself monophyletic (Bessegia et al. 2008; Simon et al. 2009). The four new species described here are placed in this combined *Setosae/Pachycarpae* clade (Fig. 2). Furthermore, it is also clear that valvate fruit dehiscence does not provide the unique diagnostic, apomorphic character envisaged by Barneby for series *Pachycarpae*. At the time of Barneby’s (1991) revision, pods of 17 of the 39 species of series *Pachycarpae* remained unknown or insufficiently known to infer mode of dehiscence. After re-evaluating Barneby’s monograph and more recent herbarium material, including recent findings of segmented craspedia in *M. humivagans* Barneby (M. F. Simon 737), *M. pycnocoma* (M. F. Simon 867, see below) and *M. kalunga* (M. F. Simon 451, see below), it is now clear that fruits of several species of series *Pachycarpae* do not have valvate fruit dehiscence. In addition, other *Pachycarpae* and some *Setosae* have valves that break entire except for a segment at the base that is retained (M. foliolosa Benth., M. antrosa Benth., M. decorticans Barneby, M. setosisimma Taub., and M. densa Benth.). Furthermore, some species such as M. decorticans, M. prorepens Barneby, and M. humivagans have pods with thin papery valves that resemble varieties of the *M. setosa* Benth. complex, and contrast with the typically thick-valved *Pachycarpae*. *Mimosa* section *Habbaasia* DC. Barneby is similar, with valves that open and coil towards the base, frequently not breaking into individual articles, but which are retained entire (Barneby 1991 describes these pods as “reluctantly breaking into articles”). *Mimosa* section *Habbaasia* DC. Barneby is similar, with valves that open and coil towards the base, frequently not breaking into individual articles, but which are retained entire (Barneby 1991 describes these pods as “reluctantly breaking into articles”). *Mimosa* section *Habbaasia* DC. Barneby is similar, with valves that open and coil towards the base, frequently not breaking into individual articles, but which are retained entire (Barneby 1991 describes these pods as “reluctantly breaking into articles”). *Mimosa* section *Habbaasia* DC. Barneby is similar, with valves that open and coil towards the base, frequently not breaking into individual articles, but which are retained entire (Barneby 1991 describes these pods as “reluctantly breaking into articles”).
morphological evidence suggests that series Setosae should be incorporated into Pachycarpae, as suggested by Bessega et al. (2008). However, formal reclassification must await ongoing efforts to integrate new phylogenetic data (Simon et al. 2009) with re-evaluation of key morphological characters (Simon et al. unpubl.), especially as many well-supported groups are likely to defy easy morphological definition due to the great variation in growth habit, leaf formula, indumentum and armature that is apparent within many such clades (Barneby 1991).

**TAXONOMIC TREATMENT**


*Mimosa pycnocoma* Benth. similis sed frutice pumilo, ramulis juvenibus cum cortice persisti, pinnis (12–)15–21-jugis (non, ut in *M. pycnocoma*, plus quam 25-jugis), foliolis longissimis, pedunculis 4–8 cm longis, capitulis insuper differt.

Unarmed, prostrate subshrub 20–50 cm with ascending stems, sometimes becoming a short-stemmed dwarf pachycaul shrub, the stem attaining a maximum of 8 cm diam (near the base), the crown of sparse irregular stout defoliate branches bearing a rosette of crowded microphyllous leaves and a short terminal pseudoraceme of globose capitula crowded at the tips of branchlets, the annotinous shoots 1–1.5 cm in diam, transversely ridged by leaf and stipule scars, the bark thick and slightly corky. Young leaves, peduncles and developing fruits densely lanate-silky with 8–12 mm long white or canescent ascending hairs. Stipules early deciduous, slender triangular or lanceolate 10–14 × 2.4 mm, externally densely covered with 4–6 mm long lanate hairs, internally glabrous with 7–10 weakly prominulous longitudinal nerves. Leaves bipinnate, leafstalks 6–12 cm, petiole including broad pulvinus 1–2 cm long, the longer interpinnal segments 0.7–1.3 cm,
Longer pinnae with (12–)15–21 pairs of larger 5–7 cm leaflets; pods breaking into 2–5 one-seeded segments to leave a persistent 1 mm wide, densely setulose replum; seeds 1.5–3 mm, the tube 0.7 mm irregularly and bluntly denticate, pilosulous at the base with 0.5–1 mm setulae; corolla 4–5 mm, the narrow tube glabrous, the ovate concave 1-nerved nectary. Flowers, 4-merous, 8-androus, the calyx pappiform, the stamens 4–8 cm long, pink. Pods 1–5 per capitulum, sessile, 2.5–3.5 × 0.8 cm, 4–5-seeded, linear-oblong, mucronate at apex, covered with dense fine setulae, breaking into 2–5 one-seeded segments to leave a persistent 1 mm wide, densely setulose replum; seeds round or ovoid 5 × 3.5 mm, the testa smooth, castaneous.

In campo sujo (shrubby grassland) on sandy soils just above 1,000 m, known only from the type locality about 26 km N of Cavalcante, northern Goiás, Brazil, where it is locally frequent. Mimosa kalunga grows in open vegetation dominated by grasses and other herbs, such as Bulbostylis spp. and Rynchospora spp. (Cyperaceae), with sparse small shrubs such as Palicourea rigidoides Kunth (Rubiaceae). Flowering October to March. Fruiting January to March.

Mimosa kalunga can be distinguished from other species of series Pachycarpae by a unique combination of characters, namely a prostrate or sometimes dwarf shrub habit associated with precocious flowering, lanate-silky indumentum covering the leaves, peduncles and developing fruits, and a pod breaking into individual articles (craspedium), which is only known from a few species of series Pachycarpae. It resembles the poorly known and sympatrically occurring M. pycnocoma in many respects (pubescence, foliage, flower and pod dehiscence), but can be distinguished from that species by a persistent, as opposed to exfoliating epidermis, on the young branches; a prostrate/dwarf shrubby (Fig. 1a), as opposed to arboreal habit; smaller leaflets; and the arrangement of the inflorescence, with capitula on 4–8 cm long peduncles exposed above the leaves, rather than 3.5 cm long peduncles nesting within the dense foliage (Fig. 3 and see M. pycnocoma below). Mimosa kalunga can readily be distinguished from the other pachycaul rosette species of Pachycarpae with condensed foliate axes at the end of stout defoliate branches, such as M. manidea Barneby and M. oedoclada Barneby (this with similar leaf formula), by the reduced habit and the segmented pod which is unusual in this group of predominately valvately dehiscent species. Apart from M. pycnocoma, the only other species of Pachycarpae with the dense whitish or canescent lanate-silky indumentum on the young developing leaves and inflorescence is M. laniceps Barneby, which can be distinguished by valvately dehiscent pods, smaller and more numerous leaflets, and an arboreal, multibranching habit.

The species epithet refers to the Kalunga people, the descendants of nineteenth-century escaped slaves, who established several isolated communities in northern Goiás, and are still present in the region where M. kalunga grows.

Additional Specimens Examined—BRAZIL. Goiás: Cavalcante, Vila Engenho, caminho para cachoeira Santa Bárbara, campo-suíjo, solo arenoso, 13°32' S 47°29' W, 1,070 m, 12 Oct 2002 (fl), M. F. Simon 451 (CEN, FHO, HUEFS, UB); Cavalcante, cerca de 30 km ao norte de Cavalcante, caminho para cachoeira Santa Bárbara, 13°32'27" S, 47°29'17" W, 1,060 m, 5 Jan 2007 (fl), M. F. Simon 866 (CEN, FHO, HUEFS, K, NY, UB).

The following key separates M. kalunga from other species of series Pachycarpae with lanate-silky indumentum:

1. Longer pinnae with 14–25(–30) pairs of small 2.5–4(–4.5) cm leaflets; pods valvately dehiscent. .......................... M. laniceps Barneby
2. Pachycaul rosette tree or arboreal shrub 2–3 m; epidermis of young branches exfoliating; inflorescences densely nested within the foliage; peduncles 3.5 cm. .......................................................... M. pycnocoma Barneby.
3. Prostrate shrub with ascending stems or short-stemmed dwarf pachycaul shrub 20–50 cm; epidermis of young branches persistent; inflorescences exposed above the leaves, peduncles 4–8 cm. .......................... M. kalunga Benth.


Mimosa setosa Benth. similis sed pedunculis (4–)8–12 cm longis (non, ut in M. setosa subsp. setosa, 1.5–3.5(–6) cm longis), sine setae glandulosis, stipulis triangularibus dense setosis 4 mm latibus (non, ut in M. setosa, 0.8–2.5 mm latibus) differt.

Unarmed shrubs growing from a xylopodium with procumbent woody shoots to 1 m, these with thick corky, horizontally or irregularly fissured bark, giving rise to pliantly humifuse herbaceous few-branched stems, these deeply tinged maroon and amply leafy from the base upwards to above middle, thence distally incurved or assurgent with leaf development suppressed, the young developing leaves sub-tending long-pedunculate shortly ellipsoid capitula. Shoots, leafstalks, and peduncles densely rusty golden strigose or pilose with horizontal or weakly descending basally dilated 3–5 mm long rufous setae adaxially with shorter sparse white hairs on leaf axes and peduncles, the leaflets short ciliolate with scattered longer setulae. Stipules triangular acuminate 10–12 × 4 mm, densely strigose dorsally with basally dilated setae, internally glabrous exposing 5 faintly prominent nerves. Leaf-stalks of fully expanded leaves 13–23(–28) cm long, but much shorter (9–13 cm) in younger individuals, the petiole (2–)3–5 cm, the rachis grooved adaxially with a continuous channel, longer interinnip segments 0.8–1.5 cm, spicles ± 2 mm long, linear setulae present between each pair of pinnae. Pinnae of longer leaves (6–)10–19(–22) jugate, proximally decrescent, the pinnar rachis (3–)4–6(–7.5) cm, leaflets of longer pinnae (20–)23–29 pairs, linear-oblong, 1.5–2.5 × 6–8(–10) mm, acute at apex, asymmetric at base,
Fig. 3. *Mimosa kalunga* M. F. Simon & C. E. Hughes. A. Flowering branch. B. Unopened capitulum. C. Flower and bract. D. Fruiting branch. E. Stipule, ventral and dorsal views. F. Fruit. G. Detail of leaflets. H. Shrubby pachycaul habit found in some individuals. C and E from *M. F. Simon* 456, all the others from *M. F. Simon* 451.
the distal pair smaller with a rounded apex, glabrous and slightly lustrous on both faces, ciliolate with minute hairs, and occasional sparse short setulae, faintly 3-nerved above, more prominently below, paraphyllidia absent. Peduncles in fascicles of 1–2(–3) in axes of young developing leaves, (4–)8–12 cm, capitula prior to anthesis conelike with shortly emergent bracts, these lanceolate 1–2 × 4–6 mm, dorsally densely covered with ± 1.5 mm long setulae, the capitula shortly ellipsoid at anthesis, 2 cm diam excluding filaments. Flowers 4-merous 8-androus, calyx pappiform to 1 mm, externally glabrous, setose ciliate to 1 mm, corolla 4–6 mm long, petals 1-nerved, glabrous except on ovate concave distal pair smaller with a rounded apex, glabrous and densely covered with ± 1.5 mm long setulae, the capitula prior to anthesis conelike with shortly emergent bracts, these lanceolate 1–2 × 4–6 mm, dorsally densely covered with ± 1.5 mm long setulae, the capitula shortly ellipsoid at anthesis, 2 cm diam excluding filaments. Flowers 4-merous 8-androus, calyx pappiform to 1 mm, externally glabrous, setose ciliate to 1 mm, corolla 4–6 mm long, petals 1-nerved, glabrous except on ovate concave distal pair smaller with a rounded apex, glabrous and densely covered with ± 1.5 mm long setulae, the capitula prior to anthesis conelike with shortly emergent bracts, these lanceolate 1–2 × 4–6 mm, dorsally densely covered with ± 1.5 mm long setulae, the capitula shortly ellipsoid at anthesis, 2 cm diam excluding filaments. Flowers 4-merous 8-androus, calyx pappiform to 1 mm, externally glabrous, setose ciliate to 1 mm, corolla 4–6 mm long, petals 1-nerved, glabrous except on ovate concave

The following key separates M. pseudosetosa from unarmed species of series Pachycarpae and Setosae with interinnial spicules:

1. Stipules barbate with 6–12 mm-long orange-red setae. ................................. 2
2. Erect pachyaucal treelets 1–2 m. ................................................................. M. splendidula Barneby
3. Acaulescent or prostrate shrubs with leaves and peduncles arising from ground level. ......................................................... M. trivinii Barneby
4. Corolla lobes glabrous externally. ............................................................... 4
5. Shrubs branched, 1.5–5 m tall, Serra do Espinhaço, Minas Gerais. .......................... M. maguirei Barneby
6. Subshrubs wandlike, with basal leaves and distally efoliate stems, central Goiás. ............................... M. ulei Barneby
5. Corolla lobes hispidulous, setulose or glandular-setulose externally. ............................... 5
6. Habit of pachyaucal treelets 2–3 m. ............................................................... M. dominarum Barneby
7. Habit variable, but usually subshrubs and shrubs less than 2 m. ............................... 6
8. Peduncles 1.5–3.5(–6) cm, glandular setae present (except in M. setosa subsp. urbica), stipules lanceolate-attenuate or rarely ovate-acuminate 4–11(–15) × 0.8–2(–2.5) mm. ............................................................... 7
9. Calyx-tube externally glabrous, the rim ciliolate; articles at middle of craspedium 3–6 mm long; flowering primarily in September–March; unarmed subsp. of M. setosa Benth. ............................................................... 6
10. Calyx-tube densely setulose externally as well as ciliolate; articles at middle of craspedium 6–11 mm long; flowering primarily in May–July. ............................................................... M. melanoarpa Benth.
11. Peduncles (4–)8–12 cm, glandular setae absent, stipules triangular acuminate 10–12 × 4 mm. ............................................................... M. pseudosetosia sp. nov.

Mimosa vipherina M. F. Simon & C. E. Hughes, sp. nov.—TYPE: BRAZIL. Goiás, município de Cavalcante, estrada de chão do Paraíso rumo à Teresina de Goiás, 13°50' S, 47°15' W, 1,190 m, 13 Apr 2004 (fl) R. C. Mendonça et al. 5528 (IBGE, UB).

Species habitibus humifusis, pinnis plerumque 3-jugis, pedunculis longis et corollis strigosis dense a conge-

neribus diversa. Foliorum Mimosa ulei Taub. et M. nitens Benth., a M. ulei caulibus humifusis et petiolis espiculatis differtibus, a M. nitens caulibus humifusis et inflorescentiis longis foliatis differtibus.

Unarmed ample-leaved functionally herbaceous trailing subshrub with pliantly humifuse linear few-branched stems from a xylopodium, the inflorescences in fascicles of long-pedunculate capitula in axils of coevally developing leaves,

Mimosa setosa

G. Barneby, M. gracilis Benth var. invisiformis Barneby and M. diminuta (see below). A second population, also forming a large stand (Fig. 1c), was found on the roadside between Teresina and Alto Paraíso (40 km directly SE of the type locality), which suggests that the species is more widespread in the region. Flowering October to March. Fruiting unknown.

Mimosa pseudosetosa resembles unarmed members of the M. setosa complex in habit, setose indumentum, foliage and leaf formula, and also in having interinnial spicules. It differs from M. setosa in the longer peduncles of (4–)8–12 cm (not 1.5–3.5(–6) cm); the absence of glandular setae (although M. setosa subsp. urbica has eglandular indumentum) and in large, triangular brownish setae on the immature pods of M. pseudosetosa suggests affinity with members of ser. Pachycarpae although mature fruits are still needed to clarify this. Given the marked differences, M. pseudosetosa is described as a distinct species, rather than as a variety of M. setosa. This decision is reinforced by preliminary evidence that suggests that the M. setosa complex may itself be polyphyletic and represent several distinct species (Fig. 2). In habit, M. pseudosetosa resembles the humifie members of ser. Pachycarpae, M. humidicrepans, M. lithoreas Barneby, M. prorepens, and M. pseudofoliosa Barneby. However, M. pseudosetosa can be distinguished from these four species by the presence of interinnial spicules on the leaf rachis, longer peduncles (except the allopatric M. lithoreas which has peduncles up to 7.5 cm), and larger leaves. Mimosa pseudosetosa and M. albolanata overlap in leaf form and prostrate habit, but the latter produces a long pseudoraceme (200–100 cm) bearing capitula on much shorter peduncles. Once again, these inconsistencies and overlapping characters between Setosae and Pachycarpae are indicative of the non-monophyly of these two species which are better treated as a single group. Apparently abnormal inflorescences have been noted on some individuals in the field, with clustered sessile capitula instead of a pseudoraceme with the characteristic long peduncles.

The epithet refers to the close resemblance of M. pseudosetosa to M. setosa.

Additional Specimen Examined—BRAZIL. Goiás: Cavalcante, cerca de 30 km ao norte de Cavalcante, caminho entre Vila Engenho e cachoeira Santa Bárbara, 13°32'27" S, 47°29'17" W, 1,050 m, 5 Jan 2007 (fl), M. F. Simon 864 (CEN, FHO, HUEFS, K, UB); Alto Paraíso, 50 km ao norte de Alto Paraíso rumo à Teresina de Goiás, 13°50' S, 47°15' W, 1,000 m, 7 Jan 2007 (fl), M. F. Simon 871 (FHO, UB); Município de Cavalcante, estrada de chão entre Cavalcante e Araí, 13°35'59" S, 47°31'30" W, 1,190 m, 13 Apr 2004 (fl) R. C. Mendonça et al. 5528 (IBGE, UB).
Fig. 4. *Mimosa pseudosetosa* M. F. Simon & C. E. Hughes. A. Flowering branch. B. Leaflets and details of the interpinnal spicule. C. Longitudinal section of flower. D. Flower and bract. E. Stipule, ventral and dorsal views. F. Habit. All from *M. F. Simon 453.*
erect and held above foliage, the shoots, leafstalks, and peduncles densely hispid with spreading or weakly retrorse, orange-brown, basally slightly dilated, setae 4–6–8 mm long, admixed with minute white pubescence on younger shoots. Stipules persistent, triangular acuminate, sometimes ovate, papery 3–4 × 10–15 mm, dorsally densely covered with appressed ± 4 mm setae, glabrous and slightly glossy within, striate with 6–10 weakly visible parallel veins, sometimes glabrous on both faces, occasionally bifid, splitting from the middle of the blade. Leafstalks of larger leaves 5–8–13–20 cm long, including a 5.5–6–7.5–(9.5) cm long petiole, the pulvinus marked, drying livid blackish, the rachis deeply grooved adaxially with a continuous channel, ending in a setulose linear 7–9 mm spicule, the longer interpinnal segments 2–3.5 cm, spicules absent. Pinnae of most leaves 3-jugate, exceptionally 4, the rachis (6–9)–13–(19) cm, including a markedly livid setose pulvinule, the longer interfoliolar segments 4–5–(9) mm, the first pair ± 3 mm distant from the minute 1 mm long linear parphyllidia. Leaflets (18–)20–25–(27)–jugate, linear oblong, apex acute, base asymmetrical, 9–15–(20) × 3–5–(7) mm in fully developed leaves, essentially glabrous and lustrous on both faces, sparsely ciliate with short setulae and minute hairs, 4–6–veined on abaxial face, the pulvinules dark blackish on dried material and setose. Peduncles (5–)7–10–(14) cm, (1–2) in axis of coevally developing leaves, the leaves fully developed only after anthesis, capitula excluding filaments 0.8–1 cm diam, prior to anthesis conelike due to the prominent exerted bracts subtending flowers, these rhombic-oblative, 2 × 6 mm, margins and dorsal face densely covered by ± 2 mm long setulae, internally glabrous, weakly striate. Flowers 4–merous, 8–androus; calyx tube irregularly denticulate, to 1–1.5 mm, the rim ciliolate with uneven setulae to 1–1.5 mm long, probably breaking entire into flat 2 mm thick valves although fully mature pods not seen, the 1 mm wide replum apparently becoming puberulent when ripe, 6–8–seeded, the seeds ovoid, 6 × 3–4 mm, pleurogram nearly complete, dark brown. Figure 5.

In campo soju on sandy seasonally flooded soils around 1,000 m, known only from the type collection near Rio Prata, a small tributary of the Tocantins river, ca 50 km NW of Cavalcante, Goiás, Brazil. Although known from just a single locality, *M. viperina* is locally frequent in open vegetation dominated by grasses and small shrubs, including several sympatric species of *Mimosa*, such as *M. adenophylla* Taub., *M. claussenii*, and *M. foliolosa*. Flowering in March, possibly following the rainy season.

The placement of *M. viperina* within the series *Setosae* and *Pachycarpae* clade (Fig. 2) confirms its affinities to section *Habasiasa*. The one to three faintly nerved corolla lobes could suggest placement in series *Bipinnatae*, where one species with valvate pod dehiscence, *M. brachycarpa* Benth., is already known. However, the affinities of *M. viperina* to members of the combined *Setosae/Pachycarpae* clade is strongly supported by a set of characteristics that are not uncommon in these groups, such as a humifuse habit, setose indumentum, large capitula and flowers, triangular stipules, and the wide pod. This distinctive mimosa can be readily recognized by a combination of humifuse habit, ample leaves with only three pairs of pinnae and relatively large leaflets, long peduncles, and a densely stigose corolla. The foliage of *M. viperrina* resembles *M. ulei* Taub. and *M. nitens* Benth. However, *M. viperina* is easily distinguished from *M. ulei* by its prostrate humifuse, as opposed to upright wand-like shrubby habit, and by the lack of interpinnal spicules. It also differs in habit from *M. nitens*, which is an erect subshrub. From the other *Pachycarpae* species with humifuse habit (including *M. pseudosetosa* described here), *M. viperina* can be immediately distinguished by its distinctive leaves with just three pairs of pinnae and a stigose corolla. *Mimosa viperina* also shares similarities in pubescence and pod characters with some varieties of the *M. setosa* complex, but differs in having broader stipules, leaves with fewer pairs of pinnae, and larger leaflets. A similar habit, long peduncles, and few pinnae are also present in members of section *Mimosas* such as *M. procurrens* Benth. (subser. *Hirsutae* (Benth.) Barneby) and *M. flagel- laris* Benth. (subser. *Pedunculosae* (Benth.) Barneby), but all of these differ from *M. viperina* in having haplostemonous flowers, suggesting independent derivation of this combination of characters.

The epithet refers to the procumbent habit of the plant, and the long slender stems that weave their way through the grass like a snake.

The following key separates *M. viperrina* from other humifuse subshrub members of series *Pachycarpae*:

1. Corolla lobes glabrous externally. .................................................................................................................. *M. lithorea* Barneby
2. Corolla lobes hispidulous or setulose externally. ..............................................................................................
3. Leaves with only 3–4 pairs of pinnae, leaflets of fully developed leaves 9–15–(20) × 3–5–(7) mm. ................
4. Peduncles 7.5–12 cm. ........................................................................................................................................
5. Leaves petiolate, the petiole including pulvinus 4–11 mm; leaflets of longer pinnae 26–50 pairs; capitula
6. Excluding filaments 8–10 mm diam ................................................................................................................
7. Leaves subsessile, the petiole including pulvinus 1.5–3.5 mm; leaflets of longer pinnae 10–18 pairs; capitula
8. Excluding filaments 4–7 mm diam ................................................................................................................
9. Gland-tipped setae of stems 0.8–1 mm; leaf-formula xii–xiii/14–18; rachis of longer pinnae 7–10 mm
10. And largest leaflets less than 2 mm .............................................................................................................
11. *M. pseudofoliola* Barneby
12. Gland-tipped setae of stems absent or less than 0.5 mm; leaf-formula vii–xii/10–15; rachis of longer
13. Pinnae 13–21 mm and largest leaflets 3–5 mm ..............................................................................................
14. *M. hamivagans* Barneby

2010] SIMON ET AL.: FOUR NEW SPECIES OF MIMOSA 283
Fig. 5. *Mimosa viperina* M. F. Simon & C. E. Hughes. A. Flowering branch (mid stem). B. Detail of leaf rachis and paraphyllidia. C. Narrow stipules (dorsal and ventral views) and detail of leaf node. D. Longitudinal section of flower. E. Flower and bract. F. Broad stipules (dorsal and ventral views) and detail of leaf node. G. Fruit. H. Seed. I. Habit. J. Detail of leaflets. K. Unopened capitulum. All from *M. F. Simon 461.*
Mimosa diminuta M. F. Simon & C. E. Hughes, sp. nov.—Type: BRAZIL. Goiás, Município de Cavalcante, cerca de 30 km ao norte de Cavalcante, caminho entre Vila Engenho e cachoeira Santa Bárbara. Campo sujo sob solo arenoso escuro, 13°32'27" S 47°29'17" W, 1,060 m, 5 Jan 2007 (fl, fr), M. F. Simon 866A (holotype: UB; isotype: FHO).

Mimosa rava Barneby similis sed habite pumilo prostrato, foliis aggregatis apice, internodii brevibus, rhachidibus 5–8 cm longis (non, ut in M. rava, 2–5.5 cm longis), pinnis (6–)7–8–10-jugis (non, ut in M. rava, 4–7-jugis), foliis glabris, pedunculis 7.5–9 cm longis (non, ut in M. rava, 2–4 cm longis), leguminibus 4–5-seminalis (non, ut in M. rava, 9–12-seminalis) differt.

Dwarf unarmed subshrubs, arising from a xylodipum, the shoots 12–16 cm long and less than 5 mm in diam, woody at base, shoots unbranched, horizontal but weakly ascending towards the tips, the whole plant just 15–20 cm tall, the leaflets, the stems with epidermis sometimes exfoliating in pieces to expose a reddish-brown underbark. The leaf formula of the species is illustrated for the first time (Fig. 7).

Mimosa pycnocoma Barneby, J. Bot. (Hooker) 4: 405. 1842.—Type: Serra do S. Felix prope Rio Trihiras, Pohl 1819 (K).

Mimosa pycnocoma has long been known only from the type collection. The species was rediscovered and recollected at the same locality in 2007 [BRAZIL. Goiás: Cavalcante, cerca de 30 km ao norte de Cavalcante, caminho entre Vila Engenho e cachoeira Santa Bárbara, 13°32'42" S, 47°29'03" W, 1,060 m, 5 Jan 2007 (fl, fr), M. F. Simon 868 (UB, FHO, CEN, K, HUEFS).], 188 yr after its first collection. The new material was compared with the type at K. The species was described by Bentham in 1842, and although subsequently equated with M. claussenii (Bentham 1875), the status of M. pycnocoma as a distinct species was confirmed by Barneby (1991) who provided a detailed description. However, key features of the habit, pod and seeds were unknown to Bentham and Barneby. These are described here and the species is illustrated for the first time (Fig. 7).

Mimosa pycnocoma is, as predicted by Barneby (1991), a small tree. It forms small pachycarpous rosette trees or arborescent shrubs to 2–3 m height with a blackish trunk to 10 cm diam and a ± symmetrical crown formed of stout whorled ascending leafless candelabrum branches 4–7 cm in diam (Fig. 1d), the crowded pseudoraceme of subglobose capitula nestling within rosettes of ample leaves crowded at tips of the branchlets, the stems with epidermis sometimes exfoliating in pieces to expose a reddish-brown underbark. The leaf formula of the specimen collected is xi–xvii/14–21. Pods few per capitulum,
Mimosa diminuta M. F. Simon & C. E. Hughes. A. Habit of an individual in fruit, and unopened capitulum. B. Detail of leaflets and pubescence. C. Flower. D. Bract, dorsal and ventral views. E. Stipule, dorsal and ventral views. All from M. F. Simon 866A.

The habit of M. pycncoma is strongly reminiscent of several other Pachycarpae, notably M. oedoclada, M. manidea, M. clausseni var. claviceps Barneby, M. dominarum Barneby, M. regina Barneby and M. splendida Barneby in their similarly stout branches, and M. capito Barneby in the arrangement of the capitula. The capitula of M. pycncoma are so deeply nested in
Fig. 7. *Mimosa pycnocoma* Benth. A. Flowering branch. B. Detail of leaflets. C. Stipule, ventral and dorsal views. D. Longitudinal section of flower. E. Flower and bract. F. View of a flowering branch from above, showing the inflorescences nested within the foliage. G. Habit. H. Fruit. I. Seed. All from M. F. Simon 868.
the terminal rosette of ample leaves as to remain largely invisible to the casual observer (Figs. 1e and 7f). This concealment of the flowers may explain in part why this species remained uncollected for 188 yr since the first collection. However, it is also clear that this part of Goiás is severely under-collected and that this species is almost certainly very narrowly restricted in distribution. It grows on gentle slopes of cerrado with rock outcrops, with few other species of shrubs and small trees (Vellozia spp., Mimosa oligosperma, and Vochysia spp.).

Although _M. pycnocoma_ is strongly reminiscent of the other pachycaul rosette trees of series _Pachycarpae_ and undoubtedly has affinities to those species, it does not have the valvately dehiscent pods typical of that group. The pods of _M. pycnocoma_ (described here from remnants of the previous season) have a narrow (< 1 mm wide) replum and valves that at least partially break up into one or more segments. Unfortunately, attempts to extract DNA from silica-dried leaf material of this species always produced unexpectedly poor quality DNA.

**Acknowledgments.** We thank Rosemary Wise for the illustrations and Carolyn Proença (UB) for her kind support, and two reviewers and the editor for helpful comments on the manuscript. The Brazilian Institute for the Environment (IBAMA) provided authorization for this research project (n. 02001.007621/2005). MFS thanks the Clarendon Fund, Wolfson College, and the Systematics Association for financial support during his D.Phil. at the University of Oxford. CEH was supported by the Royal Society.

**Literature Cited**


