Two New Dioecious Species of Symplocos (Symplocaceae) from Southern Brazil

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Abstract. Two new dioecious species of Symplocos Jacquin from southern Brazil are described and illustrated. Both species belong to section Barberina (Vellozo) A. DC. of subgenus Symplocos. Symplocos bidana Aranha is characterized by its cymose or racemose inflorescences (9.5—11—34 mm long, corolla with five or six lobes 3.7—4.9 mm long, and fruits (10—)13—20 × 5—10 mm with the calyx lobes covering in fruit, and fruits 12—18 × (5—)6—8 mm. In addition, both species have thick endocarps (0.8—1.2 mm), a notable character among the Brazilian species of section Barberina.

Resumo. Duas novas espécies dióicas de Symplocos Jacquin do sul do Brasil são descritas e ilustradas, do subgênero Symplocos, seção Barberina (Vellozo) A. DC. Symplocos bidana Aranha é reconhecida por sua inflorescência címosa ou racemosa (9.5—11—34 mm compr., corola com 5 a 6 lobos com 3.7—4.9 mm compr., e frutos (10—)13—20 × 5—10 mm com lobos do cálice cobrindo o disco no fruto. Symplocos incrassata Aranha é reconhecida por suas cimeiras reduzidas (4—7 mm compr.), brácteas caducas no fruto, e fruto 12—18 × (5—)6—8 mm. Além disso, as novas espécies são distintas pela espessura de seus endocarpos, 0.8—1.2 mm, raro entre as espécies brasileiras de Barberina.

Key words: IUCN Red List, sect. Barberina, southern Brazil, Symplocaceae, Symplocos.

Symplocos Jacquin, one of two genera of the monophyletic family Symplocaceae (Fritsch et al., 2008), comprises ca. 318 species distributed mainly in tropical and subtropical regions of America, southern and eastern Asia, Australia, and the East Indies. Several species occur in the temperate zones of eastern Asia and the southeastern United States (Occhioni, 1974; Wang et al., 2004; Fritsch et al., 2006, 2008).

The two species here described both belong to Symplocos subg. Symplocos sect. Barberina (Vellozo) A. DC. (sensu Fritsch et al., 2008), a monophyletic group with ca. 26 species (including those described here) in the Americas and one species in eastern Asia.

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Hace species quadrum habitum, foliorum formam magnitudinem indumentumque ac fructum satis graminem Symplacis variabilis Martius ex Miquel ut videtur acuta affinis, sed ab ea lobulis corollinis majoribus 5 vel 6 in sicco parce atropunctatis, lobulis calycinis in fructu discum obtegminibus atque endocarpio crasso distinguenter.

Evergreen dioecious shrub or tree, 1.5–10 m tall; branchlets strongly angled, ridged, striate, transversely and longitudinally strongly fissured, glabrous; vegetative buds glabrous. Leaves simple, alternate, petiolate, stipules lacking; petioles (8–)10–35 mm, adaxially rounded or rarely concave, abaxially convex, glabrous; leaf blades elliptic to broadly elliptic, occasionally ovate or rarely oblong-elliptic, 3.5–13 × 1.2–5.5 cm, coriaceous, dark green adaxially, green abaxially, glabrous, venation ± brochidodromous, midvein impressed or slightly elevated on both surfaces, base attenuate, margin conspicuously serrate to inconspicuously serrulate with (1 to 8)9 to 14 teeth, rarely entire, revolute, marginal glands often caducous, apex acute, acuminate to obtuse with acumen, rarely obtuse or retuse, acumen (when present) 3–14 mm, apical gland caducous or less often persistent. Inflorescences axillary, cymose or racemose, (9.5–)11–34 mm, 3- to 16-flowered, glabrous, peduncle 5–30 mm; bracts early caducous, numerous, strongly imbricate and forming a closed and conical structure 7–12 mm, 4–6 × 4–5 mm, glabrous, margin ciliate to ciliolate, apical gland usually absent. Flowers 4.7–6.5(–7) mm, hypanthium glabrous. Pedicel 0.5–3 mm, articulated; bracteoles early caducous, 1 or 3 per flower, ovobate or ovate, flat to vaguely concave, 2.5–3 × 1.5–2 mm, glabrous, margin ciliolate, apex obtuse-rounded, apical gland lacking. Calyx lobes 5, oblong to obovate, erect, 1.7 × 1.5–2 mm, glabrous, margin ciliate or occasionally ciliolate. Corolla tube 0.5–0.6 mm, lobes 5 or 6, erect, white, ± oblong, concave, 3.7–4.9 × 3.5–5.5 mm, glabrous, densely papilllose mainly near the margin, dark dots sparsely distributed mainly on the proximal half of the adaxial surface (in dried specimens), margin ciliate to ciliolate. Stamens and staminodes alternate to the corolla mostly in clusters alternate with the lobes; filaments erect, the longer series exceeding the style and stigma (when the latter are present in staminate flowers), glabrous. Disc flat, 5-lobed, smooth, glabrous. Staminate flowers: hypanthium (0.5–)1.3–1.5 mm; stamens in 3 to 6 series of different lengths, (25)34 35 to 50(51 to 60), 25 to 50 stamens alternate with the corolla lobes, 0 to 10 stamens opposite the corolla lobes, 1.5–6 mm; filaments completely distinct or connate portion up to 0.4 mm; ovary asperate or with 1 to 3 incomplete septa; style usually present or rarely lacking, straight to curved, occasionally bifurcate, to 3 mm; glabrous; stigma obsolete; disc 0.6–0.8 mm diam. Pistillate flowers: hypanthium 2.2–2.5 mm; staminodes in 2 to 4 series of different lengths, 13 to 18; 13 to 15 alternate with the corolla lobes, 0 to 3 opposite the corolla lobes, 1.5–3 mm; filaments completely distinct or connate portion up to 0.5 mm; style straight, 1.7–2.3 mm; glabrous; stigma capitate or 3-lobed; disc 0.7–1.1 mm diam. Drupes ellipsoid or occasionally ovoid, (10–)13–20 × 5–10 mm, glabrous; calyx lobes lying above or occasionally tightly appressed to disc; disc not visible; endocarp 0.8–1.1 mm thick; seed ellipsoid, 6–13 mm, circular in cross section, rugose, in dried specimens flattened and crescent-shaped.

Distribution and habitat. Symplacos bidana is known from northeastern Paraná State to northeastern Santa Catarina State, growing in Mata Atlântica rainforest of the Serra do Mar. This species delves in elfin forest (ca. 2000 m elevation), occurring also on the lower slopes (ca. 900 m elevation) in ombrophilous forest.

IUCN Red List category. Symplacos bidana occurs mostly in protected areas in Paraná (e.g., Parque Estadual Pico Paraná and Parque Estadual Pico Marumbi), but in Santa Catarina it occurs outside protected areas. Our field observations suggest that this species is uncommon, but there are no data regarding estimates of population numbers or sizes. Therefore, we recommend a conservation status of Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).
**Phenology.** Flowering in May to October; fruiting in September to December.

**Etymology.** The specific epithet honors Adriano Bidá, who has provided important contributions to the knowledge of Brazilian Symplocaceae. Dr. Bidá dedicated his professional life to teaching and research at the Universidade Federal do Paraná. He is now retired and currently lives in Curitiba.

**Discussion.** *Symplocos bidana* is characterized by its large inflorescences (9.5–11.3–34 mm long), corolla with five to six lobes, lobes 3.7–4.9 mm long with sparse black dots mainly on the proximal half of the adaxial surface (in dried specimens), large fruit ([10–]
13–20 × 5–10 mm), calyx lobes covering the disc in fruit, and thick endocarp (0.8–1.1 mm).

Based on its habit, leaf shape, size, and indument, and relatively large fruit, the latter feature uncommon among Brazilian species of Symplocos sect. Barberina, we hypothesize that S. bidana is closely related to S. variabilis Martius ex Miqel. Symplocos variabilis can be distinguished from S. bidana by its three or four corolla lobes that are smaller (2.5–3 mm long) and without black dots in dried specimens, calyx lobes that do not cover the disc in fruit, and endocarp less than 0.5 mm thick.


Haec species quoad cymam deminutam Symplocis italicae Wawra simillimis, sed ab ea bracteis in fructu caducis, fructu majore atque endocarpio crasso distinguitur.

Evergreen dioecious shrub, occasionally a small tree, 0.7–3 m tall; densely branched, branchlets angled, ridged, striate, transversely and longitudinally fissured, glabrous; vegetative buds glabrous. Leaves simple, alternate, petiolate, stipules lacking; petals 2.5–10 mm, adaxially slightly to moderately concave, abaxially rounded to occasionally convex, glabrous; leaf blades elliptic to obovate, 1.5–4.5 × 0.3–1.6 cm, coriaceous, dark green adaxially, green abaxially, both surfaces sparsely to densely puberulent or glabrous, venation ± brochioidromous, midvein impressed to somewhat elevated on both surfaces, base cuneate to attenuate, margin entire or inconspicuously serrulate with 1 to 5 teeth, revolute, marginal glands often caducous, apex usually hooked, acuminate or occasionally acute, rarely obtuse or retuse, acumen (when present) 1–3 mm, apical gland caducous or less often persistent. Inflorescences axillary, cymose, 4–7 mm, 1- to 3-flowered, rarely 4–5-flowered, glabrous, peduncle 1–2 mm (1–3–4 mm when 1-flowered); bracts persistent at anthesis and caducous in fruit, numerous, imbricate, spreading outward and forming a cylindrical and open or less often globose structure 2.5–3 mm, 0.9–1.5 × 1–2.2 mm, glabrous, margin ciliate to ciliolate, apical gland lacking. Flowers 3.5–4.3 (–5) mm, hypanthium glabrous. Pedicel nearly absent to 1 mm, articulated; bracteoles early caducous, 1 or 2 per flower, deltoid or occasionally ovate, concave, 0.8–1.2 × 0.8–1.2 mm, glabrous, margin ciliate, keeled, apex acute or occasionally obtuse, apical gland lacking. Calyx lobes 5, oblong to nearly deltoid, erect, 1.3–1.6 × 0.8–1.2 mm, glabrous, margin ciliate or occasionally ciliolate. Corolla tube 0.4–0.6 mm, lobes 5, erect, white, ± oblong, concave, 2.5–3.4 × 1–3.8 mm, glabrous, obscurely and sparsely papillose mainly near the margin, margin entire or occasionally sparsely ciliolate. Stamens and staminodes adnate to the corolla mostly in clusters alternate with the lobes; filaments erect, the longer series exceeding the style and stigma (when the latter are present in stamine flowers), glabrous. Disc flat, obscurely 5-lobed, smooth, glabrous. Staminate flowers: hypanthium 0.6–1 mm; stamens in 3 to 6 series of different lengths, (24 to 26)27 to 35, 24 to 28 alternate with the corolla lobes, 0 to 7 opposite the corolla lobes, 0.8–4.5 mm; filaments completely distinct or connate portion up to 0.5 mm; ovary asceptate or with 1 to 3 incomplete sepal; style usually lacking, when present straight or curved, sometimes bifurcate, to 2 mm, glabrous; stigma obsolete; disc 0.6–1 mm diam. Pistillate flowers not seen. Drupe ellipsoid, 12–18 × (5–)6–8 mm, glabrous; calyx lobes erect, rarely incurved but not tightly appressed to disc; disc usually visible; endocarp 0.9–1.2 mm thick; seed ellipsoid, 8–10 mm, circular in cross section, rugose, in dried specimens flattened and crescent-shaped.

Distribution and habitat. Symplocos incrassata has been collected only near Curitiiba in the eastern region of Paraná State. This species grows in the Serra do Mar, dwelling mainly in elfin forest (ca. 2000 m elevation) and rarely in ombrophilous forest at 1500 m elevation.

IUCN Red List category. Symplocos incrassata is poorly sampled in herbaria and our field observations suggest that this species is rare, but there are no detailed data regarding estimates of population numbers or sizes. Fortunately, the new species is protected within Parque Estadual Pico Paraná. The extent of occurrence is less than 5000 km² and there are fewer than five localities known. Therefore, we recommend a conservation status of Endangered (EN B1a) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Flowering in July to September; fruiting in October to November.
Etymology. The specific epithet is from the Latin for “thickened,” in reference to its relatively thick endocarp, rare among section Barberina species.

Discussion. Although pistillate flowers are unknown in Symlocos incrassata, this species must nonetheless be functionally dioecious, like the majority of probably all Brazilian section Barberina species (Aranha Filho et al., 2009). The staminate flowers often lack a style, and when the style is present the stigma is obsolete. Moreover, staminate flowers almost always lack ovules, and when they are present they are reduced and in all likelihood nonfunctional because in male plants only old flowers have been observed, without any apparent development of young fruit.

Symlocos incrassata is characterized by its small cymes 4–7 mm long, bracts caducous in fruit, large fruits (12–18 × 5–6–8 mm), and thick endocarp (0.9–1.2 mm). Among the species of Symlocos sect. Barberina, only S. itatiaiae Wawra has the type of
diminutive eyme observed in S. incrassata. Symplocos itaitiae can be distinguished from S. incrassata by its persistent bracts in fruit, smaller fruits (6–7 × 3–4 mm), and an endocarp less than 0.2 mm thick.

Paratypes. BRAZIL. Paraná: Campina Grande do Sul, Serra do Ibitiaquaire, O. S. Ribas, J. M. Silva & E. Barbosa 1500 (G, HB [3], K, MBM, NY, SPF, UPCB); trail to Pico Caratuva, P. W. Fritsch, J. L. M. Aranha Filho & E. Barbosa 1828 (CAS, UEC); Antonina, Serra do Ibitiaquaire, O. S. Ribas & V. A. O. Dietrich 2188 (B, HRCB, MBM, SPF).

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Literature Cited
Caryodaphnopsis fieldii (Lauraceae), a New Species from the Coastal Cordillera of Venezuela

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Abstract. A new species of Caryodaphnopsis Airy Shaw from Henri Pittier National Park, in the Coastal Cordillera of Aragua State, Venezuela, is described and illustrated, and its morphological relationships with allied species are discussed. Caryodaphnopsis fieldii Aymard & G. A. Romero resembles C. fosteri van der Werff, but it is distinguished by leaves with densely puberulent petioles and a rounded apex, pedicels 2–3 mm long, inner tepals 3–4.5 mm long and densely sericeous inside, stout filaments ca. 2 mm long, inner stamens with two globose glands attached at the base, and the pubescent ovary. Geographical information about the Coastal Cordillera region and a key to the Neotropical species of Caryodaphnopsis are presented. This species represents the first report of this genus for Venezuela.

Resumen. Una nueva especie de Caryodaphnopsis Airy Shaw del Parque Nacional Henri Pittier, en la Cordillera de la Costa, estado Aragua, Venezuela, es descrita e ilustrada, y sus relaciones morfológicas con las especies afines son discutidas. Caryodaphnopsis fieldii Aymard & G. A. Romero es similar a C. fosteri van der Werff, sin embargo, se diferencia de esta especie por sus pecíolos densamente puberulentos, el ápice redondeado; los pedicelos 2–3 mm de largo; los tépalos internos 3–4.5 mm de largo, densamente seríceos internamente, los filamentos gruesos, ca. 2 mm de largo, los estambres internos con dos glándulas glososas situadas en la base del filamento, y el ovario pubescente. Se presenta información geográfica acerca de la Cordillera de la Costa y una clave de las especies Neotropicales de Caryodaphnopsis. Esta nueva especie representa el primer registro del género para Venezuela.

Key words: Caryodaphnopsis, Coastal Cordillera, IUCN Red List, Lauraceae, Venezuela.

Caryodaphnopsis Airy Shaw is a tropical amphipacific genus of Lauraceae (van der Werff & Richter, 1985) that shows a remarkable disjunction between Southeast Asia (southern China, Vietnam, Laos, Cambodia, the Philippines, and Indonesia) and tropical America (Costa Rica, Panama, Colombia, Ecuador, Peru, and Brazil, and reported herein for Venezuela). Caryodaphnopsis is characterized among genera of Lauraceae by its opposite leaves and six strongly unequal tepals, the outer three being much smaller than the inner three (van der Werff & Richter, 1985; van der Werff, 1991a; van der Werff & Dao, 1999). In addition, Caryodaphnopsis has an interesting wood anatomical feature: the presence of pyramidal calcium oxalate crystals in the ray parenchyma cells (Richter, 1981; van der Werff & Richter, 1985), which is present in the Old World species of the genus, but not found in the Neotropical species (F. Lorea, pers. comm., 2008). Most species have 4-locellate anthers (vs. 2-locellate in other Caryodaphnopsis [vs. other Lauraceae]), nine stamens (vs. six), and triplicate leaves (vs. pennivneined).

The Coastal Cordillera

The Coastal Cordillera (Cordillera de la Costa) is the third largest mountain range in Venezuela, extending approximately 800 km from its western extreme in the Turbio-Yaracuy depression, where it separates from the Venezuelan Andes, to its eastern end at the tip of the Peninsula de Paria in the state of Sucre. Because of their proximity, the Coastal Cordillera and the Venezuelan Andes have sometimes been considered a continuous mountain chain. However, these two cordilleras do not share a common geologic history; the Coastal Cordillera is ca. 65 million years old, whereas the northern Andes complex is ca. 20 million years old (González de Juana et al., 1980; F. Urbani, pers. comm., 2006). The northern limit of the Coastal Cordillera is the Caribbean coastline, and to the south we find vast plains known as Los Llanos. The summits and

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uppermost slopes of the Coastal Cordillera are mostly covered by humid cloud forest, which extend between 600 and 2000 m. Deciduous and humid low forest are also found in this region, scrub and low forests are present in the arid coastal region, and savannas and herbaceous formations occur on lower slopes, mainly in the interior valleys and plains. Steyermark (1982) studied the Coastal Cordillera flora and concluded that, in addition to endemic taxa, the vegetation of this region was a blend of Central American, Caribbean, Andean, and Guayanaman-Amazonian elements. According to Huber et al. (1998), the region holds between

3000 and 3500 species of vascular plants, of which ca. 278 were noted as endemic.

**Caryodaphnopsis fieldii** Aymard & G. A. Romero, sp. nov. TYPE: Venezuela. Aragua: Distrito Girardot, Parque Nacional Henri Pittier, cloud forest, 1180 m, July 1984, A. Field 442 (holotype, MY; isotypes, MERF, NY). Figure 1.

Species *Caryodaphnopsis fosteri* van der Werff accedens, sed ab ea petiolis dense puberulis, folis apice rotundatis, pedicellis 2–3 mm longis, tepalis interioribus 3–4.5 mm
longis, intus dense sericeis, filamentis validis ca. 2 mm
longis, antheris interioribus glandulis globosis duabus basi
adhaerentibus atque ovario pubescente diversa.

Tall trees; twigs quadrangular to slightly terete,
densely puberulent, glabrescent when mature. Leaves
opposite, chartaceous, elliptic to elliptic-oblung, 6–12
× 3–6 cm, base acute to cuneate, apex rounded,
glabrous adaxially, sparsely pilose abaxially, more
densely along the main and secondary veins; blades
triplinerv, the basal lateral veins leaving the midrib
1–3 mm from the base of the leaf, lateral and
secondary venation slightly impressed adaxially,
raised abaxially, tertiary venation immersed on both
surfaces; petioles 6–12 mm, densely short pubescent.
Inflorescence axillary, paniculate with alternate
branches, 2.5–5 cm; peduncles ridged, sparsely
pilose; flowers pedicelled, pedicels 2–3 mm, densely
adpressed pubescent, with 2 triangular bracteoles at
the base. Tepals 6, strongly unequal, the outer 3 1–
2 mm, wide-ovate, sparsely strigose externally, gla-
bruous internally, the inner 3 3–4.5 mm, ovate, 6-
veined, adpressed pilose externally, densely sericeous
internally; fertile stamens 9; filaments ca. 2 mm,
stout, densely sericeous; anthers 4–locellate, the
locelli arranged in 2 horizontal rows with the lower
pair larger than the upper, introrse in the outer 6
stamens, extrorse in the inner 3, these with 2 globose
glands attached at the base; staminodia 3, 1.5–2 mm,
filaments densely sericeous, tip triangular; ovary ca.
1 mm, sparsely pilose at the base, strigose from the
middle to the apex; style ca. 1 mm, slender; stigma
capitate. Fruit not seen.

Distribution and habitat. Caryodaphnopsis fieldii
is known only from the type specimen, collected in
Aragua State, Venezuela, in the central portion of the
Coastal Cordillera, in moist montane forests dominated
by trees of Gyranthera caribenensis Pittier (Malvaceae)
that are up to 50 m tall (Huber, 1986; Smith & Field,
2001). It may be common in this area, but the great
height of the trees surely has discouraged collectors.

IUCN Red List category. According to IUCN Red
List criteria (IUCN, 2001), the new species should be
included in the category LC (Least Concern) at the
regional level, because it is legally protected within
Henry Pittier National Park, Aragua State, Ven-

Etymology. The specific epithet honors the col-
lector of the type, Andrew M. Field (1955–1984),
pioneer of forest canopy studies in Venezuela, who
died when he accidentally fell from a Gyranthera
caribenensis tree while conducting canopy research in
August 1984 (Bordón, 1987).

Discussion. Caryodaphnopsis fieldii shares the
following characters with C. fosteri: rachis of the
inflorescence and pedicels sparsely to densely
adpressed pubescent, inflorescences not longer than
6 cm, and ovary ca. 1 mm long. However, C. fieldii
is distinguished from C. fosteri by petals densely short
pubescent (vs. slightly pilose); apex of the leaves
rounded (vs. obtuse to acute); pedicels 2–3 mm long
(vs. ca. 5 mm long); inner tepals 3–4.5 mm long,
densely sericeous inside (vs. 5–6 mm long, pilose
inside); filaments stout, ca. 2 mm long (vs. slender,
3–4 mm long); the inner stamens with two globose
glands attached at the base (vs. two glands attached
cal 1 mm above the base); and the ovary pubescent
(vs. glabrous).

Including the new species described here,
Caryodaphnopsis currently comprises 15 species.
The Asian species were revised by Kostermans
(1974), and a key for known species was written in
Chinese by Li and Li (1991). Since Kostermans
revised the Asian species, eight new species (includ-
ing C. fieldii) have been described in or
transferred to Caryodaphnopsis, one from Vietnam
and the others from the Neotropics (van der Werff &
van der Werff & Dao, 1999; Zamora et al., 1988).
However, the genus as a whole has never been
revised. The following key facilitates the identifi-
cation of the Neotropical species. It is based on
original descriptions and on the examination of
specimens deposited in the New York Botanical
Garden, the Missouri Botanical Garden, and the
Harvard University Herbaria.
5a. Flowers with 6 fertile stamens; leaves coriaceous, densely brown tomentose abaxially; Ecuador, Peru...
5b. Flowers with 9 fertile stamens; leaves chartaceous to subcoriaceous, sparse to densely shortly pilose abaxially.
6a. Leaf apex acute or acuminate to cuspidate; inner tepals 7–10 mm long; ovary ca. 1.9 mm long with sparse sericeous pubescence; Costa Rica, Panama...
6b. Leaf apex acute or rounded; inner tepals 3–6 mm long; ovary ca. 1 mm long, glabrous or pubescent.
7a. Petioles slightly pilose; pedicels ca. 5 mm long; inner tepals 5–6 mm long, sparsely pilose inside; filaments slender, 3–4 mm long; the inner stamens with 2 globose glands attached ca. 1 mm above the base; ovary glabrous; Colombia, Ecuador, Peru, Bolivia...
7b. Petioles densely short pubescent; pedicels 2–3 mm long; inner tepals 3–4.5 mm long, densely sericeous inside; filaments stout, ca. 2 mm long; the inner stamens with 2 globose glands attached at the base; ovary pubescent; Coastal Cordillera, Venezuela.

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Literature Cited
Cinnamodendron occhionianum, a New Species of Canellaceae from Brazil

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Abstract. A new species belonging to the genus Cinnamodendron Endlicher (Canellaceae) is described: C. occhionianum F. Barros & J. Salazar. The new species is known only from Cardoso Island off the coast of southeastern Brazil. It is similar to C. axillare Endlicher ex Walpers and C. sampaioanum Occhioni, but differs from the former by the fasciculate inflorescence and dark purple flowers, and from the latter by the nonplicate apex of the leaves and a shorter fruit pedicel. It also resembles C. dinisi Schwacke in its vegetative features, but differs from it mainly by the flowers with 10 petals, 10 stamens, and ovary with two placentae.


Key words: Brazil, Cardoso Island, Canellaceae, Cinnamodendron, IUCN Red List.

Canellaceae is a small tropical family with ca. 21 species in six genera. Six species belonging to the two genera, Canella P. Browne and Cinnamodendron Endlicher, have been found in South America so far. Only Cinnamodendron is represented in Brazil, and its distribution extends into French Guiana, Suriname, and Venezuela. Capsicodendron Hoehne, a monotypic genus from Brazil described by Hoehne (1934), has been shown to be a synonym of Cinnamodendron (Hutchinson, 1964; Barroso et al., 1978; Salazar, 2006).

Cinnamodendron is characterized by axillary inflorescences with flowers that are mainly fasciculate, rarely racemiform to corymbiform, with three conspicuous bracts, three sepals, six to 10 free petals (generally 10) arranged in two series, eight to 10 stamens (commonly 10), two or three carpels, two or three placentae, few ovules (four to six), and small fruit up to 1.5 cm in diameter (one of the smaller fruits in the family). The fruit is commonly stipitate with few seeds (one to six) that are embedded in a gelatinous pulp and do not have a ruminiate endosperm.

Five species of Cinnamodendron are currently recognized (Salazar, 2006): C. axillare Endlicher ex Walpers, C. dinisi Schwacke, C. sampaioanum Occhioni, C. tenuifolium Uitteien, and C. venezuelense Steyermark. The first three species occur in Brazil, where the highest diversity of the genus is found (Salazar, 2006). Herein, a sixth species (fourth for Brazil) for the genus is described, based on collections from the state of São Paulo, southeastern Brazil.


Affine Cinnamodendron axillarii Endlicher ex Walpers sed floribus fasciculatis purpureis differt; affine etiam C. sampaioanum Occhioni sed apice folliorum non plicato atque pedicellis fructuum breviobibus differt; etiam simile C. dinisi Schwacke sed petalis staminibusque 10 atque ovario placentis 2 et ovaris 4 differt.

Tree, 8–20 m tall; bark brownish gray with abundant rounded reddish brown lenticels. Leaves with petiole contorted at the base, canaliculate above, 5–10 mm; blade ± symmetrical, bicolored, oblong-lanceolate to ovate-lanceolate, apex obtuse to

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acuminate, base obtuse to attenuate; chartaceous, glabrous, glandular dotted on both surfaces, with the glands more prominent abaxially, (3.5–)8–11(–15) × (2–)2.9–5(–6.5) cm, adaxial surface glossy and dark, abaxial surface opaque and pale; midvein prominent abaxially, 8 to 10 secondary veins on each side, slightly impressed adaxially, but prominent abaxially; stomata brachylyraeotic. Inflorescence as fascicles of
Table 1. Principal differences among the four Brazilian species of *Cinnamodendron*.

<table>
<thead>
<tr>
<th></th>
<th><em>C. occhionianum</em></th>
<th><em>C. axillare</em></th>
<th><em>C. dinisii</em></th>
<th><em>C. sampaioanum</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflorescence</td>
<td>fascicle of 1 to 4 flowers</td>
<td>raceme of 3 to 8 flowers</td>
<td>fascicle of 2 to 6 flowers</td>
<td>solitary flowers or fascicle of 2 to 3 flowers</td>
</tr>
<tr>
<td>Flower color</td>
<td>dark purple obulate to acuminate, not plicate</td>
<td>whitish cream acute to subacuminate, not plicate</td>
<td>dark purple obute to rounded, not plicate</td>
<td>purple acute, plicate</td>
</tr>
<tr>
<td>Leaf apex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flower pedicel length, mm</td>
<td>2-5</td>
<td>4-5</td>
<td>7-9</td>
<td>3-6</td>
</tr>
<tr>
<td>Fruit pedicel length, mm</td>
<td>2-5</td>
<td>6-10</td>
<td>5-7</td>
<td>5-9</td>
</tr>
<tr>
<td>No. of petals</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>No. of placenta</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>No. of stamens</td>
<td>10</td>
<td>10</td>
<td>(8)(9)(10)</td>
<td>10</td>
</tr>
</tbody>
</table>

few flowers (1 to 4); peduncle glabrous, glandular-punctate, with bracts and bracteoles subcoriaceous, caducous, imbricate, slightly ciliolate at the margin and glandular-punctate. Flowers with pedicels 2–5 mm, with glabrous, glandular-punctate, imbricate bracteoles at the base; flowers small, pentamerosus, subsessile; sepals 3, green, suborbiculate to orbiculate, 2–3 × 3–4 mm, margin entire or slightly ciliolate; petals 10, free, in 2 series of 5, imbricate, dark purple, fleshy, glandular-punctate, margin slightly ciliolate, the outer 5 petals larger and thicker, 6–7 × 4–5 mm, obturate, the internal 5 petals smaller, more membranaceous, with more glandular punctations, 4–5 × 2–3 mm, obturate to spatulate; androecium with 10 stamens, fused into a staminal tube and monadelphous, 4–5 mm, the base of the staminal tube 3.2–4.5 mm; anthers 1–1.8 mm, inequilateral, apically truncate; gynoecium cylindrical, 5–7 mm; stigma capitulate, papillate, bilobate, placenta 2, ovules 4. Fruit a stipitate berry, ca. 1.5 × 1.3–1.5 cm, ± globose, dark purple; pedicels 2 to 5; seeds 2 to 4, dark brown, embedded in a gelatious pulp, ca. 10 × 8 mm; endosperm not nucinate.

**Distribution and ecology.** *Cinnamodendron occhionianum* is a tree up to 8–20 m, endemic to Brazil and collected only in São Paulo State from Cardoso Island. It is found in the Atlantic Forest at 120–200 m along the hillsides of the River Perequê cliffs.

**IUCN Red List category.** *Cinnamodendron occhionianum* should be considered Data Deficient (DD) according IUCN Red List criteria (2001). A number of trees of *C. occhionianum* are known from the forests of Cardoso Island, but no objective measure of its range of distribution or information on the density and size of its population are available. However, because of Cardoso Island’s status as a state park, the species is most likely not endangered at this time.

**Phenology.** The new species has been collected flowering and fruiting from August to November.

**Etymology.** *Cinnamodendron occhionianum* is named in honor of Paulo Occhioni (1915–2000), the Brazilian botanist who extensively studied the family Canellaceae in Brazil.

**Local names and uses.** The popular name of the species is “paratudo,” from the Portuguese meaning “for all.” Its bark is used to aromatize and dye cachaça, a popular Brazilian alcoholic beverage, which is often used to treat rheumatism (Barros, 2000).

**Diagnostic features.** *Cinnamodendron occhionianum* is similar to *C. axillare* and *C. sampaioanum*, but differs from the former by the fasciculate inflorescence and the dark purple flowers, and from the latter by the imbricate apex of the leaves and the shorter fruit pedicel. It also resembles *C. dinisii* in its vegetative features and has been frequently confused with it in both literature and herbaria; however, it differs in the flowers that have 10 petals, 10 stamens, and an ovary with two placentae. The differences among these species are summarized in Table 1.


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from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). We thank Marcela Martínez Millán for her useful comments, and Carmen S. Zucchio Fidalgo for the drawing of the new species.

Literature Cited


abstract. A new species and combination in Malvaceae, *Wissadula stipulata* Bovini and *W. cuspidata* (R. E. Fries) Bovini, respectively, are presented. Both were found in the central-west of Brazil, in the lowlands and Amazon rainforest regions. A description and illustration of the new species are provided, and a taxonomic key of species related to *Wissadula* in Brazil is presented. The name *W. cuspidata* is lectotypified.

Key words: Brazil, IUCN Red List, Malvaceae, Mato Grosso do Sul, Wissadula.

El género *Wissadula* Medikus, posee aproximadamente 26 especies (Fryxell, 1997), ocurre básicamente en los neotrópicos, y es reconocido entre las Malvaceae, por poseer un tubo estaminal extremadamente reducido y principalmente por el fruto esquizocarpo con mericarplos que presentan una constricción en la región medial, aparentando internamente, una división en dos cavidades de sus mericarplos.

La monografía de Fries (1908) fue la última obra completa para el género. Actualmente, al prepararse una revisión de *Wissadula* para el Brasil, se identificó una nueva especie, y se necesitó establecer una nueva combinación.


Hace especies inter congeneros brasileñses *Wissadulae cuspidatae* (R. E. Fries) Bovini et *W. excelsiori* (Cavanilles) C. Preal maxime accedens, sed ab eis stipulis ca. 1.5 cm latis apice longe acuminatis, lamina foliari in sicco manifeste discolori, corolla ca. 1.8 dm diam., mericarpis 4 atque semine in quoque mericarpio solitario distinguatur.

Arbusto erecto con 1–2.5 m de altura; ramas jóvenes pubérulas, blanquecinas, brilloso-sedosas, tricomas diminutos glandulares y raramente estrellados. Estípulas lanceoladas, ca. 1.5 cm, ápice largo acuminado, base atenuada y ancha, en pares, persistentes, cara adaxial pubescente, diminutos tricomas simples, cara abaxial pubescente, tricomas estrellados. Hojas simples, enteras, membranáceas a cartáceas; lámina ovada a lanceolada, 4.5–12 × 2.5–6 cm, ápice acuminado a agudo, base cordiforme, con lóbulos hasta 1.2 cm, margen entera, revoluta, ligeramente ciliada, tricomas simples; nerveduras prominentes en el envés; haz marrón oscuro, glabrescente, rojos e inconspicuos tricomas glandulares, envés albo-argénto (cuando secas), tomentoso, tricomas estrellados; peciolo 0.5–6.5 cm, indumento y tricomas iguales a los de las ramas. Panícula ca. 30 cm, con ramas botriomorfas, laxa; pedicelo hasta 2 cm, antepodio hasta 1 cm; indumento y tricomas iguales a los de las ramas; cáñiz campanulado ca. 5 mm, no engrosado en la fructificación, 5 lóbulos ligeramente cuspidados, partidos hasta la porción medial, externamente pubérulo, tricomas estrellados, internamente ligeramente pubérulo, tricomas simples largos, margen densamente vilosa, tricomas simples largos; corola alba a crema, ca. 1.8 cm diá., pétalo espalpulado, en la margen con tricomas estrellado-estipitados en la base; filamentos concrecenses formando un tubo estaminal ca. 1 mm, con raros tricomas estrellados estipitados y ca. 5 mm de filamentos libres; anteras amarillas, ca. 1 mm; ovario glabro, 3 óvulos por lóculo; estilo ca. 6 mm, igual al número de mericarplos, estigma capitado. Esquizocarpo ca. 8 mm diá., con 4 mericarplos, ca. 7 mm de altura, siendo menos de 1 mm de arista; constricción casi imperceptible, glabro, brilloso (cuando seco); 1 semilla ca. 2 mm de altura, vilosas en la región del hilo, tricomas largos.

Distribución y fenología. *Wissadula stipulata*, hasta el presente momento, se restringe al Estado de Mato Grosso do Sul, en la región del Pantanal. En el material examinado, florece y fructifica en el mes de marzo.

**Estado de conservación.** Hasta el momento *Wissadula stipulata* se encuentra en “Not Evaluated” (NE) de acuerdo con la IUCN (2001). No se cuenta con un estudio y colecciones suficientes de la especie, y sólo se conoce de áreas perturbadas en el mismo municipio.

**Etimología.** El epíteto se refiere al tamaño prominente de las estípulas.
Discusión. Las características sobresalientes para la especie son las láminas en la región adaxial glabrescentes, tricomas glandulares raros e inconspicuos y en la región abaxial albo-argéntea, y cuando secas, se tornan más evidentes, estípulas ca. 1.5 cm de largo, tal vez la mayor observada para el género hasta el momento y esquisocarpo con cuatro mericarcos, glabros, con una semilla en cada mericarpo. Se asemeja a Wissadula excelsior (Cavanilles) C. Presl, pero el indumento de la hoja (hispido) y del fruto (tomentoso), la forma de la base de la hoja (truncada a ligeramente cordada), la estípula menor y el número de semillas (tres) por mericarpo, las tornan distintas.

La característica, una semilla por mericarpo es diagnóstica para la sección Wissada, siendo conocidas hasta ahora dos especies: Wissadula divergens (Bentham) Bentham & Hooker f. (Ecuador) y fadynii R. E. Fries (Caribe). En W. stipulata probablemente existe un aborto de los dos óvulos colaterales, presentando sólo el desarrollo de la semilla basal. Con base en esta característica de una semilla por mericarpo, W. stipulata se considera la tercera especie de la sección Wissada.


Fries (1908) analizó algunos ejemplares (Malme II s.n., BM 888516; Robert 341, BM; y Pielger 658, B [destruido]) y comentó sobre las evidentes diferencias morfológicas y geográficas de éstos en relación a Wissadula patens, como hojas con pecíolos más largos, base de la lámina foliar redondeada, ápice cuspidado y con el envés más claro, estableciendo la subespecie cuspidata. Además del estudio de estos ejemplares de herbario, fue encontrado otro ejemplar colectado posteriormente en la misma área de ocurrencia, que luego de un minucioso estudio permitió elevarla a nivel de especie.

Como características diagnósticas, Wissadula cuspidata posee hojas con haz glabro, ápice agudo a cuspidado y base atenuada, además de presentar una corola menor que la especie más relacionada, W. excelsior.


Clave para el reconocimiento de las especies de Wissadula relacionadas en Brasil

1a. Estípulas ca. 1.5 cm largo, ápice largo acuminado; lámina foliar nitidamente discolor (cuando seca); corola ca. 1.8 cm de diámetro; una semilla por mericarpo. ........................................... W. stipulata

1b. Estípulas ca. 1 cm de largo, ápice agudo; lámina foliar levemente discolor; corola ca. 1 cm de diámetro. o menos; tres semillas por mericarpo ............ 2

2a. Haz de la lámina foliar glabro; base atenuada; corola ca. 0.9 cm diámetro. ............... W. cuspidata

2b. Haz de la lámina foliar híspida; base truncada a ligeramente cordada; corola ca. 1 cm diámetro. ............... W. excelsior

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Literatur Citada


Three New Species of *Brachystelma* (Apocynaceae, Asclepiadoideae, Ceropegieae) from South Tropical and Southern Africa

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**Abstract.** Three new species of *Brachystelma* Sims (Apocynaceae, Asclepiadoideae, Ceropegieae) are described and illustrated. These are *B. pruinoseum* Bruyns from the mountains of southern Angola and the Kaokoveld of northern Namibia, *B. tenuissimum* Bruyns from central Tanzania and northern Zambia, and *B. theronii* Bruyns from the western parts of the Great Karoo of South Africa.

**Key words:** Apocynaceae, Asclepiadoideae, *Brachystelma*, Ceropegieae.

*Brachystelma* Sims (Apocynaceae, Asclepiadoideae, Ceropegieae) consists of 100 species that are widely distributed in sub-Saharan Africa. More than 70 of these 100 species occur in southern Africa (Dyer, 1980; Bruyns, 1995), but there are a few species in southeastern Asia, and one occurs as far east as Australasia (Forster, 1996). These taxa are mostly poorly recorded because the plants are geophytes that only appear above the ground during the rainy season and, even when in full growth, they are small and inconspicuous.

1. *Brachystelma pruinoseum* Bruyns, sp. nov.

**TYPE:** Namibia. Okombambi (1712BD), 1800 m, 20 Dec. 1999, P. V. Bruyns 8021 (holotype, BOL; isotypes, K, WIND). Figure 1.

Haec species *Brachystelmati incaeo* R. A. Dyer similis, sed ab eo caulibus erectrioribus, folis angustioribus, pagina interiore corollae laevi et lobis exterioribus corone profundius bifidis differt.

Small herb arising from flattened discoid tuber to 5 cm diam.; stems ascending to erect and mostly unbranched, 5–10 × 0.1–0.2 cm, puberulous, reddish green. Leaves narrowly elliptic, 15–25 × 3–8 mm, green, puberulous, petiole to 5 mm. Inflorescences 1 to 5, alongside many of lower nodes except first 2 above tuber, each with tiny peduncle to 3 mm, with 3 to 10 flowers opening in gradual succession; pedicel 10–15 mm, brownish green, puberulous, initially ascending then spreading and later descending to hold flower facing somewhat downward, lowest flowers held very close to ground. Flowers with sepals ca. 2 × 1 mm, lanceolate, acute, adpressed to corolla, puberulous, brownish green; corolla rotate, 5–8 mm diam., outside green suffused with black, puberulous, inside purplish brown, brown in patch toward apex of lobes, pubescent toward center (and in sinuses of and along margins of lobes) with fine white spreading crinkled trichomes, 0.5–1 mm, of which those near center cling to sides of corona; corolla tube cupular, ca. 0.5 mm deep and just containing base of gynostegium; corolla lobes 2–3 × 1.5–2 mm at base, reflexed, deltate to ovate-deltate, broadly acute, margins recurved and eciliate; corona ca. 1.75 × 2 mm, glabrous, white

![Figure 1. *Brachystelma pruinoseum* Bruyns. —A. B. Side views of flower. —C. Side view of dissected corolla. —D. Face view of gynostegium. —E. Pollinarium. Scale bar, at B: A–D = 1 mm; E = 0.25 mm. A drawn from Bruyns 10661 (BOL, E); B–E, from Bruyns 8021 (BOL, K, WIND).](image-url)
outside in lower half, without basal stipe; outer lobes ca. 1 mm, bifid to near middle into spreading flattened obtuse lobules, black; inner lobes less than 0.5 mm, adpressed to backs of anthers and shorter than them, narrowly deltoid, acute, black. Fruits and seeds unknown.

Habitat and distribution. Brachystelma pruinum has been collected twice: one collection was made in the Kaokoveld of Namibia at the top of the Otjihipa Mountains and the other collection hails from the adjacent part of southwestern Angola (Fig. 4), where it occurred around the base of larger granite hills among trees. In both cases, it grew among rocks and a sparse covering of grasses and other small herbs in gently sloping areas.

IUCN Red List category. Brachystelma pruinum should be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. Brachystelma pruinum is most similar to B. incanum. In both species, the small, dark flowers are borne in small clusters on comparatively long pedicels. The two differ by the spreading habit of the stems of B. incanum with much broader leaves 10–15 mm across, the rugose inner surface of the corolla in B. incanum (smooth in the new species), and the more deeply bifid outer corona lobes of B. pruinum (which are not bifid in B. incanum). Brachystelma pruinum is unusual in the genus for the fine, crinkled, white hairs, which are plentiful near the center of the corolla, many of which cling to the sides of the gynostegium.

Superficially, there is some resemblance also to Brachystelma arnotii Baker and to B. schinzii (K. Schumann) N. E. Brown. In B. arnotii, the outer and inner coronas arise much lower on the gynostegium, the outer lobes do not form a cup around the anthers as in B. pruinum, and the inner lobes are extremely short so that the anthers are left exposed in the center nearly to their bases. Brachystelma schinzii differs by the presence of pendulous marginal cilia along the lobes and the short outer corona lobes that do not rise above the level of the anthers.

Paratype. ANGOLA. North of Chitado (1613DD), 1220 m, 4 Jan. 2007, P. V. Bruyns 10661 (BOL, E).

2. Brachystelma tenuissimum Bruyns, sp. nov.
TYPE: Tanzania. Mpwapwa distr.: Kibori Tana Hills (0636AD), 1500 m, 16 Dec. 2003, P. V. Bruyns 9641 (holotype, BOL). Figure 2.

Hae species a Brachystelmate elegantula S. Moore floribus in pluribus fasciculis parvis dispositis, lobis corollae 5–6 mm longis et lobis coronae exterioribus profunde bifidis in lobulos lineares patentes differens.
Small herb with single stem arising from cluster of thickened, swollen, whitish roots; stem erect and unbranched, 15–45 × 0.1–0.2 cm, glabrous, green. Leaves filiform, 20–65 × 2–3 mm, grayish green, nearly glabrous, slightly folded upward along midrib, sessile. Inflorescences 1 to 5, in small fascicles alongside middle to upper nodes, each with short peduncle to 3 mm, with 3 to 6 flowers opening in gradual succession; pedicel 12–17 mm, green, sparsely puberulous, descending. Flowers with sepals ca. 1.5 × 0.5 mm, narrowly lanceolate, acute, adpressed to corolla, sparsely puberulous, green; corolla rotate to slightly campanulate, 8–10 mm diam., outside green, glabrous, inside purple, finely pubescent with purple spreading trichomes up to 0.5 mm; corolla tube less than 0.25 mm deep (almost absent); corolla lobes 5–6 × 0.8–1 mm at base, ascending to slightly spreading, narrowly lanceolate, acuminate, with erect purple cilia (not swollen) along slightly recurved margins; corona ca. 1.8 × 2.25 mm, glabrous except for small hairs on lobules of outer corona, with short basal stipe; outer lobes ca. 1 mm, ascending, deeply bifid into 2 widely spreading linear lobules and fused to inner lobes only near base; inner lobes nearly 1 mm, adpressed to hacks of anthers and exceeding them to meet in center, linear, obtuse. Fruits and seeds unknown.

Habitat and distribution. Brachystelma tenuissimum is known at present from two widely scattered localities: one in central Tanzania and the other on the northern edge of Zambia, near Lake Tanganyika (Fig. 4). It occurs in Brachystegia-woodland on steep to gently sloping ground among stones under trees, with very little other vegetation.

IUCN Red List category. Brachystelma tenuissimum should be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. Brachystelma tenuissimum is one of the species of Brachystelma in which the stems arise from a fascicle of swollen roots rather than a tuber. Dyer (1980) listed B. canum R. A. Dyer, B. compton N. E. Brown, B. franksiae N. E. Brown, B. gerrardii Harvey, B. longifolium (Schlechter) N. E. Brown, B. macropetalum (Schlechter) N. E. Brown, B. natalense (Schlechter) N. E. Brown, B. ramostissimum (Schlechter) N. E. Brown, B. sandersonii (Oliver) N. E. Brown, and B. schizoglossoides (Schlechter) N. E. Brown as possessing this form of rootstock in southern Africa. Other tropical African species with this habit are B. brownianum (S. Moore) Meve from Angola and possibly B. elegantulum S. Moore from Angola.

Outside Africa, this phenomenon is only known in B. nepalense (Radelilffe-Smith) Meve from the Himalayas of Nepal. Of all of these, Brachystelma tenuissimum is most similar to B. elegantulum, but differs in that the flowers are produced in several small fascicles along the stem (rather than terminally as in B. elegantulum), the corolla lobes are 5–6 mm long (vs. 12–15 mm long in B. elegantulum), and the outer corona lobes are pouch-like in B. elegantulum rather than divided into two spreading lobules as in this new species.

Paratype. ZAMBIA. Near Kalombo Falls (0831CA), 1200 m, 6 Dec. 2003, Bruyns 9603 (BOL).
3. *Brachystelma theronii* Bruyns, sp. nov. TYPE: South Africa. Fraserburg distr.: Tafelberg (3221AA), 1400 m, 2 Nov. 1991, P. V. Bruyns & A. S. Theron 4839 (BOL). Figure 3.

_Haece specie Brachystelmati caudata* (Thunberg) N.E. Brown similis, sed ab eo floribus simul aperientibus, tube corollae minus profunde, lobis coronae exterioribus non profunde bifidis et tumore nutlo post lobos interiores coronae distingueda.

Small herb to 10 cm tall arising from flattened discoid tuber to 12 cm diam.; stems ascending to erect and branching near base, 5–10 × 0.1–0.2 cm, puberulous, gray-green. Leaves narrowly elliptic, 15–50 × 3–10 mm, gray-green, puberulous, petiole 4–6 mm. Inflorescences 1 to 3, alongside lower nodes except first 2 above tuber, each with short peduncle to 5 mm long, with 3 to 20 flowers opening nearly simultaneously usually in a dense cluster; pedicel 10–18 mm, green, puberulous, ascending to hold flower facing upward. Flowers with sepals ca. 5 × 1 mm, narrowly lanceolate, acute, adpressed to corolla, puberulous, green; corolla rotate to slightly campan-
ulate, 30–45 mm diam., outside green faintly mottled with brown, puberulous, inside cream mottled with maroon, covered especially around mouth of tube and inside tube with shaggy white spreading hairs 0.5–3 mm long, with fetid odor; corolla tube shallow and bowl-shaped, 2–3 mm deep and completely containing gynostegium; corolla lobes 15–20 × 4–6 mm at base, spreading, narrowly lanceolate, acuminate, margins slightly recurved and eciliate; corona ca. 2.5 × 3.5–4 mm, glabrous, apparently blackish red (actually dark yellow heavily suffused with maroon flecks), with very short basal stipe; outer lobes ca. 0.75 mm, forming almost continuous ring around gynostegium with slight notch in middle, distinctly thicker behind inner lobes; inner lobes nearly 1 mm, adpressed to backs of anthers and exceeding them, rectangular, obtuse to acuminate, slightly descending beyond anthers. Fruit a pair of slender follicles 80–100 × 3–4 mm, each horn of follicle bearing 18 to 25 flattened shiny blackish comose seeds, ca. 6 × 3 mm.

Habitat and distribution. Brachystelma theronii is found among dolerite-capped, shale hills at altitudes of 1000–1400 m on the western edge of the Great Karoo between Laingsburg and Williston (Fig. 4). Plants grow on gently sloping ground among stones and scattered small, nonsucculent shrubs, usually completely in the open and mostly around the bases of the larger hills.

IUCN Red List category. Brachystelma theronii should be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Etymology. Brachystelma theronii is named for A. S. Theran, who has for many years documented the flora of his own farm, Tafelberg, in the Fraserburg district of the western Great Karoo, and neighboring areas and has discovered many interesting new records of succulents and other plants in this little-collected corner of the country. Among these is this new species of Brachystelma.

Discussion. Brachystelma theronii shares many features with B. caudatum and has flowers of a similar size to those of B. caudatum. It differs from B. caudatum in that the flowers are produced in nearly simultaneously opening clusters, which mature before the leaves have fully developed, usually around the middle of October. In B. caudatum (which also flowers in October), the flowers are produced in fascicles of two to eight among the mature leaves and open successively, the corolla tube is deeper (roughly twice the height of the gynostegium) and has steeper sides, the outer corona lobes are deeply bifid with an erect tooth on either side of the divide, and the inner lobes have a distinct swelling behind them inside the cup formed by the outer lobes.

From Brachystelma decipiens N. E. Brown. B. theronii differs by the much larger flowers (to 25 mm diam. in B. decipiens) with their shallowly bowl-shaped corolla tube (more cup-shaped in B. decipiens) and the manner in which the flowers are produced in simultaneously opening clusters (developing successively in groups of two to four in B. decipiens). In B. decipiens, the outer corona lobes are also deeply divided in the middle (unlike B. theronii) and have a dense cluster of white hairs on their inner faces (lacking in B. theronii).


Literature Cited
Validation of the Name *Sinoleontopodium lingianum* (Asteraceae, Gnaphalieae)

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ABSTRACT. *Sinoleontopodium lingianum* Y. L. Chen (Asteraceae, Gnaphalieae), originally described from Xizang (Tibet), China, was not validly published in 1985 because two gatherings were designated as type. The name is validated here, with the specimen bearing female florets designated as holotype.

Key words: Asteraceae, Gnaphalieae, IUCN Red List, Sinoleontopodium.

*Sinoleontopodium lingianum* Y. L. Chen, the basis for the monotypic genus *Sinoleontopodium* Y. L. Chen, was described based on material from Xizang (Tibet), China (Chen, 1985). Unfortunately, this publication was not in accordance with Articles 37.1 and 37.2 of the *International Code of Botanical Nomenclature* (McNeill et al., 2006), since two gatherings, one with female florets and the other with male florets, were cited concurrently as type. Article 37.1 requires the type to be clearly indicated for the name of a species published after 1957. Article 37.2 allows the type to be indicated by reference to a single gathering, even if more than one specimen is involved. However, nothing in Article 37 allows the type to be indicated by reference to more than one gathering. Although the collection information is quite similar for both specimens, the sites do differ, being glacial gravel, 4500 m, or cliff, 4600–4900 m, respectively. In such an instance, the name is not validly published because Article 32.1(c) requires compliance with the special provisions of Article 37 (among others).

*Sinoleontopodium* is a distinctive genus recognized widely since its publication (e.g., Ni & Cheng, 1987; Anderberg, 1991; Ying & Zhang, 1994). Chen (1985) considered that, in the habit and the shape of the involucre, this genus is very similar to some Sino-Himalayan species of *Leontopodium* R. Brown, particularly to those in *Leontopodium* ser. *Haastioidea* Ling, in *Leontopodium* subsect. *Haastioidea* Handel-Mazzetti, such as *L. haastioidea* (Handel-Mazzetti) Handel-Mazzetti, but readily distinguishable by the plants being dioecious and having homogeneous florets, the corolla white villous distally, and achenes 1-costate on each side. As well, Chen (1985) also pointed out that *Sinoleontopodium* may be more closely related to *Antennaria* Gaertner than to *Leontopodium* in the plants being dioecious, but differs in having pappus hairs not comminute at the base, receptacles areolate with the areoles cup-shaped, corollas white villous distally, and involucral bracts thinly membranous. However, Anderberg (1991) later segregated *Sinoleontopodium*, together with five genera from New Zealand, Tasmania, and South America, namely *Psychrophytion* Beauverd, *Pterygotappus* Hooker f., *Loricaria* Weddell, *Raoulia* S. F. Blake, and *Mniodes* (A. Gray) Bentham, in the subtribe Loricariinae Anderberg in the tribe Gnaphalieae Bentham. The systematic position of *Sinoleontopodium* remains unresolved.

The first author intends to recognize *Sinoleontopodium* in his forthcoming treatment of the tribe Gnaphalieae in the *Flora of China*. It is therefore necessary for the only species of *Sinoleontopodium* to have a validly published name. The present paper validates the name *S. lingianum* under Article 45.1 (McNeill et al., 2006) by designating as the holotype a specimen from the gathering with female florets, cited in the original publication, and by direct reference to Chen’s Latin description there. A specimen from the gathering with male florets is designated as a paratype. We ascribe both the name, *S. lingianum*, and its Latin description to the original author, Y. L. Chen, so that, under Article 46.2, the name must be

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Novon 19: 23–24. Published on 19 March 2009.
attributed to that author. We intend that the authorship of this name should be cited simply as Y. L. Chen, or more precisely Y. L. Chen in Y. S. Chen & Q. E. Yang.


Habitat and distribution. Sinoleontopodium lingianum is only known from Mainling County, Xizang Autonomous Region (Tibet), China, growing on cliffs and glacial gravels at altitudes from 4500 to 4900 m.

IUCN Red List category. Sinoleontopodium lingianum, known from only two small populations from similar localities in Mainling County, should be categorized as a Critically Endangered species (CR), according to IUCN categories and criteria (IUCN, 2001).

Paratype. CHINA. Xizang (Tibet): Mainling County, Daduka, Namula, alt. 4600–4900 m, on cliff, 26 July 1983 [♀], B. S. Li, Z. C. Ni & S. Z. Cheng 5852 (PE).

Acknowledgments. We thank Nicholas J. Turland and Li-Bing Zhang for their critical comments on the manuscript.

Literature Cited


Two New Species of *Pentagonia* (Rubiaceae, Hippotideae) from Colombia and Ecuador

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**Abstract.** Two new species of *Pentagonia* Bentham (Rubiaceae, Hippotideae) are described and illustrated. *Pentagonia tapacula* Cornejo is from the pluvial forests of Bajo Calima, Valle del Cauca Department, southwestern Colombia. This new species belongs to a species group of plants with entire leaves that have a tapering, subsessile base, and with a 5-lobed calyx, but differs mainly by its thicker coriaceous leaf blades, obovate stipules, and inflorescences with remarkably elongated and thick peduncles. The second new species is *P. clementinensis* Cornejo from the wet forests of western Ecuador. This is segregated from *P. involucrata* C. M. Taylor, which differs sharply by its leaf blades, floral bracts, fruits, and calyces.

**Resumen.** Se describen e ilustran dos nuevas especies de *Pentagonia* Bentham (Rubiaceae, Hippotideae). *Pentagonia tapacula* Cornejo es de los bosques pluviales del Bajo Calima, Departamento del Valle de Cauca, en el suroccidente Colombiano. Esta nueva especie pertenece al grupo de las *Pentagonia* de hojas enteras, de base gradualmente angosta, subesbíl, con cáliz 5-lobado, de las que principalmente se diferencia por presentar hojas con gruesas láminas coriáceas, estípulas obovadas, e inflorescencias con pedúnculos distintivamente más gruesos y largos. La segunda nueva especie es *P. clementinensis* Cornejo de los bosques muy húmedos de la región occidental de Ecuador. Esta es segregada de *P. involucrata* C. M. Taylor, de la que difiere notoriamente en cuanto a sus hojas, brácteas florales, cálices y frutos.

**Key words:** Chocó, Colombia, Ecuador, Hippotideae, IUCN Red List, *Pentagonia*, Rubiaceae.

*Pentagonia* Bentham (Rubiaceae, Hippotideae) is a Neotropical genus of usually understory shrubs to trees, often monocausal or sparsely branched, with interpetiolar stipules that are triangular in bud and usually caducous, and with usually large, entire or pinnate leaf blades. The lateral inflorescences are in subsessile to pedunculate cymes or cymose, bearing flowers with a spathaceous or 3- to 5-lobed calyx; the corollas are regular to zygomorphic with the tube somewhat curved, hypocrateriform to infundibuliform, greenish or white to cream, yellow, or red, with (4 to)5 lobes. The corollas are fibrous with the staminal filaments tomentose at and around their base and are mostly hummingbird pollinated. The fruits are berries, 2-locular, many seeded, ± thick walled, and often crowned by a ± persistent calyx. *Pentagonia* comprises ca. 34 species, all found from moist to pluvial, tropical to premontane and rarely to lower montane forests, ranging from 0 to 1600(0 to 1800) meters above sea level, from Guatemala to Peru and Brazil (Dwyer, 1980; Burger & Taylor, 1993; Taylor, 1995, 2001, 2002). In South America, this genus is represented by ca. 21 species (Andersson & Rova, 2004; Cornejo, 2006). During the revision of the South American species of *Pentagonia*, the following novelties were discovered.

1. *Pentagonia tapacula* Cornejo, sp. nov. **TYPE:**
Colombia. Dept. Valle del Cauca: Bajo Calima, ca. 15 km N of Buenaventura, Carón de Colombia concession, 3°56’N, 77°08’W, ca. 50 m, transition betw. tropical wet & pluvial forest, 18 Feb. 1983, A. Gentry & A. Juncosa 40480 (holotype, MO 3210799 [fl.]; isotypes, MO 3104184, MO 3104185 [fl., fr.], COL 259809 not seen). Figure 1.

Species nova affinis *Pentagonia subsectis* L. Andersson & Rova, a qua stipulis obovatis 3.5-5.5 cm latis, lamina foliari 48-80 cm lata, inflorescentia pedunculo robusto 3.5-7 cm × 5-15 mm insidente, bracteis basaliis conduplicatis 2.35 cm longis, corolla glabra, viridi vel alba atque fructu 2.28 × 2.27 cm differt.

Shrub or unbranched pachycaul tree, to 10 m tall; terminal stems subtetragonal, young shoots densely strigose. Stipules obovate, 5–9 × 3.5–5.5 cm, stiffly coriaceous, strongly keeled, finely veined longitudinally, densely short-sericeous to strigose outside, at apex acuminate, ca. 8 mm (due to the elongated costa); petioles 0.5–2.5 × 1–2 cm, densely strigose; leaf blades entire, drying thickly coriaceous, obovate to oblongolate, 75–140 × 48–80 cm, at apex somewhat obtuse, tapering at base; midveins densely to sparsely strigose, short-pilose or glabrous, and the

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blades glabrescent or glabrous adaxially, veins tomentose to densely strigose, and the blades tomentose to sparsely strigose abaxially, margin usually strigose and glabrescent toward the apex, with 10 to 15 pairs of lateral veins. Inflorescences axillary, cymose, ca. 20- to 30-flowered, densely to sparsely strigose; peduncle stout, 3.5-7 cm × 5–15 mm, densely short-sericeous to strigose; hasal
<table>
<thead>
<tr>
<th></th>
<th><strong>P. tapacula</strong></th>
<th><strong>P. subsessilis</strong></th>
<th><strong>P. microcarpa</strong></th>
<th><strong>P. magnifica</strong></th>
<th><strong>P. wendlandii</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leaf blade texture</strong></td>
<td>coriaceous</td>
<td>papyraceous to thinly chartaceous</td>
<td>papyraceous to thinly chartaceous</td>
<td>papyraceous</td>
<td>chartaceous or subcoriaceous</td>
</tr>
<tr>
<td><strong>Stipules</strong></td>
<td>oblong, 5–9 × 3.5–5.5 cm</td>
<td>narrowly lanceolate, 3.5–8 × 1–2.5 cm</td>
<td>narrowly lanceolate, 2–3.5 × 0.7–1.2 cm</td>
<td>narrowly</td>
<td>lanceolate to ovate-oblong, 2.5–8.5 × 1–3 cm</td>
</tr>
<tr>
<td><strong>Peduncle of the inflorescences</strong></td>
<td>3.5–7 × 0.5–1.5 cm</td>
<td>0.5–2 × ca. 0.3–0.5 cm</td>
<td>0.5–1 × 0.3–0.5 cm</td>
<td>ca. 1 × 0.3 cm</td>
<td>0.5–2.5 × ca. 0.3–0.4 cm</td>
</tr>
<tr>
<td><strong>Bracts</strong></td>
<td>slightly oblong to oblong, 1.8 × 1–1.3 cm</td>
<td>oblong to lanceolate, 1–2 × 0.3–0.7 cm</td>
<td>pink-red or reddish</td>
<td>green</td>
<td>oblong, 0.6–2 × 0.3–0.7 cm, red</td>
</tr>
<tr>
<td><strong>Calyx</strong></td>
<td>green</td>
<td>red</td>
<td>pink-red</td>
<td>red, hirtellous</td>
<td>red to purplish red or brown-red</td>
</tr>
<tr>
<td><strong>Corolla</strong></td>
<td>greenish to white or cream, glabrous</td>
<td>pink to red, more or less tomentose</td>
<td>pink-red to red, more or less tomentose</td>
<td>yellow, glabrous to puberulent</td>
<td></td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td>2.28 × 2–2.7 cm</td>
<td>3.5 × 3.5 cm</td>
<td>1.5–1.5 × 1.4 cm</td>
<td>ca. 1.2–1.5 × 1.2–1.5 cm</td>
<td>to 4.5 cm</td>
</tr>
<tr>
<td><strong>Seeds</strong></td>
<td>yellow</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
<td>red</td>
</tr>
</tbody>
</table>

bracts conduplicate, oblong, 2–3.5 × 1–3 cm, coriaceous, yellow-green, densely short-seriaceous to densely strigose and lenticillate outside; floral bracts slightly oblong to oblong, ca. 2–2.3 × 1–1.3 cm, yellow-green, ± chartaceous to foliaceous, with collerets in the basal 1/3 within, densely to sparsely strigose, glabrescent or glabrous without, margin ciliate, often with tufted fibers (from the vascular nerves reaching the outside of the margin); pedicels 2–6 mm, thick, somewhat complanate, densely strigose. Calyx regularly 5-lobed in the distal 1/3, ± chartaceous, green; hypanthium tubinate to cylindric, ca. 4 mm, tube 10–16 × 4–7 mm, both densely short-seriaceous or strigose to glabrous without, with collerets arranged in longitudinal fields below the sinuses within, lobes ± equal, oblong, 5–9 × 5–7 mm, apex obtuse to rounded, glabrous without. Corolla hypocrateriform, greenish to white or cream, tube 20–25 × ca. 5 mm, glabrous without, lobes 5, lanceolate, ca. 8 × 3.5–5 mm, reflexed at anthesis, with abundant, tiny, flat to squamulose, light brown, subhyaline indumentum (apparently papillose when hydrated). Stamens 5, all filaments of similar length, 18–20 mm, attached 6–7 mm from the tube base, densely tomentose with flat yellowish hyaline hairs in the lower 1/3; anthers ca. 3 × 1 mm; style 18–20 mm, glabrous; stigma bilobate, ca. 3 mm. Inflorescences with persistent bracts; fruits globose to globose-turbinate, 2–2.8 × 2–2.7 cm, ± truncate at the apex, fruit wall ca. 3 mm thick, brown to reddish brown, lenticillate, glabrescent or often densely strigose toward apex, crowned by a persistent calyx, with tube 1–8 mm; mature seeds ca. 5 mm, yellow.

**Discussion.** In its subsessile leaves with blades tapering at the base and its 5-lobed calyx, *Pentagonia tapacula* is similar to *P. subsessilis, P. microcarpa* L. Andersson & Rova, *P. magnifica* K. Krause, and *P. wendlandii* Hooker (Table 1). It differs from these species by the thicker coriaceous leaf blades; the wider, oblong, stiffly coriaceous stipules; and the inflorescences with remarkably longer and thicker peduncles. The new species also differs from *P. subsessilis* by its larger bracts, which are conduplicate at the base of the inflorescence, and its glabrous corolla greenish to white or cream outside, longer stamens, and smaller fruits. *Pentagonia tapacula* additionally differs from the Amazonian *P. microcarpa* by the yellow-green larger bracts and larger fruits (vs. fruits only to 1.5 cm). It resembles *P. wendlandii*, restricted to the lowland Caribbean rainforests of Costa Rica and Panama (Burger & Taylor, 1993), and apparently disjunct to the lowlands of Chocó Province in western Colombia (Tuberquia et al. 490, GB). However, *P. tapacula* differs from the latter by the tendency to have thicker petioles, yellow-green bracts, green calyx, greenish to white or cream corolla, and fruits globose to globose-turbinate with the apex ± truncate, containing yellow seeds. Finally, the new species also differs from *P. magnifica* by the green calyx; glabrous corolla, greenish to white or cream, with larger lobes; and distinctively larger bracts.
Habitat and distribution. *Pentagonia tapacula* is an endemic species of primary tropical lowland rainforests in western Colombia, collected from elevations 50–230 m. Physical parameters of its habitat include annual rainfall 7400 mm, an average relative humidity of 86%, and temperatures from 22°C–30°C (J. van Rooden et al. 568, MO). It grows in poor soils, noted as low in the nutrients P, Ca, K, Mg, Cu, B, Mn, Zn, and with a high percentage of saturation of Al (Monsalve 384, 1327, MO).

IUCN Red List category. *Pentagonia tapacula* is only known from five close localities within an area of less than 5000 km², which is under pressure of deforestation. The species is assigned a provisional IUCN conservation status of Endangered (EN B12c) (IUCN, 2001).

Vernacular name and uses. Tapacula (Colombian [slang] Spanish, in sched. Monsalve 1327, MO). This may refer to the fruit’s use to treat diarrhea or cause constipation after consumption (Stella Sylva, Juan Granados-Tochoy, pers. comm.). The fruits at maturity are sweet and edible (Monsalve 1327).

Etymology. The specific epithet refers to its vernacular name. The epithet is considered as a noun in apposition, cf. Art. 23.1 and is supported by Art. 23.2 of the International Code of Botanical Nomenclature (McNeill et al., 2006).

Phenology. *Pentagonia tapacula* has been collected with flowers and fruits from September to February.


2. *Pentagonia clementinensis* Cornejo, sp. nov.


Figure 2.

Species nova affinis *Pentagoniae insulacratae* C. M. Taylor, a qua lamina foliaria elliptica usque late elliptica majoro (30–60 x 15–28 mm), bracteis floribus minoribus et angustioribus (5–15 x 3–7 mm), lobulis calycinis minoribus et angustioribus (4–12 x 2–6 mm) atque fructibus in acco globosis usque late ellipticis calycye persistente ad tubum sicut lobulos minores subaequales lenticellato coronatis differt.

Shrubs or trees, to 20 m tall and 30 cm DBH, branched, with open crown; terminal branches subtetragonal, strigulose, glabrescent or glabrous. Stipules narrowly lanceolate, 2.8–6 x 0.5–1.3 cm, charitateous, rather smooth or finely veined longitudinally and ± densely strigulose to often strigose at the apex, glabrescent without, yellow or green, the tip usually minutely curved; petioles 3–6 cm x 2.4–5 mm, strigillosa or glabrous; leaf blades entire, drying papyraceous to thinly charitateous, elliptic to broadly elliptic or slightly obovate-elliptic, 30–60 x 15–28 cm, apex acute to obtuse, base cuneate, stigiose to strigillosa or glabrescent (glabrescent with age) adaxially, densely strigose when very young, strigose to strigillosa mainly on veins and glabrescent or glabrous at maturity abaxially, with 18 to 25 pairs of lateral veins. Inflorescences axillary, a pedunculate cyme, branched to 2nd order, ca. 4 to 12-flowered, glabrous; basal bracts unknown; peduncle 1.6–7 cm x 3–5 mm, flat to concave adaxially, green, glabrous; with 2 secondary axes (1 per side), 1–3.5 cm, both subtended by a pair of light green bracts, each bearing 1 to 3 flowers; lateral flowers with pedicels 5–18 x ca. 3 mm, somewhat complanate, central flowers subsessile; floral bracts 2 to 4, decussate, suborbicular to oblong or sublanateolate, 5–15 x 3–7 mm, light green, thinly charitateous, apex rounded to obtuse or emarginate, with callosk at the inner base, glabrous on both sides. Calyx regularly 5-lobed in the distal 1/3, charitateous to thinly charitateous, greenish cream or red; hypanthium turbinate to obconic, 3–4 mm, occasionally with a single bract attached; tube 5–9 x 5–7 mm, both glabrous without, lobes slightly unequal, obovate to oblong, shorter to slightly longer than the tube, 4–12 x 2–6 mm, at apex obtuse to rounded, with callosk arranged in small groups around or at both sides of the sinuses, glabrous without and within, but margin sometimes ciliate. Corolla obconic to subcylindric, white with lobes pale pink at tip outside, tube 25–35 x 6–15 mm, shortly tetonose or golden-vellutinous at the upper 1/2 and glabrous toward the base without, lobes 5, ovate to triangular, 6–14 x 3–8 mm, erect at anthesis (in La Clementina), glabrous or with scattered, whitish squamulose indumentum within. Stamens 5, filaments of unequal length, 12–18 mm long, all inserted ca. 4–5 mm from the tube base, densely golden-hirtellous or tormentose at the lower 1/3 to 1/2 and around their attachment to the corolla tube, anthers 3–4 x 0.6–1.1 mm; style ca. 15 mm, glabrous; stigma bilobate, ca. 1.5–2.7 mm. Inflorescences with persistent bracts; fruits globose to broadly elliptic, 3–5–7 cm,
Figure 2. A–D, *Pentagonia clementinensis* Cornejo. —A, Terminal branch with infructescences. —B, Nearly mature fruit. —C, Flower at anthesis. —D, Infructescence. —E, *Pentagonia involucrata* C. M. Taylor. Infructescence. A, B, taken from the isotype, Gustafsson & Cornejo 500 (S); C, taken from Stähle & Cornejo 5949 (S); D, from Stähle & Knudsen 1247 (S); E, from the isotype, Aulestia & Aulestia 908 (GB).
Table 2. Morphological comparison of *Pentagonia clementinensis* and *P. involucrata.*

<table>
<thead>
<tr>
<th></th>
<th><em>P. clementinensis</em></th>
<th><em>P. involucrata</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf blades</td>
<td>elliptic to broadly elliptic or slightly obovate-elliptic, 30–60 × 15–28 cm</td>
<td>oblong-elliptic, 19–32 × 6–10 cm</td>
</tr>
<tr>
<td>Calyx lobes</td>
<td>4–12 × 2–6 mm</td>
<td>20–24 × 8–11 mm</td>
</tr>
<tr>
<td>Floral bracts</td>
<td>5–15 × 3–7 mm</td>
<td>13–22 × 9–12 mm</td>
</tr>
<tr>
<td>Fruits</td>
<td>globose to broadly elliptic, with persistent calyx tube ± as long as the calyx lobes</td>
<td>barrel-shaped, with persistent calyx tube 1/4 to 1/7 smaller than the calyx lobes</td>
</tr>
</tbody>
</table>

fide Ortiz et al. 529) × ca. 3–3.5 cm, rounded to obtuse at apex, fruit wall 1.5–7 mm thick, brown, richly lenticellate, glabrous, crowned by a persistent calyx, with tube ± as long as the lobes, both prominently lenticellate; mature seeds 5–7 × ca. 3 mm.

**Discussion.** In its petiolate leaf blades, the relatively long pedunculate inflorescences that become flexuous in fruit, the flowers surrounded by two to four persistent floral bracts, and the 5-lobed calyx with colleters in groups around the sinus, *Pentagonia clementinensis* is related to *P. involucrata,* a lowland allopatrian taxon endemic to northwestern Ecuador. This new species was previously included in the latter by Andersson and Rova (2004). However, *P. clementinensis* differs from *P. involucrata* by having larger and broader elliptic mature leaf blades, distinctively shorter and narrower calyx lobes, smaller and narrower floral bracts (Fig. 2D, E), and globose to broadly elliptic (dry) fruits with calyx tube approximately as long as the calyx lobes (Fig. 2B, D, E; Table 2).

**Habitat and distribution.** *Pentagonia clementinensis* is known from premontane to montane, wet to pluvial forests in western Ecuador between 600 and 1600 m. According to the literature, this is the highest altitudinal record for a species of this genus in South America (Burger & Taylor, 1993; Taylor, 1995, 2001, 2002; Andersson & Rova, 2004). Some populations of this new species are located at the upper part of the Reserve Indígena Awá, which belongs to the National System of Protected Areas of Ecuador (SNAP), and at Rancho Buitrón, in Pichincha Province. They are apparently disjunct to the lower wet forests in Cerro Samana (600–750 mm) at La Clementina, in Los Ríos Province.

According to herbaria records, *Pentagonia clementinensis* and *P. involucrata* appear to be allopatrian. Even when both occur in the Reserve Indígena Awá, *P. clementinensis* is located higher on the western slopes of the Andes between 900 and 1600 m. *Pentagonia involucrata* occurs in lowlands between 250 and 500 m, ranging toward the west to the tropical evergreen and often hilly forests of the Cotacachi-Cayapas Reserve, which houses the largest (more than 200,000 ha.) and one of the best-conserved moist and wet forests of western Ecuador (Cornejo, pers. obs.). Both reserves contain the remaining forests of the province of Esmeraldas and therefore deserve higher efforts for conservation. *Pentagonia clementinensis* may also be expected in the pluvial forests of Chocó Department in southwestern Colombia.

Some morphological differences are noted among the disjunct populations of *Pentagonia clementinensis.* Those from Reserva Indígena Awá have a red calyx and the tendency to produce larger fruits (to 7 cm long) with a thicker fruit wall (3–7 mm). One of its vernacular names, “huevo de gallo,” refers to the similarity of these larger fruits to a chicken’s egg. In contrast, the disjunct population from La Clementina has a greenish cream calyx and somewhat smaller fruits (to ca. 4 cm) with a thinner fruit wall (1.5–3 mm).

**IUCN Red List category.** During the past four decades, the native populations of *Pentagonia clementinensis* have been fragmented due to extensive deforestation of the wet forests in western Ecuador (Dodson & Gentry, 1991; Cornejo, pers. obs.). The species is assigned an IUCN conservation status of Endangered (EN A1c) (IUCN, 2001).

**Vernacular name and uses.** Huevo de gallo (Spanish; in sched. Ortiz et al. 529, NY), Palo aguanoso (Spanish; in sched. Beck et al. 3041, NY). The fruits are edible.

**Etymology.** The specific epithet refers to the type locality La Clementina, which is the largest banana farm of Ecuador and which encompasses the best and perhaps the last forests of Los Ríos Province, sheltering many local and regional endemic plant taxa from western Ecuador (Cornejo, pers. obs.).

**Phenology.** *Pentagonia clementinensis* has been collected with flowers in April to June and September and with fruits in May, June, and September.

Acknowledgments. This research was partially conducted at the Botany Department at the University of Wisconsin. The herbaria that I had the pleasure to visit are: GUAY, INB, MO, QAP, QCA, QCNE, SEL, and US. The curators and keepers of F, GB, MO, and S sent me their specimens of *Pentagonia* on loan, including the types of *Pentagonia involucrata*. Jacquelyn Kalhunki and Néstor Pérez-Moliere (both NY) kindly provided a high-resolution scanned image of *Beck 3041*. Charlotte M. Taylor, Victoria C. Hollowell (both MO), and an anonymous reviewer made constructive comments on the manuscript. The figure of *P. tapacula* was scanned and designed by Kandid Elliot, artist in residence at the Botany Department, University of Wisconsin.

Literature Cited


Agrostopoa (Poaceae, Pooideae, Poeae, Poinae), a New Genus with Three Species from Colombia

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Abstract. Agrostopoa Davidse, Soreng & P. M. Peterson, a new genus endemic to the páramos of Colombia, is proposed. The genus includes two new species, A. barclayae Davidse, Soreng & P. M. Peterson and A. woodii Soreng, P. M. Peterson & Davidse, and a third species transferred from Muhlenbergia Schreber, A. wallisii (Mez) P. M. Peterson, Soreng & Davidse (lectotype designated here). A key for determining the species and illustrations of the three species are provided. Agrostopoa is placed in subfamily Pooideae because it has non-Kranz anatomy and lanceolate membranous lodicules, and in tribe Poeae where it differs from Agrostis L. by having carinate lemmas with a terminal awn or mucro, well-developed pales, and peculiar synflorescences with recurved branches and fragile pedicels. It is classified near Poa L., but differs from that in its single-flowered spikelets that lack rachilla extensions and possess awned or mucronate lemmas.

Resumen. Se propone Agrostopoa Davidse, Soreng & P. M. Peterson como un género nuevo endérmico de los páramos de Colombia. El género incluye dos especies nuevas: A. barclayae Davidse, Soreng & P. M. Peterson y A. woodii Soreng, P. M. Peterson & Davidse; y las tres especies transferidas de Muhlenbergia Schreber: A. wallisii (Mez) P. M. Peterson, Soreng & Davidse (lectotipo designado aquí). Se presenta una clave de determinación y las ilustraciones de esas tres especies. Agrostopoa pertenece a la subfamilia Pooideae basado sobre la anatomía foliar de non-Kranz y el tipo de las lodiculas cuales son membranas y lanceoladas, y a la tribu Poeae donde Agrostopoa se diferencia de Agrostis L. por tener las lemas carinadas con una arista o un mucron terminal, las pales bien desarrolladas y las inflorescencias peculiares con las ramas curvadas y los pedicelos frágiles. Según la esquema de clasificación Agrostopoa es aproximada a Poa L., pero se diferencia de ése género por tener las espiquillas con una sola flor que carecen la extensión de rachilla, y tienen las lemas aristadas o mucronadas.

Key words: Agrostopoa, Colombia, IUCN Red List, Poaceae, Poeae, Poinae, Sioldideae, Sierra Nevada del Cocuy, Sierra Nevada de Santa Marta.

A perennial grass collected in 1959 by Barclay and Juajibioy on the isolated Sierra Santa Marta massif in northern Colombia has remained unamed until now. Reexamination of this collection convinced us this collection represents an unknown species in subfamily Pooideae Bentham, tribe Poeae R. Brown. Our search also indicated that a very similar annual species had been previously described by Mez (1921) as Muhlenbergia wallisii Mez, a genus placed in subfamily Chloridoideae Kunth ex Beilschmied, subtribe Muhlenbergiinae Pilger (Peterson et al., 2001 [M. wallisii was intentionally excluded from this Chloridoideae volume of the Catalogue of New World Grasses], 2007). While inventorying species of Muhlenbergia Schreber from South America in 1989, PMP recognized that the type collected by G. Wallis (M. wallisii) was not a chloridoid grass, but a member of the Poeaeae. Despite the efforts of agrostologists to assign this collection to a current genus in the intervening years, the mystery remained. After the initial description of M. wallisii, no further mention has been made of this species in the grass literature, as far as we are aware, until Soreng et al. (2003: 454) reevaluated the US isotype fragment and noted that it represented an “unknown Deyeuxia or Poeaeae.”

The reappearance of the H. G. Barclay & P. Juajibioy 7079 specimen from the Sierra Nevada de Santa Marta gave us more material to study the annual species, enabling us to reclassify this species into the correct subfamily, and now we provide a new combination in a new genus, Agrostopoa Davidse, Soreng & P. M. Peterson. In addition, we also describe two new species of Agrostopoa, one based on another

Barclay & Juaibiya collection from the headwaters of the Río Sevilla, Sierra Nevada de Santa Marta, and the other based on a J. R. I. Wood collection from about 500 km south-southeastward in the Sierra Nevada del Cocuy in Colombia.

Agrostopoa Davidse, Soreng & P. M. Peterson, gen. nov. TYPE: Agrostopoa wallisi (Mez) P. M. Peterson, Davidse & Soreng.

Genus novum ad trium Poeas pertinens quod ab Agrostidie L. lemmate carinato in macronem vel aristan non geniculatam terminalen desinente atque palea subcartacea et chlorophylloosa lemma sequente manifeste bicarinata marginibus spatium inter carinas non excedentibus recedit; a Poo L. spiculis sine racheloae extensione flosculum solitarum gerentibus atque lemmate aristo vel macrono recedit.

Annuals or perennials, tufted or sometimes rooting at the lower culm nodes, branching primarily intravaginal; culms 7–29 cm, terete, slender, hollow, glabrous, smooth; nodes 2 to 6 or more, 0 to 3 nodes exposed above. Upper sheaths loose, smooth, margins closed at the base for 1–3 mm or up to 1/4 the length; basal sheaths herbaceous, papery, or becoming fibrous; collars without auricles; ligules 0.5–3.5 mm, hyaline, clear or slightly brownish, abaxially smooth, glabrous, apices entire to sparingly shallowly lacerate or irregularly deeply lacerate; blades 0.8–5 cm, to 1.5 mm wide, thin, folded with flat or slightly involute margins, the uppermost 0.5–1 cm, apices indistinctly to distinctly naviculate, slightly scabrous. Synflorescences 1–4 cm with 5 to 20 spikelets, paniculate, axis erect or arching, smooth, with 2 to 5 nodes; branches 1 to 4(to 5) per node, spreading, sinuous, slender, fragile, smooth, longest branches 0.4–1.6 cm with 1 to 7 spikelets; pedicels smooth, proximally capillary, recurved, fragile (breaking near base), distally expanded for 0.2–5 mm below the spikelet attachment. Spikelets 2.4–5.6 mm (excluding awns), 1-flowered, laterally compressed, nodding, without a rachilla extension, disarticulating above the glumes; glumes 2, unequal in equal in length, thinly chartaceous, 1- to 3-nerved, keel smooth or keel and margins slightly scabrous apicately, margins hyaline, narrow, spreading and exposing the floret; lower glumes 2–5.6 mm, 1-nerved; upper glumes 2.4–5.6 mm, 1- to 3-nerved; lemma 2.1–4.5 mm, slightly shorter to slightly longer than the glumes, laterallycompressed, 5-nerved, glabrous, surfaces mostly smooth, thinly chartaceous, keeled, keels finely scabrous in the distal 1/3 to 1/2; apex mucronate (< 0.7 mm) or awned from between 2, delicate, slightly scabrous, lateral lobes to 0.2 mm, or terminally awned, mucron and awns extended only as a vein, densely and finely scabrous; awns 2–5.2 mm, straight, or slightly sinuous, twisted; calluses glabrous, smooth, indistinct; paleas subequal to equal to the lemma in length, hyaline to thinly chartaceous, chlorophyllous, keels 2, smooth or slightly scabrous with distal hooks, the margins about as wide as the inter-keel region, 0.2–0.25 mm wide. Flowers bisexual; lodicules 0.3–0.7 mm, 2, lanceolate, entire; stamens 3, rarely 2, anthers 1.6–2.7 mm, filaments attached near the middle of the anther; ovaries glabrous, styles terminal, stigmas densely plomose, white, bearing branches to or near the base; caryopses 1.2–2 mm, fusiform, slightly laterally compressed, ventrally shallowly sulcate, firm, slightly translucent, light brown; hilum basal, punctiform; embryo 1/5–1/3 the length of the grain. Chromosome number unknown.

Leaf anatomy. In cross section, the blades are thin with unspecialized mesophyll and widely spaced vascular bundles indicating C₃ metabolism. Microhairs are absent.

Distribution. All three species currently described in Agrostopoa are endemic to páramos of northern Colombia, from 3450 to 4500 m elevation.

Etymology. We combine the generic names of Agrostis and Poa to represent a new genus that is somewhat morphologically intermediate between these two genera.

Discussion. Agrostopoa differs from Agrostis by having carinate lemmas that are mucronate or awned with terminal non-geniculate awns and by having thinly chartaceous, chlorophyllous paleas that are as long as the lemmas with distinct keels where the distance between the two nerves is equal to or broader than the distance from either nerve to the margin. Agrostopoa differs from Poa by having spikelets with a single floret without a rachilla extension, and by having awned or mucronate lemmas.

The only species of Agrostopoa previously described was named Muhlenbergia wallisi (= Agrostopoa wallisi) by Mez (1921). Because A. wallisi does not have Kranz anatomy and bicellular microhairs are lacking, it is definitely misplaced as a member of subfamily Chloridoideae (Peterson et al., 2001, 2007). In addition to possessing C₃ metabolism, the lodicules of Agrostopoa are thin and lanceolate, characteristics that indicate a relationship with subfamily Pooideae rather than Chloridoideae.

Agrostopoa seems most allied to members of tribe Poeae s.l., subtribe Poinae (Soreng et al., 2003, 2007, 2008), where the following genera also have single-flowered spikelets: Aniselytron Merrill, Apera Adamson, Arcagrostis Grisebach, Libyella Pampanini, and Toxorchloa T. D. Macfarland & But. Traditionally, subtribe Agrostidinae Fries has included many genera
with single-flowered spikelets, but that characteristic is highly homoplasic in tribe Poeae sensu Soeng et al. (2003; cf. Soeng et al., 2007). Based on the following five major suites of characters, we are placing Agrostopoa in subtribe Poinae rather than Agrostidinae: (1) the upper calyx sheaths are closed up to 1/4 their length, common in Poinae, rare or absent in Agrostidinae; (2) the palea keels are well separated, with the palea margins about as broad as the inter-keel gap, whereas in Agrostidinae the margins are commonly wider than the narrow inter-keel gap (or invagination, if detectable when keels are absent); (3) the paleas are membranous and chlorophyllous, whereas Agrostidinae paleas are typically hyaline throughout except for the nerves of the keel (when present); (4) the awns are terminal and not geniculate, and the awns themselves are evenly scabrous along their length, whereas in the Agrostidinae the awns are typically dorsal and geniculate and the vestiture may vary along the length of the awn (exceptions are the following genera that have terminal or subterminal awns: Ancistragrostis S. T. Blake, Simplicia Kirk, Echinochloa P. Beauvois, and Dichelochloa Endlicher); and (5) the lemmas and calluses are totally glabrous and smooth except for hooks on the upper half on the keel and apex near the awn (Agrostis and relatives typically have some lines of minute hairs along the base of the marginal nerves, and there are usually hooks and also sometimes hairs on the lemma surfaces). Without additional analyses, we are not able to suggest what genera within the Poinae might be most closely related to Agrostopoa.

Agrostopoa species resemble elements of the Old World Colpodium Triunius complex (Alexeev, 1980; Alexeev & Tzvelev, 1981; Hedberg & Hedberg, 1994) that have single-flowered spikelets with glumes approximately equaling the lemmas and lack or have only vestigial rachilla extensions (i.e., Colpodium s. str. [sections Colpodium and Keniochloa (Melderis) E. B. Alexeev] and Paracolpodium (Tzvelev) Tzvelev sections Paracolpodium and Tzelevia E. B. Alexeev). Species of Agrostopoa differ from all of these by the glabrous lemmas that are scabrous in the upper part (vs. pubescent in part and smooth throughout) and have awns or mucros, and by having hooks along the palea keels. From Colpodium they also differ in having 5-veined lemmas, and from Paracolpodium they differ in lacking rhizomes. Agrostopoa panicules are reminiscent of the racemose panicules with pendulous spikelets found in P. wallrichii (Hooker f. ex Stapf) E. B. Alexeev. Preliminary molecular analyses by Gillespie et al. (2008) have shown Colpodium and Zingeria P. A. Smirnov to group together with Miltium L., slightly apart from other elements of subtribes Puccinellinae Soeng & J. I. Davis and Poinae, and for Paracolpodium to align within Puccinellinae with Catabrois P. Beauvois, Catabrolella (Tzvelev) Tzvelev, and Hyaloopoa (Tzvelev) Tzvelev. However, unlike Agrostopoa, none of the other genera listed above or other Puccinellinae have awns, whereas some genera of Poinae do. A possible relationship of Agrostopoa to genera of subtribe Cinnininae Caruel also needs to be explored, as newer DNA evidence suggests that Cinnininae genera may belong within Poinae (Gillespie et al., 2008). Cinninae genera have single-flowered spikelets, but, among other differences from Agrostopoa, their spikelets disarticulate at the base of the glumes, and their panicles are otherwise unspecialized.

**KEY TO THE SPECIES OF AGROSTOPOA**

1a. Plants annual; lower glumes (2.3–2.5 mm); upper glumes (2.3–2.5 mm); A. wallrichii
1b. Plants perennial; lower glumes (2.8–3.4 mm); upper glumes (3.2–4.5 mm); A. burchiana

2a. Lemmas awned, the awns 2.5–5 mm; basal sheaths papery; plants loosely tufted; culm nodes 3–10, upper 1 or several nodes exerted from the basal tuft of leaves; major roots to 0.25 mm diam.; lower glumes (2.8–3.4 mm); upper glumes (3.2–4.5 mm); A. wallrichii
2b. Lemmas mucronate, the mucros to 0.6 mm; basal sheaths becoming fibrous; plants densely tufted; culm nodes 2 or 3, hidden in the basal tuft of leaves; major roots to 0.4 mm diam.; lower glumes 4.4–5.6 mm; upper glumes 4.7–5.6 mm; A. woodii


Annuals, branching frequently from the lower nodes; major roots ca. 0.20 mm diam.; culms 7–15 cm, slender, erect, smooth, glabrous; internodes more than 6, except the 2 lowermost, all elongated, without adventitious roots. Leaves mostly cauleine; sheaths herbaceous not becoming fibrous or papery, with the margins free to within 1–2.5 mm of the base and overlapping for most of its length, loose (lightly inflated), smooth; ligules 0.8–3.5 mm, triangular, hyaline except at the base, acute, smooth, clear, upper margin entire or sparingly lacerated; blades 0.8–2.5 cm, ca. 0.3 mm wide, folded or slightly involute, twisted in senescent blades, thin, surfaces and margins smooth, apex indistinctly narrowly navicular, smooth (faintly slightly roughened with incipient hooks). Panicles 1–3.5 cm, with 5 to 15
spikelets, the main axis erect, included in the upper cm with 3 to 5 nodes; lateral branches 1 to 4(to 5) at the lowest node, spreading, slender, smooth; longest branches up to 1.5 cm with up to 7 spikelets; pedicels 0.4–3 mm, with distal 0.2–0.8 mm expanded to the tip. Spikelets 2.4–3.9 mm, excluding the awns, mostly longer than the pedicels; glumes 0.4–0.5 mm wide in side view, 1-nerved, laterally compressed, (colors not determinable from the senescent material available), margins narrowly hyaline from near the base, smooth, apex acuminate to subaristate, keel smooth; lower glumes (2–)2.3–2.6 mm, usually distinctly shorter than the upper glume and the floret; upper glumes (2–)2.4–3.9 mm, slightly longer or as long as the floret; florets 2.4–3 mm; lemmas 2.1–3 mm, laterally compressed, terminally awned, 5-nerved with the lateral and marginal nerves inconspicuous, keeled, keel with fine hooks in the distal 1/8–1/4, sides smooth, green to purple, margins involute at maturity, proximally narrowly hyaline in the distal 1/2, suffused with purple then clear to the edge; awns 2.5–5.2 mm, arising from the apex, entered by the central nerve only, hygroscopic, usually slightly sinusus near the middle, loosely twisted in the lower 1/2, minutely scabrous throughout; callus not well differentiated, blunt, smooth, glabrous; paleas about as long as the lemma or slightly shorter, acute, hyaline throughout or the keels slightly thicker and chlorophyllous, weakly 2-keeled, keels ca. 0.2 mm apart, smooth, margins ca. 0.2 mm wide; lodicules ca. 0.3 mm, minute; anthers 1.6–2.1 mm; caryopses ca. 1.5 mm, ventrally straight and dorsally curved, dark honey brown at maturity.

Distribution and habitat. Agrostophoa wallisii is endemic to the high-elevation páramos of the Sierra Nevada de Santa Marta. Specimens have been collected on rock outcrops and on dry soils near the headwaters of the Río Ancho at 3500 m in Colombia.

IUCN Red List category. Agrostophoa wallisii clearly falls within the Data Deficient (DD) category as defined by the IUCN (2001). We have inadequate information to assess the status of this species, since we do not have data regarding its abundance or the extent of its distribution.

Discussion. A lectotype at US was selected because the holotype at B was destroyed and we do not know if other original material exists.

Additional specimen examined. COLOMBIA. La Guajira [as Depto, Magdalena on original label]; Sierra Nevada de Santa Marta, alrededores de cabeceras de Río Ancho, Páramo de Macotama, 10°54'55"N, 73°30'50"W, 3500 m, 18 Feb. 1959, H. G. Barclay & P. Juajibi no 7079 (COL not seen, MO 2773513, US 2434347).

2. Agrostophoa barclayae Davidec, Soreng & P. M. Peterson, sp. nov. TYPE: Colombia. Magdalena: Sierra Nevada de Santa Marta, alrededores de cabeceras de Río Sevilia, 3490 m, 20 Jan. 1959, H. G. Barclay & P. Juajibi 6567 (holotype, MO 5114991; isotypes, COL, US 2434406, US). Figure 2.

Ab Agrostophoa wallisii (Mez) P. M. Peterson, Davidec & Soreng habitu perenni, invaginationibus basaliis chartacea, glumis inferioribus (2.8–3.4–4.4 mm longis atque superioribus (3.2–)4–4.4 mm longis reedit.

Perennials, loosely tufted with spreading culms, sometimes rooting at the lower nodes; major roots ca. 0.25 mm diam.; culms 11–29 cm, erect to decumbent at the base in longer culms, smooth; internodes 3 to 10, elongated, longer culms with adventitious roots at the lower nodes. Leaves in basal clusters or in elongated culms in one to several clusters from the base of branches, originating from the lower 1/5 of the culm; basal sheaths papyry, with the margins free to within 1–3 mm of the base and overlapping for most of their length, smooth; ligules 1–3.1(–3.3) mm, membranous, deeply to shallowly and irregularly lacerate, acute, abaxially smooth, clear or brownish; blades 1.5–5 cm, 0.3–0.5 mm wide, to 0.9 mm wide when flattened, folded or slightly involute, thin, margins smooth, apex indistinctly navicate, faintly scabrous. Panicles 2–4 cm with 5 to 20(to 30) spikelets, main axis erect with 2 to 4 nodes, smooth; lateral branches with 1 to 3 spikelets, spreading, slender, smooth; pedicels 0.7–4 mm, with distal 0.2–0.8 mm expanded to the tip. Spikelets (3.5–)4–4.5 mm excluding the awns; glumes 0.2–0.3 mm wide in side view, 1-nerved to faintly 3-nerved, laterally compressed, dorsally green to purple, laterally purple, margins hyaline from near the base, apex acute, keel and margins apically weakly scabrous; lower glumes (2.8–)3.4–4.4 mm, as long as or slightly shorter than the floret; upper glumes (3.2–)4–4.4 mm, as long as or slightly longer than the floret; florets 4–4.5 mm; lemma keel with fine hooks in distal 1/2, sides inconspicuously papillate, terminally awned, 5-nerved with the marginal nerves inconspicuous, smooth, glabrous, green to purple, margins involute proximally, narrowly hyaline in distal 1/2, suffused with purple then clear to the edge, with sparse hooks toward the apex; apex acute, sometimes with delicate, hyaline lobes ca. 0.2 mm; awns 2–5.2 mm, arising from the apex or between the lobes, entered by central nerve only, straight, slightly bent, or sinuous, but never geniculate and not or only slightly twisted at the base, minutely scabrous throughout; callus not well differentiated, blunt, smooth, glabrous; paleas about as long as the lemma, keels ca. 0.25 mm apart, margins 0.25 mm wide,
keels distally and apex with few hooks; lodicules ca. 0.5 mm, flat, nerveless, asymmetrically lanceolate with an acute tip; anthers 2.1—2.7 mm, carpyopsis fusiform, light brown, slightly translucent (suggesting lipid), ventrally sulcate.

**Distribution and habitat.** Agrostopoa barclayae is known only from the type locality near the headwaters of the Río Sevilla in the Sierra Nevada de Santa Marta, Colombia, where it was found growing among large rocks in a deep draw bounded by rock outcrops on west-facing slopes.

**IUCN Red List category.** Agrostopoa barclayae clearly falls within the Data Deficient (DD) category as defined by the IUCN (2001). We have inadequate information to assess the status of this species, since we do not have data regarding its abundance or the extent of its distribution.

**Etymology.** The epithet honors Harriet G. Barclay, a former professor of botany at the University of Tulsa (1929—1942), long-time botanist of the Rocky Mountain Biological Laboratory, and explorer of the Sierra Nevada de Santa Marta, who collected the type.

3. **Agrostopoa woodii** Soreng, P. M. Peterson & Davidse, sp. nov. TYPE: Colombia. Boyacá: Sierra Nevada del Cocuy, Boquerón cf. Cusiri, 4450 m, 31 Dec. 1985, J. R. I. Wood 5268 (holotype, US 3481074; isotype, K). Figure 3.

Ab Agrostopoa wallisii (Max) P. M. Peterson, Davidse & Soreng habita perenni, invaginationibus basalis fibrosis, glumis inferioribus 4.4—5.6 mm longis, superioribus 4.7—5.6 mm longis atque lemmatis mucronatis (non aristatis) mucron 0.2—0.6 mm longo recedit.

Perennials, completely glabrous, densely caespitose with spreading culms, sometimes rooting at the lower nodes; major roots ca. 0.4 mm diam.; culms 15—20 cm, erect to decumbent at the base in longer culms, smooth; nodes 2 or 3; internodes usually 2 or 3, hidden in the basal tuft, longer culms with adventitious roots at the lower nodes. Leaves in basal clusters or in elongated culms in one to several clusters from the base with branches originating from the lower 1/3 of the culm; sheaths becoming distinctly fibrous in age, uppermost ca. 4 cm, with the margins fused ca. 1/4 the length and overlapping on the upper part, smooth; ligules 0.5—2.5 mm, membranous, deeply, irregularly lacerate, acute, abaxially smooth, clear or brownish; blades 1.5—4.5 cm, 0.5—0.8 mm wide, up to 1.5 mm wide when flattened, flat or folded or slightly involute on the margins, thin, surfaces and margins smooth, apex abruptly distinctly naviculate, smooth. Panicles 2—3 cm, with 8 to 11 spikelets, barely exerted, main axis erect, with 3 to 5 nodes, smooth; lateral branches 1 to 3 per node, 0.4—0.6(--1) cm with solitary spikelets, spreading, slender, smooth, capillary, fragile, recurved at the base, with distal 3—5 mm gradually thickened to the tip. Spikelets 4.5—5.6 mm excluding the awns; glumes 0.2—0.3 mm wide in side view, 1- to 3-nerved, laterally compressed, dorsally green to purple, laterally purple, margins hyaline from near the base, apex acute, keel and margins apically weakly scabrous; lower glumes 4.4—5.6 mm, slightly shorter to slightly longer than the floret; upper glumes 4.7—5.6 mm, slightly longer than the floret; florets 3.7—4.5 mm; lemma keel with fine hooks in distal 1/2, sides inconspicuously papillate, terminally mucronate, 5-nerved with the marginal nerves inconspicuous, surface smooth, glabrous, green to purple, margins involute proximally, hyaline in distal 1/2, suffused with purple then clear to the edge, with sparse hooks toward the apex; apex acute or sometimes with 2 delicate, hyaline lobes ca. 0.1 mm; micros 0.2—0.6 mm, arising from apex or between lobes, entered by central nerve only, straight, minutely scabrous throughout; callus not well differentiated, blunt, smooth, glabrous; paleas slightly shorter than the lemma, keels ca. 0.25 mm apart, margins 0.25 mm wide, keel apex with few to several hooks; lodicules ca. 0.7 mm, flat, nerveless, broadly lanceolate with a slightly irregularly lobed tip; stamens 3, rarely 2; anthers 1.7—2.2 mm; carpyopsis ca. 2 mm, fusiform, light brown, firm, slightly translucent (suggesting lipid), ventrally sulcate.

**Distribution and habitat.** Agrostopoa woodii is known only from the Colombian type locality of Boquerón cf. Cusiri (Cusiri Pass) in the Sierra Nevada del Cocuy, ca. 100—130 km southeast of Bucaramanga, where it was found growing on bare gravel banks beside a stream in a páramo at 4450 m.

**IUCN Red List category.** Agrostopoa woodii clearly falls within the Data Deficient (DD) category as defined by the IUCN (2001). We have inadequate information to assess the status of this species, since we do not have data regarding its abundance or the extent of its distribution.

**Etymology.** The epithet honors the type collector J. R. I. Wood (1944—), a botanist at Oxford University who specializes in Acanthaceae and Lamiaceae, and who has been on many South American collecting expeditions.

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Literature Cited


A New Name and a New Species in *Matelea* (Apocynaceae, Asclepiadoideae) from Brazil

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ABSTRACT. The new name *Matelea endressiae* Goes & Fontella is proposed to replace *Gonolobus cordatus* Malme from Brazil. A new species, *M. demuneri* Goes & Fontella, from Espírito Santo State, Brazil, is described and illustrated. *Matelea demuneri* is similar to *M. endressiae* and *M. maritima* (Jacquin) Woodson subsp. *cearensis* (Malme) Fontella, but it is distinguished from the first by its shorter pedicel and corolla tube, pubescent corona, and follicles with short projections, and from the second by its mixed indumentum, inflorescence with peduncle, green-purple corolla, rounded 5-lobed corona, shorter pollinia, and follicles with short prickles.


Key words: Apocynaceae, Asclepiadoideae, Brazil, Espírito Santo, IUCN Red List, *Matelea*, Santa Teresa.

The genus *Matelea* Aublet comprises approximately 180 species (Stevens, 2001) distributed from the United States into South America. In Brazil, there are about 44 specific and infraspecific taxa found in primary and secondary rainforest, disturbed areas, cerrado, and campos rupestres formations.

As a result of a study of Asclepiadoideae occurring in Santa Teresa, Espírito Santo State, Brazil, a taxonomic novelty, *Matelea demuneri* Goes & Fontella, is recorded, and a new name, *M. endressiae* Goes & Fontella, is established.

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The type specimen, *A. Loefgren* n° 62, was identified by Malme as a new species of *Gonolobus* Michaux, as *G. cordatus*. However, this species does not present dorsal anther appendages, which is the main distinguishing characteristic between species of *Gonolobus* and *Matelea* (Woodson, 1941). Because the combination *M. cordata* (Brandegee) Woodson (1941) previously existed, having *Microactylon cordatus* Brandegee (1908) as its basionym, the new combination could not be made; therefore, the name *Matelea endressiae* is here proposed as a replacement name for *G. cordatus*. The new epithet honors Mary Endress, of the Institute of Systematic Botany, University of Zurich, Switzerland.

*Matelea demuneri* Goes & Fontella, sp. nov. TYPE: Brazil. Espírito Santo: Santa Teresa, São João de Petrópolis, Barra de Santo Hilário (Paulo Zanette-dono), 10 May 2000, V. Demuner 1015, E. Bausen, W. Pizziiio & L. Kollmann (holotype, MBML; isotype, R). Figure 1.

Species nova *Matelea endressiae* Goes & Fontella affinis, sed ab ea pedicellis et tubo corollae minoribus, corona pubescenti et fructibus aculeis brevibus eburneis armatis praecipue differt.

Vines, with older stems woody and thick, ridged, spongy, pale yellow cork, glabrous; roots tuberous, latex white, internodes 11.5–17 cm; young stems with mixed indumentum, long trichomes moderately dense, 1.2–2 mm, straight, translucent yellow, shorter glandular trichomes dense, red-brown, 0.07–0.15 mm. Leaves simple, opposite, blades ovate to cordate, 6–14.5 × 3–9.2 cm, apex acuminate, base cordate, adaxially with mixed indumentum, sparse long trichomes, straight, translucent yellow, and shorter glandular trichomes, dense, red-brown, abaxially with moderately dense short glandular trichomes, red-brown, and with mixed indumentum on veins; adaxial
Figure 1. *Matelea demuneri* Goes & Fontella. —A. Habitat, ca. 30 km north of Santa Teresa seat, on the property of Paulo Pascoli Zanetti. The arrow indicates the type locality, on a rocky slope at the forest edge, in an open, dry, and sunny area. —B. Flowering branch. —C. Flowering branch, with post-anthesis flowers and buds just preceding anthesis. —D. Fruit, note the short prickles. —E. Seeds and coma. —F. Seeds, note the irregularly crenate margin. —G. Habit, with two mature fruits (arrows). —H. Flower, frontal view, showing corona and gynostegium. —I. Mixed indumentum with sparse long trichomes and shorter glandular trichomes. —J. Gynostegium, apical view. —K. Pollinarium. —L. Roots. Scale bars: B, C = 6 mm, D = 5 cm, E = 1 cm, F = 5 mm, G = 8 cm, H = 5 mm, J = 1 mm, K = 0.2 mm, L = 10 cm. (B–K, photographed and drawn from cultivated collection. B, C, G–K, Goes & Barros 108b; D–F, Goes & Barros 108c; L, Goes & Barros 108a. Line drawings by Monique Goes.)
Table 1. Morphological comparison of the new species *Matelea demuneri* with *M. endressiae* and *M. maritima* subsp. *cearenensis*.

<table>
<thead>
<tr>
<th></th>
<th><em>M. demuneri</em></th>
<th><em>M. endressiae</em></th>
<th><em>M. maritima</em> subsp. <em>cearenensis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indumentum</td>
<td>mixed: long trichomes moderately dense, straight, translucent yellow, and short glandular trichomes dense, red-brown</td>
<td>mixed: long trichomes moderately dense, straight, translucent white, and short glandular trichomes dense, red-brown</td>
<td>long trichomes dense, flexuose, translucent white</td>
</tr>
<tr>
<td>Peduncle length</td>
<td>2–6.2 cm</td>
<td>4–5 cm</td>
<td>1–1.5 mm</td>
</tr>
<tr>
<td>Pedicel length</td>
<td>9–12 mm</td>
<td>15–20 mm</td>
<td>1–2 mm</td>
</tr>
<tr>
<td>Sepals</td>
<td>ca. 2× longer than corolla tube, linear-lanceolate</td>
<td>as long as corolla tube, lanceolate</td>
<td>ca. 2× longer than corolla tube, ovate</td>
</tr>
<tr>
<td>Corolla color</td>
<td>green-purple</td>
<td>purple</td>
<td>green-yellow</td>
</tr>
<tr>
<td>Corolla tube length</td>
<td>2.5–3 mm</td>
<td>4–4.5 mm</td>
<td>1–1.2 mm</td>
</tr>
<tr>
<td>Corona</td>
<td>rounded, 5-lobed, pubescent, 1–1.5 mm long</td>
<td>rounded, 5 crenate and 5 crenulate, glabrous, 0.75–1.2 mm long</td>
<td>lobes triangular, pilose, and ciliate, 0.3–0.35 mm long</td>
</tr>
<tr>
<td>Pollinia</td>
<td>0.28–0.32 mm long, suborbicular</td>
<td>0.35–0.40 mm long, suborbicular</td>
<td>0.6–0.65 mm long, ovate</td>
</tr>
<tr>
<td>Foliage</td>
<td>with short prickles, prickles 2.5–3.5 mm</td>
<td>with long prickles, prickles 7–9 mm</td>
<td>with long prickles, prickles 5–6 mm</td>
</tr>
</tbody>
</table>

blade with 5 or 6 collers at base; petiole 3.5–7 cm, with similar mixed indumentum. Inflorescence umbelliform, with mixed indumentum, 8 to 11 flowers mature at one time, peduncle 2–6.2 cm, pedicel 8–12 mm, bracts 4–12 × 0.3–0.5 mm, linear or narrowly lanceolate, not persistent; calyx tube 1.2–2 mm, with 1 collar per sinus, lobes linear-lanceolate, 3–4 × 1.5–2 mm, apex acute, green, abaxially with mixed indumentum, adaxially glabrous; corolla briefly campanulate then rotate, abaxially purple-green, adaxially olive-green and purple at base, or orange when senescent, abaxially with sparse mixed indumentum, adaxially hirsipulose, trichomes translucent yellow, 0.24–0.30 mm, corolla tube 2.5–3 mm long, corolla lobes 5.5–6 × 3.5–4 mm, patent, ovate to oblong-ovate, rugose, apex obtuse, shortly twisted; gynostegium sessile, 1–1.2 mm; corona rounded, 5-lobed fused up to the apex, black, exceeding apex of gynostegium, 1–1.5 mm, pubescent, with short trichomes moderately dense, translucent yellow; anthers trapezoidal in outline, guide rails straight, parallel, terminal appendages suborbicular, wings shorter than the dorsal part, corpusculum 0.17–0.21 × 0.05–0.11 mm, oblong, apex truncate, brown, translators 0.23–0.28 mm, pollinia 0.28–0.32 × 0.28–0.30 mm, subglomerose to asymmetrically ovate or subovate, yellow, sterile and translucent at attachment; style head apex 0.5–0.8 mm wide, pentagonal, slightly concave, apex briefly mamilate, pale brown. Follicles divergent when double, fusiform, 7.5–11 × 2–2.5 cm, brown, with dense mixed indumentum, follicle apex long attenuate, base stipitate, with scattered short prickles (32 to 45 total), prickles 2.5–3.5 mm long, 1.5–2 mm wide at middle; seeds ovate, 7–8 × 6–6.5 mm, brown, margin 0.9–1.2 mm wide, irregularly crenate on 2/3, surface slightly rugose with coma 3.5–4 cm, white.

In Goes (2007), this species was treated as "*Matelea* sp. nov. 1."

**Habitat and distribution.** *Matelea demuneri* is known only from forest edges in an open, dry, and sunny area from 656 to 660 m in elevation, in Santa Teresa, Espírito Santo State. It was found growing in a small population, was collected with buds and fruits, and later flowered in cultivation.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), *Matelea demuneri* should be included in the category Critically Endangered (CR). However, there is not enough data to produce a precise conservation evaluation, because much of Espírito Santo State and other states of the Southeast and Northeast regions of Brazil are poorly known.

**Phenology.** *Matelea demuneri* was observed flowering from August to April and fruiting from November to June.

**Etymology.** The name of this new species pays homage to Valdir Demente from Museu de Biologia Professor Mello Leitão, who has made important contributions with his botanical collections to our knowledge of the flora of Santa Teresa, Espírito Santo State, Brazil.

**Paratypes.** BRAZIL. Espírito Santo: Santa Teresa, Santo Antônio do Canaã, Barra do Rio Perdido, Propriedade do Sr. Paulo Pascoal Zanetti, ca. 656 m.s.m., 19 Jan. 2006.

Acknowledgments. The authors thank Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the fellowship granted. Our gratitude to the curators of herbaria MBML (Museu de Biologia Prof. Mello Leitão) and S (Naturhistoriska Riksmuseet, Stockholm) for the loan of specimens; to Valdir Demuner (MBML) for providing detail of the new species’ locality; to David Goyder for scanned sheets of the type of Gonolobus cearensis Malme; and to Eduardo Barros for his support with fieldwork at Santa Teresa.

Literature Cited


**Cuphea fluviatilis** (Lythraceae), a New Species from Antioquia, Colombia

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In preparing an account of the Lythraceae for the *Catalogo de las Plantas Vasculares del Departamento de Antioquia, Colombia*, a joint project of the Missouri Botanical Garden and the University of Antioquia, an undescribed species of *Cuphea* P. Browne was discovered. *Cuphea* is the largest genus of the family with more than 260 species and is centered primarily in the eastern Brazilian highlands and secondarily in western and southern Mexico (Graham et al., 2006). The novelty described and illustrated here, *C. fluviatilis* S. A. Graham, appears at a superficial level to be a new member of section *Amazoniana* (Lourteig) Lourteig, but is not taxonomically assigned there. One of the 13 sections of the genus, section *Amazoniana* is atypical, being centered in northwestern South America and mainly occurring in riverine habitats in neighboring humid tropical regions of Venezuela, Colombia, and Brazil. The section is morphologically distinctive and easily recognized, and the species are closely similar, suggesting relatively recent radiation. *Cuphea fluviatilis* is found in Colombia along river margins in the humid tropical forest zone and displays a habit and leaf form common to the section. However, detailed examination including pollen morphology, which has proven highly informative of relationships in *Cuphea* (Graham & Graham, 1971; Graham, 1998; Graham et al., 2006), raises questions about its sectional placement. An evaluation of possible relationships follows the description of the species.

**Cuphea fluviatilis** S. A. Graham, sp. nov. **TYPE:** Colombia. Antioquia: Mun. San Luis, Rio Samaná Norte, margen izquierda del rio, sobre la via Medellín–Bogota, 700–780 m, lhb/bmhb, 6°00′N, 74°50′0, 23 June 1987, R. Callejas, A. Arbelaez, H. Correa & J. Betancur 4108 (holotype, HUA not seen; isotypes, MO [2]). Figures 1, 2.

Haec species a congeneris quoad habitum similis Americae australis paritem boreali-occidentalem habitantibus caele setarum adscendentium incassatam sericeas dubias internodalibus ornato ceterum glabro, lamina foliari lineari glabra margine setis carnosis parce ciliata, tubo flabili praeter setas nonnullas crassas secus costas glabro calcari brevi descendente praeedito atque ovulis 4 ad 6 tantum per facie distinguatur.

**Perennial** fruticosce, multistemmatibus herbis ad 40 cm tall; roots dense, fibrous; stems erect to semi-decumbent, much branched, branches ascending, 5–15 cm, invested by 2 opposing longitudinal rows of thickened, adpressed, ascending setae, the setae enlarged at the base, stems otherwise glabrous; internodes 1–3 mm, substantially shorter than the subtending leaves. **Leaves** decussate, sessile or subsessile; petioles absent or to 0.5 mm; blades linear, 10–30 × 0.3–1.2 mm, uninnerved with midvein dark abaxially, thickly membranous, base attenuate, apex rounded, margin thickened or slightly rolled, sparsely ciliated by well-separated adpressed setae; blade surfaces glabrous; leaves scarcely or not at all reduced in size toward the stem apex. **Inflorescences** leafy terminal racemes; flowers interpetiolar, alternate; pedicels 3–4.5 mm; bracteoles 0.5–0.7 × 0.3–0.5 mm, ovate to oblong, leaf-like, persistent at the apex of the pedicel. **Floral tubes** 5–6.5 × 1–1.2 mm at anthesis including a slightly descending spur 0.4–0.8 mm long, the mouth broadly flaring, 2–2.5 mm diam., blunt, neck not strongly contracted in fruit.
outer surface green, sparsely strigose on the ribs, the remainder glabrous; inner surface densely white villous ventrally in the mouth, the indument extending to the level of stamen insertion and along the 2 dorsalmost veins toward the base of the floral tube, surface surrounding the ovary sparsely villous or pilose; calyx lobes deltate, ca. 0.5 x 0.5 mm; epicalyx segments flattened lobes, reaching 1/2 the length of the calyx lobes, bearing a single seta at the apex; petals 6, obovate-spatulate, 2 dorsal ca. 2.2 x 0.7 mm,
4 ventral 2.8–3 × 0.8–1.2 mm, white or pale pink; stamens 11, the 2 dorsalmost shortest, inserted slightly below the other 9, the others equally inserted, 3 ventral long stamens glabrous, the others villous, all included, anthers of the longest antepetalous ones scarcely reaching the sinus of the calyx lobes; pollen oval-triangular in outline, tricolporate, syncolpate, pores protruding; exine uniformly striate, diam. 27–30 μm in lactic acid; ovary pilose distally, nongibbous; style pilose at base, included, equal to longest stamens at anthesis, ultimately exserted; stigma small, capitiate; ovules 4 to 6; nectariferous disc erect, perpendicular to the base of the ovary, thick, dark red, 0.6–1 mm wide in dorsal view. Seeds ca. 1.4 × 1.5 mm, suborbicular, apex retuse, margin rounded.

Distribution and phenology. Cuphea fluviatilis is known only from the type area, at the margin of rivers at 500–780 m. It has been collected in flower and fruit in March and June and probably flowers throughout most of the year.

IUCN Red List category. Conservation status for Cuphea fluviatilis is Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001) because the species is known only from the type collection.

Discussion. This small linear-leaved shrub is uniquely differentiated from a number of Cuphea species with similar habit and habitat in northwestern South America by: two internodal rows of ascending, thickened setae on an otherwise glabrous stem; linear leaves with glabrous blades and a sparsely ciliate margin of fleshy setae; floral tubes glabrous except for a few coarse adpressed setae on the ribs and with a short descending spur; and ovules numbering only four to six (Fig. 1). Additionally, the pollen is syncolpate with protruding pores and striate exine (Fig. 2A).

Within the genus, Cuphea fluviatilis agrees most closely with members of section Amazoniana. The section comprises 20 species with malpighiaceous trichomes, dorsal petals narrower than the ventral petals, and with distribution primarily along rivers in the western Amazon (Lou-teig, 1986). The section (first published as a subsection) was drawn out of the South American section Euandra subsect. Hyspopoecula Kochne p.p. (Lourteig, 1959) and subsequently expanded as new species were discovered in poorly explored parts of Amazonian Venezuela and Colombia (Lourteig, 1986, 1996). Flower morphology of C. fluviatilis is characteristic of section Amazoniana, i.e., the floral interior villous; nectariferous disc thick, short, and erect; ovary and style base pilose; and seeds less than 2 mm long. Unlike other members of the section, however, C. fluviatilis does not bear the conspicuous malpighiaceous trichomes that are a major diagnostic character of the section, and the pollen does not correspond to that of the section. The pollen of all members of section Amazoniana lacks protruding pores, is psilate or finely rugulate, and generally is nonsyncolpate (Fig. 2B).

Pollen morphology has been of great value in recognizing relationships in Cuphea that are obscured by floral homoplasy. Although some pollen features are also homoplastic, related plant species can share virtually identical pollen and some sections or clades are recognizable based on pollen morphology (Graham & Graham, 1971; Graham, 1998; Graham et al., 2006). The syncolpate striate pollen type of C. fluviatilis is a widespread form that appears in several phylogenetic lineages whose species have been
classified in either sections Brachyandra Koehne or Euandra Koehne (Koehne, 1903, but also see Graham, 1998: fig. 3a, section Brachyandra/C. pseudosilene Grisebach; Graham & Graham, 1971: fig. 14, section Euandra subsect. Platypetala Koehne/ C. corisperma Koehne and fig. 17, C. carunculata Koehne).

The type collection of Cuphea fluviatilis was originally determined as aff. C. hyssopifolia Kunth (sect. Euandra subsect. Hyssopocuphea), another linear-leaved fruticose member of the genus that is found along river margins in humid tropical areas, especially in Central America. That species is superficially similar to C. fluviatilis in its habit, small flowers with ovate bracteoles, and seeds less than 2 mm long. The flowers differ in being a sparsely, slender tube and the pollen is not synceolate with nonprotuding pores and a psilate exine as in section Amazoniana. At present, without independent molecular evidence, the relationships of C. fluviatilis are unclear. It shares floral morphology, but not plant indument or pollen type with members of section Amazoniana and in other respects displays features held in common by numerous members of the large polyphyletic sections Brachyandra and Euandra without apparent close relationship to any particular species.


Literature Cited


A New Species of *Cyclanthera* (Cucurbitaceae) from Alajuela Province, Costa Rica

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**Abstract.** *Cyclanthera lalajuelae* Hammel & J. A. González, known only from the Caribbean slope of Alajuela Province, Costa Rica, is described. The combination of trifoliolate leaves with conspicuous, sessile glands at the base of the leaflets and unarmed fruits distinguish it from all other species in the genus.

**Resumen.** Se describe *Cyclanthera lalajuelae* Hammel & J. A. González, conocida solamente de la vertiente caribeña de la provincia de Alajuela, Costa Rica. La combinación de hojas trifolioladas con glándulas sésiles, conspicuas en la base de las hojuelas y sus frutos inermes la distingue de todas las demás especies del género.

**Key words:** Alajuela, Costa Rica, Cucurbitaceae, *Cyclanthera*, IUCN Red List.

Perhaps most new species described today are ones found by specialists who have worked many years in a given group, have personally collected the species, may have even known them for many years, accumulating numerous new ones to publish in revisionary compendia. Many, however, also come to light as a result of work on country or regional floras. Since its beginning over 15 years ago, the *Manual de Plantas de Costa Rica* project has recorded over 50 species new to Costa Rica per year, more than half of them new to science (cf. Zamora et al., 2004). The rather cryptic new species of *Cyclanthera* Schrader (Cucurbitaceae, Cyclantheraceae) described below was first collected in flower in 1935 by San Ramón’s patron saint of botany, Alberto Brenes (1870–1948); however, no other fertile collections were made until W. Haber’s fruiting specimen of 1983, near the beginning of the Manual project. Restricted to wet forests of the Caribbean slope of Alajuela Province that even now remain quite isolated, the species is still only known from six fertile collections, but is here recognized as distinct from all others in this Neotropical genus of ca. 30 species.

*Cyclanthera lalajuelae* Hammel & J. A. González, sp. nov. **TYPE:** Costa Rica. Alajuela: Cantón de Tilarán, San Gerardo, Río Caño Negro, Finca de Marcos Vargas, 850 m, 12 Jan. 1989 (fl.), Erick Bello 658 (holotype, INB; isotypes, CR, MO). Figure 1.

Species insignis foliis trifoliolatis, foliis subintegris (elobatis sed inconspicue crematulis vel denticulatis) glan- dulis conspicuis basi omatis et fructibus laevibus a speciebus congeridis nobis notis bene distincta.

Slender monoeocious vine; stem nodes puberulent. Petioles 1–2.5 cm, puberulent at apex. Leaves trifoliolate, orbicular to oblanceolate, 5–10 × 6–12 cm; leaflets markedly petiolulate, petiololes 0.5–1.5 cm, central leaflet 5–10 × 2.5–5 cm, elliptic to obovate, nearly entire (indistinctly crenate to denticulate), lateral leaflets similar, unlobed but inequilateral; both blade surfaces glabrous but ± papilllose-scabrous; conspicuous glands at base of leaflets on abaxial surface, usually 1 to 13 per side, often also 1 to 3 glands near apex; tendrils bifid. Staminate inflorescences alone or co-axillary with a pistillate flower, narrowly paniculate, 3–7(–13) cm, floriferous nearly to the base; pedicels 2–3.5 mm, glabrous. Staminate flowers with the calyx tube ca. 1.5 mm wide, calyx teeth ca. 0.5 mm, triangular; corolla white, greenish white to cream, 3–4.5 mm wide, petals 5, 1–2 mm; filament column 0.2–0.3 mm, staminal disk 0.5–0.6 mm diam. Pistillate flowers solitary, co-axillary with a stamine inflorescence, peduncle 6–20 mm; ovary 2.5–5 mm, narrowly elliptic with a beak ca. 1.5 mm. Fruits with a pedicule ca. 3.5 cm, the body ca. 5.5 × 2 cm, basally gibbose, acuminate to the apex, smooth; seeds not seen.

**Distribution and IUCN Red List category.** This species as presently known, endemic to Alajuela Province, Costa Rica, is found only on the Caribbean slope of the Guanacaste and Tilarán mountain ranges, from 700–1200 m elevation. The species has been recorded from Arenal Volcano National Park, as well as from the San Gerardo Biological Station, so it does not seem to be in imminent danger from direct human intervention or deforestation. However, considering the apparent rarity of the species and its isolation in...
one small region of the Caribbean, mid-elevation wet forests, it should be classified as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

Etymology. Because this species was, in part, exhumed from rather old collections, we have chosen to name it by exhuming the original name of the town and now province to which it is endemic, “La Lajuela.” The combined form “lalajuela” (from which the current “Alajuela” was eventually derived by dropping the initial “T”) is used here simply as a noun in apposition (cf. Art. 23.1, McNeill et al., 2006) and not meant to be latinized.

Discussion. At first glance, one somewhat familiar with the Costa Rican flora might easily mistake this new species for a species of Cissus L. (Vitaceae) or Cayaponia Silva Manso (Cucurbitaceae), since all other Costa Rican species of Cyclanthera have either simple leaves or compound and pedately lobed leaves. As it turns out, in part for that very reason, *C. lalajuela* is quite different from all the other ca. 30 recognized species of the genus, i.e., by virtue of its strictly trifoliate leaves with sub lanceolate leaflets (all leaflets inconspicuously toothed and unlobed), as well as by its conspicuous glands at the base of the leaflets, and its smooth fruits. The glands at the base of the leaflets alone would seem sufficient to distinguish the new species from all others in the genus; in the most recent revision of the genus, it was stated that such glands “are often found at the base of the simple leaves..., but are never found on the leaves of the compound-leaved species” (Jones, 1969: 3). More recently, Lira (1995: 205, clave de identificación, lead 1a), in a treatment of the 23 species known to him, promulgated the same idea. Finally, neither of the two compound-leaved species described after or not in time for Lira’s study (*C. heisneri* C. E. Jones & Kearns and *C. jonesii* McVaug) is said to have laminar glands (Jones & Kearns, 1994; McVaug, 2001). Nevertheless, most Costa Rican material of the compound-leaved *C. multifoliola* Cogniaux (including Tonduz 10904 [CR, US], annotated by Jones) has conspicuous glands at the base of the leaflets of its compound (3- to 5-foliolate) leaves. Apart from the similar laminar glands, *C. lalajuela* bears little resemblance to *C. multifoliola*, the latter having leaflets that are strongly toothed and (the lateral ones) pedately lobed, echinate fruits, and a sessile staminal disk. The cultivated *C. pedata* (L.) Schrader is apparently the only other compound-leaved *Cyclanthera* that often has more or less unarmed (though much larger) fruits, but its leaves are at least
5-foliolate, the leaflets are strongly toothed and lack both petiololes and laminar glands, and the lateral leaflets are deeply and pedately lobed. We know of only one other Cyclanthera species, C. eichleri Cogniaux, reported to have unarmed fruits. That species, known only from the type, from the province of Rio de Janeiro, Brazil, has simple (obscurely 3- to 5-lobed) leaves, apparently without glands.

Following Jones (1969) and Lira (1995), Cyclanthera lalajuela, by virtue of its trifoliate leaves, stalked androecial column, and fruit peduncle shorter than the leaf petioles, would key out in the vicinity of C. dissecta (Torrey & A. Gray) Arnott and C. rostrata (Paul G. Wilson) Kears & C. E. Jones (as "C. parviflora"), both with armed and smaller (0.3-3 vs. ca. 5 cm) fruits and leaves that lack glands.

Unarmed fruits are unusual in Cyclanthera. The only well-known species that frequently lacks spines is C. pedata; the occurrence of spines in that species is variable, and its wild relatives have spiny fruits (M. Nee, pers. comm.). Unarmed fruits in C. pedata are surely a result of human selection; the species is cultivated in Central and South America for its large, virtually hollow, edible fruits (common names in Costa Rica: caña, caña, yuca), which are used mostly, like bell peppers, to be filled and baked. We have seen only one fruit (close to mature?) of C. lalajuela and several pistillate flowers and very young fruits, but in no case do we find any evidence of spines or protonubearances. Even if future collections should prove that this new species can indeed have armed fruits, its strictly trifoliate leaves with subentire leaflets and conspicuous glands would still distinguish it from all other species in the genus.

The two specimens cited here with very small, juvenile leaves are suspected of belonging to this species because of their locality and certain aspects of their leaf morphology. Somewhat unexpectedly, however, their simple to trifoliate leaves are profusely lobulate (see Fig. 1A).

Paratypes. COSTA RICA. Alajuela: Cantón de San Carlos, P.N. Volcán Arenal, Cerro Chato, sendero que lleva a la Laguna, 22 Aug. 2000 (fl.), A. Rodríguez, V. Ramírez & G. Soto 6268 (INB; entre La Tigua y Nuevo Arenal, entrenado por Linda Vista y Venado, 25 Apr. 2007 (fl.), D. Santamaría, C. Persson & A. Antonelli 3267 (CR, INB, MO); Cantón de San Ramón, entre La Balsa et Cataratas a San Ramón, 12 Oct. 1925 (juv.), Brenes 307 [Hb. Brenes 4522] (F852630); Cataratas de San Ramón, 21 Feb. 1931 (fl.), Brenes 3028 (fl.) [13744 (Hb. Brenes)] (CR), Brenes s.n. [13450 Hb. Brenes] (F857204); Monteverde, Río Peñas Blancas, 13 Jan. 1958 (fl., fr.), W. Huber 8071 (CR, MO); Monteverde, San Gerardo Biol. Station, 26 July 1995 (fl.), Darin Pennys 631 (INB, MO); Cantón de Tilarán, Reserva Forestal de Arenal, Quebrada San Gerardo, Río Cacho Negro, Finca de Enrique Quesada y Celfo Gonzalez, 19 Feb. 1990 (fl.), Erick Bello 1929 (INB, MO); Cantón de Zarcero, 9 Jan. 1938 (juv.), Austin Smith 6106 (F).

Acknowledgments. Thanks to Silvia Troyo for her fine illustration of the species. Michael Grayum was very helpful in providing literature and insightful observations during preparation of the manuscript. Thanks also to Christine Niezgoda, Nancy Hensold, and Robin Foster for making possible, fruitful, and enjoyable, a recent visit to the herbarium of Field Museum of Natural History (F), during which time part of this paper was elaborated. Michael Nee, Richard Wunderlin, and one anonymous reviewer provided helpful comments on the submitted manuscript. Preliminary work on this manuscript was also facilitated by a tenureship as a visiting research scientist at the Muséum National d’Histoire Naturelle, Département Systématique et Évolution, Herbier National (P). I am very grateful to that institution for providing financial assistance, as well as to all the curators, librarians, and technicians who so graciously facilitated said visit.

Literature Cited


Forestiera isabelae (Oleaceae), una Especie Nueva para Costa Rica

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Resumen. Se describe y se ilustra Forestiera isabelae Hammel & Cornejo, conocida de una sola población pequeña en Costa Rica, por Montezuma en la Península de Nicoya. Siendo una especie costera con pétalos, y además con hojas y frutos relativamente grandes (9-17 × 4-6 cm y 15-20 mm, respectivamente), se separa fácilmente de las otras dos especies costarricenses, apétalas y de elevaciones más altas. Se compara con y se distingue detalladamente de otras dos especies costeras recién descritas y con las cuales está cercanamente relacionada, F. corollata Cornejo & Wallander de más al norte en Mesoamérica (México, Guatemala y Belice) y F. ecuadoriensis Cornejo & Bonifaz del Ecuador.

Abstract. Forestiera isabelae Hammel & Cornejo, known from one small population near Montezuma on the Nicoya Peninsula of Costa Rica, is described. As a lowland coastal species with petals and relatively large leaves and fruits (9-17 × 4-6 cm and 15-20 mm, respectively), it is easily distinguished from the two other Costa Rican species, both apetalous and from higher elevation. It is compared with and distinguished in detail from two other more closely related, recently described coastal species, F. corollata Cornejo & Wallander from farther north in Mesoamerica (Mexico, Guatemala, and Belize) and F. ecuadoriensis Cornejo & Bonifaz from Ecuador.

Key words: Costa Rica, Forestiera, IUCN Red List, Nicoya Peninsula, Oleaceae.

Forestiera Poir. (Oleaceae) es un género de arbustos y árboles que comprende 14 especies distribuidas desde Estados Unidos hasta Ecuador y el Caribe (Cornejo & Bonifaz, 2006; Cornejo & Wallander, 2007). En Costa Rica se conocen solamente tres especies de Forestiera, entre ellas, dos de las especies reportadas en el Manual de Plantas de Costa Rica (González, 2007) se indicaban provisionalmente solamente con letras. Una de ellas resulta ser una especie nueva para la ciencia, aquí formalmente descrita. La otra aún queda por resolver, pero posiblemente su nombre correcto sea F. reticulata Torrey (E. Wallander & X. Cornejo, com. pers.).

Forestiera isabelae Hammel & Cornejo, sp. nov.
TIPO: Costa Rica. Puntarenas: Cantón de Puntarenas, Peninsula de Nicoya, Montezuma, por el camino que sube hacia Cóbano desde el lado sur del Río Montezuma, ca. 200 m después de la entrada, intersección con camino a Cabuya, 50 m, 10 dic. 2005 (fr.), B. Hammel & I. Pérez 23934 (holotipo, INB; isótipos, COL, CR, MO, NY, P, QCNE). Figura 1.

Hace species a Forestiera corollata Cornejo & Wallander petalis (1.5-3.5 vs. 1.2-2.3 mm) et fructibus (15-20 vs. 8-10 mm) longioribus, a F. ecuadoriensis Cornejo & Bonifaz floribus petalatis et filamentis staminum (3-4.5 vs. 1-1.7 mm) longioribus, a specie caribaea F. rhannifoliae Grisebach floribus petalatis, laminis foliaribus (9-17 × 4-6 vs. 2-8.5 × 1-3 cm) majoribus cum nervis secundaris (8 ad 14 vs. 3 ad 7) multioribus et fructu (15-20 vs. ca. 8 mm) longiore recedit.

Arbustos o árboles, 4-15 m, poligamomídia, con por lo menos algunos individuos con flores estamídas y flores hermafroditas, otros con sólo flores pistiladas; ramas diminutamente puberulentas (tricomas menos de 0.1 mm) a glabrescentes. Hojas con el pecíolo 4-12 mm; lámina 9-17 × 4-6 cm, ampliamente elíptica a oblongo-obovada, cuneada y ± decurrente en la base, aguda a abruptamente acuminada (el acumen 10-20 mm) en el ápice, entera, glabra, excepto diminuta y esparcidamente puberu- lenta sobre el haz de la base del nervio medio de las hojas más nuevas, el envés con diminutos puntos glandulares de color ámbar ± igualmente esparcidos o a veces más concentrados por el nervio medio; nervios secundarios 8 a 14 por lado, a menudo muy difíciles de distinguir (de los nervios intersecundarios...

y terciarios), a un ángulo de 75°–85° con el nervio medio. Inflorescencias axilares y suprayilares (a menudo en nudos deshojados), 5–20 mm, racemosas, con 2 a 3 pares de bractéolas basales, decusadas, 0.5–1.5 mm, triangulares a subcordadas; brácteas florales 1–2.5 × 0.5–1 mm, elípticas a obovado-espataudas, el ápice fimbriado-ciliado a centro. Flores 5 a 13, en pares bracteados más una terminal ebracteada, los pedicelos 0.5–2 mm; sépalos 4, libres, 0.3–0.7 mm, linear-triangulares; pétalos 4 ó 5, libres, crema verdoso en la antesis, que se vuelven amarillento, desiguales, 1.5–3.5 mm, linear-ligulados, pronto caedizos; estambres (flores estaminadas y hermafroditas) 4 ó 5, con el filamento 3–4.5 mm, la antera ca. 0.5 mm, ovoide; ovario (flores pistilladas y hermafroditas) ca. 0.5 mm, ovoide-turbinado, el estilo
ca. 0.5 mm, el estigma ± capítato, papiloso-puberu- lento. Infructescencias 2–3.5 cm (incl. los frutos); frutos morados a negruzcos, glaucos, 15–20 mm, elipsoides.

**Distribución y estado de conservación.** Esta especie se conoce solamente de Costa Rica y allí de una sola población en bosque húmedo de la Península de Nicoya, al lado del mar y muy cerca al pueblo de Montezuma, a lo largo del Río Montezuma. La población parece ser bastante grande, tal vez de unos 100 individuos que se encuentran dispersos justo al lado del río (hasta casi llegar a la catarata), pero también a lo largo del camino en la finca con vista al mar, hasta llegar más o menos a la altura de la catarata. Con base en el negativo resultado de exploración—en ambientes muy parecidos—esporá- dica y específica, río arriba de la catarata en el Río Montezuma y por otros ríos, quebradas y filas con vista al mar de la misma zona, y estudios más intensivos e inclusivos en la cercana Reserva Absoluta Cabo Blanco, extrañar la restringida distribución de esta especie. El área total que ocupa la población es menos que 1 km² y se ubica en una zona que rápidamente se está desarrollando para el turismo. Si protegida, será principalmente a razón de las pendientes fuertes al a lo largo del río. La ley forestal en Costa Rica contempla la protección de bosque a lo largo de nacientes permanentes, pero rige solamente sobre una franja de 15 m a lo largo de cada lado de la naciente. En realidad la vigilancia y la aplicación de las leyes es nula en todos los casos, en todo el país. En fin, todos los bosques en Costa Rica, al igual que Forestiera isabelae, están en peligro. Más por lógica que por cálculos exactos, es obvio que la especie se debería clasificar como Vulnerable (VU), según el IUCN (2001).

**Etimología.** Esta especie se dedica a Isabel Pérez Blanco, la esposa del primer autor, quien, felizmente, y ha acompañado en prácticas todos sus giras al campo de este siglo. Fue con la ayuda de ella que se logró recolectar la especie con flores y frutos maduros, tras numerosas visitas al sitio, durante el transcurso de más de un año.

**Discusión.** De las dos otras especies de Forestiera en Costa Rica, F. isabelae se distingue fácilmente por tener pétalos, por sus hojas y frutos más grandes, y por su hábitat costero. Molecularmente esta nueva especie está relacionada con las recientemente descritas y también conocidas de zonas costeras F. ecuadoriensis y F. corollata (E. Wallander & X. Cornejo, com. pers.). Desafortunadamente, estas dos especies son incompletamente conocidas, la primera con base solamente en material estaminado, la segunda en material pistilado (Ver Cornejo & Bonifaz, 2006; Cornejo & Wallander, 2007). Sin embargo, F. isabelae se puede distinguir de la primera por tener flores con pétalos (vs. apétalas) y por sus estambres con filamentos más largos (3–4.5 mm vs. 1–1.7 mm); y de la segunda se distingue por tener láminas con conspicuos, obscuros (vs. inconspicuos) nervios terciarios en el envés (al sear), y los pétalos (1.5–3.5 mm vs. 1.2–2.3 mm) y frutos (15–20 mm vs. 8–10 mm) más grandes. Además, mientras observamos solamente dos o tres pares de brácteas basales en F. isabelae, se ha notado que F. corollata tiene cinco o seis pares. Cuando en 1991 recolectamos por primera vez esta Forestiera costera en Costa Rica, la habíamos comparado con material centroamericano entonces identificado como F. rhamnifolia. Sin embargo, al revisar el manuscrito de la familia Oleaceae para el Manual de Plantas de Costa Rica (ver González, 2007) nos dimos cuenta que F. rhamnifolia s. str. se trata de una especie con hojas más pequeñas y con menos nervios laterales, que probablemente esté restringida a Cuba y otras islas caribeñas (Cornejo & Wallander, 2007). En el Manual la presente especie fue registrada como Foresteria sp. A. De hecho, subsecuentemente parte de dicho material centroamericano (exclusivo del presente material costarricense) fue descrito como F. corollata (Cornejo & Wallander, 2007). Es posible que la presente separación del material costarricense con base en pétalos y frutos más grandes de lo conocido para F. corollata sea simplemente a razón de las pocas recolecciones conocidas de esta última. Pues si subsanando dicha pobreza se da cuenta que material dentro del área de distribución F. corollata tuviera pétalos y frutos tan grandes como los del material de Costa Rica, sería comprobada esta conjetura. Por otro lado, aquí se propone que la separación morfológica indicada se ha dado a razón de un aislamiento físico suficientemente largo en espacio y tiempo entre estas especies hermanas, y que será comprobado con más recolec- ciones. Es curioso que el único individuo observado de F. isabelae con flores estaminadas también presentaba flores hermafroditas, condición conocida como andromonoica y al parecer no reportada para otras especies del género.

Agradecimientos. Estamos agradecidos a Silvia Troyo (INBio) por la fina ilustración, hecho con base en muestras, fotos, y flores conservadas en alcohol. Este trabajo se pudo adelantar, en parte, gracias a una pasantía (durante mayo y junio de 2006) al primer autor como investigador visitante al Muséum National d'Histoire Naturelle, Departement Systématicque et Evolution, Herrier National (P). Se agradece tanto a dicha institución por el apoyo económico como a todos los curadores, bibliotecarias y asistentes quienes tan gratamente dieron de su tiempo, facilitando mucho la estadía. También estamos agradecidos a Eva Wallander por facilitar datos preliminares de un estudio filogenético del género Forestiera con base en ADN, los cuales ayudaron a aclarar relaciones entre las especies discutidas. Se agradece a dos revisores científicos por sus bienvenidos comentarios.

Literatura Citada


Cephalanthera nanlingensis (Orchidaceae), a New Species from Guangdong, China

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Abstract. Cephalanthera nanlingensis A. Q. Hu & F. W. Xing, a new species of Orchidaceae from Guangdong, China, is described and illustrated. It is similar to C. longifolia (L.) Fritsch and C. erecta (Thunberg ex A. Murray) Blume, sharing slender stems, plicate leaves, and white flowers. The new species is distinguished by its deltoid bracts and a subactinomorphic perianth.

Key words: Cephalanthera, China, IUCN Red List, Orchidaceae.

The orchid genus Cephalanthera Richard belongs to the tribe Neottieae of the subfamily Epidendroideae (Pridgeon et al., 2005) and consists of ca. 12 species mainly found in northern temperate regions with a few species extending south to the Himalayas and northern Africa (Su, 2000). There are 10 species of Cephalanthera recorded from China (Zhu, 1999; Chen & Zhu, 2002).

During four botanical expeditions to Ruyuan County in northern Guangdong Province, China, we collected a peculiar Cephalanthera with a subactinomorphic perianth. After careful study, we concluded that this is a new species closely related to C. longifolia (L.) Fritsch and C. erecta (Thunberg ex A. Murray) Blume.

Cephalanthera nanlingensis A. Q. Hu & F. W. Xing, sp. nov. TYPE: China. Guangdong: Ruyuan, Nanling Mtns., 24°94'N, 113°10'E, 1500 m, 19 Apr. 2006, Ai-Qun Hu 46 (holotype, IBSC; isotype, PE). Figure 1.

Species affinis Cephalantherae longifolii (L.) Fritsch, sed ab ea bracteis omnibus deltatis 2–3 mm longis, perianthio fere actinomorpho, labello petalis lateralis simili atque sepals 7–8 mm longis petalis leviter longioribus distit.

Terrestrial herb, 13–24 cm tall, with short and indistinct rhizome; roots fasciculate, fibrous, 2–3 mm diam.; stems slender, somewhat flexuous, slightly ridged, 1–1.5 mm diam., glabrous, bearing sheaths at base; sheaths brown, cylindric, increasing in size acropetally, the lowest one scaly. Leaves 3 to 6, papyraceous, subsessile, plicate, elliptic to lanceolate, acuminate at apex, contracted at base, 32–46 × 8–12 mm, glabrous, 5- to 7-veined. Inflorescence a raceme, 3.2–5 cm, 3- to 5-flowered; bracts deltoid, 2–3 mm, obviously shorter than pedicellule ovary; pedicel and ovary green, 8–11 mm, glabrous, claviform, slightly ridged. Flowers white, 7–8 mm, suberect, slightly or not opening at anthesis; perianth subactinomorphic; sepals free, cymbiform, suboblong, obtuse at apex, unguiculate at base, 7–8 × 2–2.5 mm, 3(5)-veined; lip similar to petals; petals obvate, obtuse at apex, unguiculate at base, 5–6.5 × 1.7–2 mm, 4- to 5-veined; column erect, semi-terete, ca. 5 × 1 mm; anther erect, hinged to the top of the column by a short stalk, ovate to cordate, ca. 1.5 mm, 2-celled; stigma subterminal, oblate to concave; staminodes 2, ligulate, obtuse at apex; rostellum absent; pollinia 2, each divided into 2 halves, ca. 1 mm, white, naked, farinaceous. Fruit not seen.

Habitat and distribution. Cephalanthera nanlingensis grows at the edge of evergreen broad-leaved forests in which Castanopsis eyrei (Champion ex Bentham) Tutcher, Elaeocarpus sylvester (Loureiro) Poiret, Schima remotiserrata Hung T. Chang, and Pleioblastus amarus (Keng) Keng f. are dominant. So far, the new species is known only from two sites in the

Nanling Mountains, one at an altitude of ca. 700 m, the other at ca. 1500 m. Only a small population was found at 700 m, with less than 10 individuals, while four populations were found at 1500 m, which should have at least 30 individuals by our estimate. Based on comparison to other regions with similar vegetation and climate between 700 and 1500 m in the Nanling Mountains, this species should be expected to have more populations and individuals at other localities. Although the population size has increased each year we have observed it, according to the current knowledge of the species and using IUCN Red List criteria (IUCN, 2001), *C. nanlingensis* should tentatively be classified as Critically Endangered (CR).

**Table 1.** Comparison of *Cephalanthera nanlingensis*, *C. longifolia*, and *C. erecta*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>C. nanlingensis</em></th>
<th><em>C. longifolia</em></th>
<th><em>C. erecta</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Stem</td>
<td>somewhat flexuous</td>
<td>erect</td>
<td>erect</td>
</tr>
<tr>
<td>Leaves (cm)</td>
<td>elliptic to lanceolate, 3.2–4.6 × 0.8–1.2</td>
<td>lanceolate, 2.5–13 × 0.5–2.5</td>
<td>elliptic to lanceolate, 2–8 × 0.7–2.3</td>
</tr>
<tr>
<td>Lowest bract (cm)</td>
<td>deltoid, 0.2–0.3</td>
<td>folicaceous, 5–13</td>
<td>folicaceous, 2–8</td>
</tr>
<tr>
<td>Perianth</td>
<td>subactinomorphic</td>
<td>zygomorphic</td>
<td>zygomorphic</td>
</tr>
<tr>
<td>Sepals (mm)</td>
<td>7–8 × 2–2.5</td>
<td>11–16 × 3.5–4.5</td>
<td>8–10 × 2.5–3.5</td>
</tr>
<tr>
<td>Petals (mm)</td>
<td>obovate, 5–6.5 × 1.7–2</td>
<td>obovate, 7–8 × ca. 4</td>
<td>elliptic to oblong, 7–7.5 × 2.5–3</td>
</tr>
<tr>
<td>Lip</td>
<td>similar to petals, without sac or spur, unlobed, glabrous</td>
<td>different from petals, saccate at base, 3-lobed, with 3 to 4 lamellae and papillae</td>
<td>different from petals, spurred, 3-lobed, with 3 lamellae and papillae</td>
</tr>
</tbody>
</table>
Phenology. *Cephalanthera nanlingensis* has been observed to flower in April and May. Fruits have not been seen.

Discussion. *Cephalanthera nanlingensis* is similar to *C. longifolia* and *C. erecta*. All three taxa have slender stems, plicate leaves, and white flowers. However, the latter two taxa have a foliaceous lowest bract, a zygomorphic perianth, and a 3-lobed lip with three or four lamellae that are densely papilllose toward the apex. A close morphological comparison of the three taxa is given in Table 1.

*Cephalanthera nanlingensis* has a subactinomorphic perianth. Botanists are divided on treatment of this character, with some considering it a peloric form (Pridgeon et al., 2005), which should not be treated as a separate species; however, others consider this character to be a distinct and stable entity that merits definition at the species level (Chen, 1987). Regarding distribution, *C. longifolia* is not found in Guangdong Province. *Cephalanthera erecta* is recorded in northern Guangdong (Zhu, 1999), but has not been found to be sympatric with *C. nanlingensis*. Therefore, as *C. nanlingensis* has a separate distribution with distinct and stable populations, it should not be considered a peloric form of *C. erecta* or *C. longifolia*, and should instead be treated as a new species.


Acknowledgments. This work was supported by the Kadoorie Farm and Botanic Garden in Hong Kong, the project “Comprehensive survey on the plants in Nanling National Nature Reserve,” and the project “Investigation on rare and endemic plants in Guangdong.” We thank Yuan-Kun Wu, Zhen-Xing Yang, and Song-Yan Liu for their help during our botanical trip to Guangdong. We thank Sing-Chi Chen and Hua-Gu Ye for their critical comments on the manuscript, and Victoria C. Hollowell for editorial advice. We are grateful to Han-Ping Yu for the excellent illustration.

Literature Cited


Validation of the Name *Adiantum meishanianum* (Pteridaceae), a Species Endemic to Taiwan

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**ABSTRACT.** While investigating the fern called *Adiantum meishanianum* F. S. Hsu ex Y. C. Liu & W. L. Chiou (Pteridaceae), it was discovered that the name was not validly published because it had not appeared in an effectively published work. The name is validated herein; the holotype is deposited in HAST, and there are paratypes in TAIIF, HAST, and SYSU.

Key words: *Adiantum*, IUCN Red List, Pteridaceae, Taiwan.

The name *Adiantum meishanianum* has not hitherto been validly published. The fern bearing this designation was first collected from Taiwan by Bi-Jao Wang on 30 October 1983 (B. J. Wang 3025, HAST) and "*Adiantum meishanianum" was handwritten by Chen-Ming Kuo on the sheet without further validation. Later, Fei-Shuang Hsu collected plants of the same species in the same area of Meishan Village (Meishankou, type in shed., Wang 3025), Kaohsiung County, Taiwan, and treated them as a new species in his master’s thesis (Hsu, 1993). Unfortunately, the publication of the name *Adiantum meishanianum* F. S. Hsu was not effective under Article 30.5 of the International Code of Botanical Nomenclature (McNeill et al., 2006), because a name published in a thesis submitted to a university for the purpose of obtaining a degree is not considered an effective publication after 1 January 1953.

Moreover, even though Hsu’s thesis provided the designation and image of the holotype, it lacked information on the designated herbarium or institute that contained the holotype specimen, which is contrary to the requirement of Article 37.6 for names published after 1 January 1990 (McNeill et al., 2006). As a result, the requirements for valid publication of the name were not met.

The present paper validates the name *Adiantum meishanianum* and designates a type specimen. As noted, the diagnosis provided by Hsu (1993) was never effectively published and is brief and in some parts erroneous. Therefore, we re-describe and present a full diagnosis and description of *A. meishanianum* herein.

*Adiantum meishanianum* F. S. Hsu ex Y. C. Liu & W. L. Chiou, sp. nov. TYPE: Taiwan. Kaohsiung, Meishankou, 30 Oct. 1983, B. J. Wang 3025 (holotype, HAST). Figure 1.

Species nova ab *Adiantum caudatum* L. pinnae parisi imo stipite longiore (3–5 mm longo) atque frondis stipite longiore (ca. 10–20 cm longo) differt.

Rhizome short, erect to suberect, apex covered with scales; scales linear, to 4 mm, entire, bicolorous with a black center and brown margins; stipes ca. 10–20 cm, castaneous to blackish purple, lustrous, glabrous or sparsely hairy with multicellular hairs; scales on stipe like those on rhizome but concolorous brown. Lamina linear to lanceolate, pinnae, 10–50 × 3–6 cm; rachis sparsely hairy or glabrous, long attenuate at apex, leafless on distal part, and rooting at apex, occasionally secondarily prolonged; lateral pinnae largest at lamina base, lowermost pair of pinnae reflexed, distinctly stalked; stalks usually 3–5 mm, with ca. 60°–90° angle to rachis; pinnae numerous, 5 to 20 pairs, mostly dissected, usually 2–3 × 1–1.5 cm, rounded at apex, lower margin straight, softly herbaceous, glabrous on both surfaces; outer edge of pinnae subentire, crisped or lobed to about 1/3 of breadth of pinnae, sinuses narrow, lobes rounded to quadrangular, rounded to truncate at subentire or toothed apex. Sori at margin of pinnae, 5 to 16 per pinna, reflexed flaps 2–3 mm wide, glabrous.

Habitat, distribution, and IUCN Red List category. *Adiantum meishanianum* is an endemic species found growing on the edge of secondary forest. There is only one known population in Meishan Village (Meishankou), Kaohsiung, Taiwan. The area of distribution was approximately 40 × 20 m² and contained a population of less than 100 plants. According to IUCN Red List criteria, it should be considered Critically Endangered (CR B1a+2a; C2[a][i]) (IUCN, 2001).

Discussion. *Adiantum meishanianum* is similar to *A. caudatum* by the prolonged rachis bearing adventitious buds, but the two species differ by the sessile pinnae and dense indument on the rachis and

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pinnae in *A. caudatum*. The new species is also similar to *A. philippense* L., recognized as a valid name prior to *A. lunulatum* Burman f. (Fraser-Jenkins & Verma, 2008), in the shape of the pinnae and in the pinnae being stalked, but differs by the sparsely hairy or glabrate rachis and by the shorter stalks of the pinnae (3–5 mm vs. 10–15 mm in *A. philippense*). Both *A. caudatum* and *A. philippense* are broadly
distributed in tropical and subtropical Asia. In Taiwan, they frequently occur in the low-elevation hills of southern Taiwan and have been found in the vicinity of the A. meishanianum population.

Bi-Jao Wang (1953–1992) made the first collection of this species. After his death, most of his specimens were deposited in the Herbarium of the Research Center for Biodiversity, Academia Sinica, Taipei (HAST), and the Herbarium of the Taiwan Forestry Research Institute, Taipei (TAIF). In memory of his contribution, we choose as holotype the specimen collected by him and named by C. M. Kuo on the specimen sheet.


Acknowledgments. The authors thank the curators of HAST, SYSU, and TAIF for allowing examination of specimens; Che-Wei Lin for the illustration of the type specimen; and Tien-Chuan Hsu and Pi-Fong Lu for assistance in locating the population of Adiantum meishanianum.

Literature Cited

Hsu, F. S. 1993. Chromosome Studies on the Adiantaceae in Taiwan. Master’s Thesis, National Chung Hsing University, Taichung, Taiwan. [In Chinese.]


A New Species of *Meliosma* (Sabiaceae) from Southeastern Brazil and Notes on the Genus

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**Abstract.** *Meliosma chartacea* Lombardi (Sabiaceae), a new species from southeastern Brazil, is described from Minas Gerais and Espírito Santo. It is characterized by its entire internal petals, very short petiole (generally less than 1 cm), brochiroidous venation, and entire leaf margin. A key to determine the species from southeastern Brazil is presented. Lectotypes and new synonyms are proposed for formerly described Brazilian species: *M. sellowii* Urban and *M. itatiaiae* Urban.

**Resumo.** *Meliosma chartacea* Lombardi (Sabiaceae), uma nova espécie sudeste do Brasil é descrita para Minas Gerais e Espírito Santo, esta espécie é caracterizada pelas pétalas internas inteiras, pecíolos muito curtos (geralmente com menos do que 1 cm), veiação broquiroidóma e pela margem inteira das folhas. É apresentada uma chave para a determinação das espécies do sudeste do Brasil. Lectótipos e novos sinônimos são propostos para as espécies brasileiras anteriormente descritas: *M. sellowii* Urban e *M. itatiaiae* Urban.

**Keywords:** Brazil, IUCN Red List, *Meliosma*, Sabiaceae, South America.

The Sabiaceae (including the Meliosmaeae) currently include three genera and between 80 and 90 species (Arbeláez, 2004; Aymard & Cuello, 2005) distributed in the tropical and subtropical areas of Asia and the Americas (Kubitzki, 2004). Two genera occur in the Neotropics: *Ophiocaryon* Endlicher, restricted to the rainforests of northeastern South America (Barneby, 1972; Aymard & Cuello, 2005; Aymard C. & Daly, 2006), and *Meliosma* Blume, an amphipacific genus disjunct between Southeast Asia and tropical America, and found mostly south of Central America and in the tropical Andes.

*Meliosma* is traditionally subdivided into two subgenera, *Meliosma* and *Kingsboroughia* (Liebmann) Beusekom (Van Beusekom, 1971). The former includes sections *Meliosma* and *Lorenzanea* (Liebmann) Beusekom, while the latter is divided into sections *Kingsboroughia* and *Hendersonia* Beusekom. All Neotropical species are included in section *Lorenzanea*, except *M. alba* (Schlechtendal) Walpers, disjunct between southern Mexico and southeastern Asia, which is placed in section *Kingsboroughia* (Van Beusekom, 1971).

The most recent taxonomic study of the genus, although incomplete, was by Van Beusekom (1971), who revised all the taxa of the genus with the exception of the exclusively American section *Lorenzanea*. He recognized 15 species in the three sections and suggested the unstudied American section would not exceed 10 species.

The most recent treatment of Neotropical *Meliosma* was carried out by Urban (1900), who described 17 species: 11 from Mexico, Central America, and the Caribbean islands; one from Colombia; and five from Brazil. Since then, 40 additional new species from South America have been described (Kuhlmann, 1935; Lasser, 1943; Cuatrecasas, 1949, 1955, 1959, 1988; Steyermark, 1952, 1953, 1966; Cuatrecasas & Idrobo, 1955, 1988; Steyermark & Maguire, 1967; Gentry, 1986, 1992; Idrobo, 1988; Steyermark & Gentry, 1992; Aymard C. & Cuello A., 1994; Arbeláez, 2004; Cornejo & Bonifaz, 2006), but only one new species has been described from Brazil; this species is restricted to the Amazon Basin (Kuhlmann, 1935).

This increase in species number is attributed to the common local endemism that occurs in the family (Arbeláez, 2004) and is reported by Van Beusekom (1971) as a consequence of the pollination mechanism of the minute flowers, which eject the pollen on the stigmas in a single burst at anthesis. This probably entails a great rate of geitonogamy and consequently the establishment of local morphological variations (Van Beusekom, 1971).

The small number of new taxa described from Brazil is certainly due to insufficient collections, which is partially justified by the difficulty of collecting flowering specimens (Arbeláez, 2004) and the absence of taxonomists working on this family in Brazil. As shown by the floristic surveys in other South American countries (Cuatrecasas & Idrobo, 1955; Steyermark & Gentry, 1992; Arbeláez, 2004), additional botanical exploration always reveals many unknown species.

While starting a revisionary study of the family for Brazil, a very preliminary look at the meager collections deposited in principal herbaria in southeastern Brazil has revealed several undescribed Meliosma species, clearly distinct from those described by Urban (1895, 1900). Of these new species, thus far only one has sufficient specimens to allow a proper description, which is presented here.

**Meliosma chartacea** Lombardi, sp. nov. **TYPE:** BRAZIL. Minas Gerais: Santa Maria do Salto, Faz. Duas Barras, 16°24′12.1″S, 40°02′36.6″–33.7″W, 760–850 m, 25 Aug. 2003, J. A. Lombardi 5537, J. R. Stehmann, R. C. Mota & L. G. Temponi (holotype, BHCB; isotypes, HRCB, MO). Figures 1, 2.

Haec species *Meliosma chartacea* Urban quoad laminam foliarem magnam chartaceam spatulatum et petiolum internum ad pulviman redactum similis, sed ab ea folis marginibus integris venatione brochidodroma et petalis internis apice integris differt.

Trees, treelets, or shrubs, 5–20 m tall; branches suberete, shiny, furrowed, lenticellate, soon corky, shoot apex puberulous, with very short and inconspicuous trichomes, or sparsely strigose, glabrescent; axillary buds strigose. Leaves alternate to subopposite; petioles (0.4-)0.7–1 (-1.4) cm, cylindrical, swollen and pulvinus-like, drying cracked and scaly; blades (13.6-)26–31.6 (-61) cm2, spatulate; base cuneate-rounded, apex acute or acuminate; margin entire, thickened by a fimbrial vein; blade chartaceous, drying brown, glabrous on both sides except for very inconspicuous and sparse short trichomes along the primary vein abaxially; venation brochidodromous, primary vein lenticellate, immersed adaxially, prominent abaxially, secondary veins flat and light brown adaxially, prominent abaxially, gradually arched toward margin, tertiary veins and veinlets very lightly prominent, sometimes light brown adaxially, flat and light brown abaxially. Inflorescence a leafy terminal or subterminal panicle, 2 to 3× branched, ca. 29–42 × (8-)18–28 cm; axes lenticellate, from sparsely puberulous at base to densely puberulous at apex, glabrescent, corky on infructescence, with leaf and scale-like bracts and abortive strigose vegetative buds, branches sparsely lenticellate, densely puberulous or glabrous except at apex; leafy bracts occasional, ca. 6.2 × 2.2 cm, sessile or short petiolate (ca. 0.5 cm), elliptic, apex acute, base rounded; scale-like bracts 0.5–3 mm, aciculate to triangulate, strigose or sparsely pilose on the margin; pedicels absent; bracteoles 2 to 3, 0.5–0.8 × 0.7–1 mm, triangular, minutely ciliate, very similar to sepals. Flower buds ca. 2 mm diam., spherical, green, opened flowers not seen; sepals 5, 0.8–1 × 0.8–1.2 mm, triangulate, ± equal in size or the outer slightly smaller, carnose, ciliolate, otherwise glabrous; petals 5, unequal, with 3 larger outer petals and 2 smaller inner ones, the outer petals oblrate, cucullate, carnose, ciliolate, otherwise glabrous, outermost 1.3–1.5 × 1.1–1.6 mm, the internal two 1.4–1.8 × 1.3–2; inner petals 1.4–1.5 × 0.4–0.5 mm, reduced, papery, elliptic, apex acute and ciliolate; fertile stamens 2, ca. 1 mm, opposite inner petals and adnate to ca. 1/4 of their length, the filaments ligulate, incurved at apex, anthers ca. 0.7 × 0.9 mm, thecae suborbicular, transversely dehiscent before anthesis, separate and subtended by the thickened connective; staminodes 3, ca. 1 × 0.7 mm, opposite to outer petals and partially adnate to them, irregular, asymmetric, with 1 or 2 hemispheric cup-like depressions in the apex, these cover the adjacent thecae of the fertile stamens while inside the bud; disk consisting of 5 vestigial teeth, 0.1–0.2 mm; pistil 0.8–1.4 mm, subovate, laterally flattened, 2-locular, with 2 ovules in each locule, style 0.3–0.4 mm, cylindrical, stigmas minute, 2-lobed. Immature (?) drupes (1.7–)2–2.3 × 1.6–1.9 cm, asymmetric, green to light green, drying verrucose and brown, endocarp 1.4–1.7 × 1.5–1.6 cm, subspherical, smooth, cream; seeds not seen.

**Distribution, habitat, and IUCN Red List category.** *Meliosma chartacea* is restricted to the rainforests of the Brazilian Atlantic Range and collected in five localities in the states of Minas Gerais, Espírito Santo, and São Paulo, where it occurs at altitudes of 400–850 m. It has been reported in disturbed remnants of wet forest, on forested slopes, and along streams. This species has also been reported to occur inside different conservation areas, three in Santa Teresa Municipality, Espírito Santo—the Santa Lúcia Biological Station (ca. 440 ha), the Augusto Ruschi Biological Reserve (3598.41 ha), and the São Lourenço Biological Station (22 ha) (Mendes & Padovan, 2000); and two in São Paulo State—the Junipará State Park (26,250 ha) and the Serra do Mar–Núcleo Pedro de Toledo State Park (55,462 ha.). It is thus protected, at least in this part of its distribution; nonetheless, it is considered Endangered (EN) according to IUCN Red List criteria (IUCN, 2001) because its area of occurrence is less than 5000 km², it is known to occur only at five locations, and a continuing decline of its area of occupancy is inferred for habitat fragmentation.

**Phenology.** Collected with flowers in August, December, and January, and with fruits from March to May and July to October.

**Etymology.** The specific epithet of this species refers to the chartaceous texture of its leaves.
Figure 1. Meliosma chartacea Lombardi. —A. Inner petal. —B. Outer petals with adnate staminodes. —C. Branch with leaves and inflorescence. —D. Stamen with adnate inner petal: ventral, lateral, and dorsal views. —E. Apex of inflorescence branch with flower buds and subjacent bracteoles, one bud missing. —F. Pistil with two teeth of the disc. Drawn by the author from the holotype Lombardi 5537 (BHC)}.
Vernacular. Unknown.

Discussion. Meliosma chartacea resembles M. itatiaiae because of its large spatulate and short-petiolate leaves. Nevertheless, M. itatiaiae has conspicuous serrate leaf margins (vs. entire margin in M. chartacea), semicraspedodromous venation (vs. brochidodromous), and a bifid inner petal (vs. entire).

The “disk” is composed of five reduced teeth at the ovary base. It was seen in mature buds from the holotype, but was not observed in the flowered paratypes with younger buds. In some specimens of Meliosma sellowii, the disc was not found in bud, while in others it was more or less defined. Although, herein, this structure receives the name it is given in the literature (Urban 1895, 1900; Van Busekom, 1971), some doubts remain about its nature and possible functions in the flowe, if any at all, because of the absence of anatomical and developmental studies.

The specimens collected in Santa Teresa, Espírito Santo; in Santa Maria do Salto, Minas Gerais; and Ibiuma, São Paulo, showed different flowering periods (December–January in the first, and August for the other two). These discrepancies could be the result of insufficient sampling or may reflect a real variation of phenology. The fruits apparently remain on the plant for a long time (Fig. 2). No variation in fruit color was observed in the two different collections of the species by the author, and no other coloration is reported in the collection labels of the paratypes.


KEY TO THE DESCRIBED SPECIES OF MELIOSMA IN SOUTHEASTERN BRAZIL

1a. Leaves spatulate, large, (13.6–26.3–61.6–61) x (4.2–7.4–14.5–20.5) cm, petiole relatively short, sometimes swollen and without distinct pulvinate and canaliculate parts.

2a. Inner petals bifid, lobes divergent, conspicuous, venation semicraspedodromous, leaf margin conspicuously serrate. M. itatiaiae

2b. Inner petals entire, venation brochidodromous, leaf margin entire. M. chartacea

1b. Leaves elliptic to obovate, (2.9–3.5–5.7–21.2) x (0.9–1.6–5.4–6.1) cm, conspicuously petiolated, petiole having distinct pulvinate and canaliculate parts. M. sellowii

NOMENCLATURAL NOTES


Discussion. The holotype of Meliosma itatiaiae, pictured in F 13375, was destroyed in the Botanical Museum Berlin-Dahlem Herbarium (B) (Hieppe, 1987), and the name therefore requires lectotypification. The proposed lectotype was chosen because it is more complete and the three sheets are clearly part of the same gathering, including cauline large leaves on one sheet and more compact parts on the other two, so that the three sheets comprise the lectotype (cf. Art. 8.3 of the International Code of Botanical Nomenclature [McNeill et al., 2006]).

Meliosma itatiaiae has been reported in the Mantiqueira Range, on the border between Rio de Janeiro, Minas Gerais, and São Paulo states. The only collection outside this range (Igaratá) is only ca. 150 km south from the range outskirts.

Selected specimens examined. BRAZIL. Rio de Janeiro: Engenheiro Passos, Hutchatbach 45530 (US); Itatiaia, Alto-miro & Walter 139 (RB), Campos Porto 821 (RB), Glaziou
Meliosma sellowii Urban, Ber. Deutsch. Bot. Ges. 13: 212. 1895. TYPE: Brazil. s. loc., Sellow 2205 c. 2217 (holotype, B not seen [image seen]; another sheet was destroyed = F 13377); isotype, K.


Discussion. The holotype of Meliosma sinuata (pictured in F 13378), the syntypes of M. brasiliensis (Glaziou 17729 [F 13372] and Glaziou 8099), and the syntypes of M. glaziovii (Glaziou 12131 [F 13374] and Glaziou 19587) were destroyed in the Botanical Museum Berlin-Dahlem Herbarium (B) (Hirck, 1987), and the names therefore require lectotypification.

For lectotypification of Meliosma brasiliensis, the isotype Glaziou 8099 (Rio de Janeiro, Corcovado, Cova da Onça, 23 Nov. 1875 [F, K, P]) was also considered, but Glaziou 17729 was chosen as the most complete specimen. Likewise, for lectotypification of M. glaziovii, the isotype Glaziou 19587 (Alto Macabé, 5 Oct. 1891 [K, P]) was considered, but Glaziou 12131 was selected as more representative.

All the species described by Urban (1895, 1900) and here proposed as synonyms of Meliosma sellowii present slight variations of leaf shape and margin, indument, and inner petal apex. Intermediate states of these characteristics were seen in the many specimens collected in Santa Teresa, Espírito Santo State; Camanducaina, Minas Gerais State; and in the other localities represented by unique collections. Among the available names by priority, M. sellowii was the chosen name. It is the most frequently seen name on herbarium labels and in floristic and phytosociological studies (e.g., Jung-Mendáncoli, 1996; Kurz & Aráji, 2000; Jurinicz & Jarenkov, 2003; França & Stelmann, 2004).


Acknowledgments. The author thanks Tarciso S. Filgueiras for the Latin diagnosis; Robert Vogt for the type image from the Herbarium of the Botanischer Garten und Botanisches Museum Berlin-Dahlem; Odile Poney and Alain Changy for the type image from the Herbier National de Paris, Muséum National d’Histoire Naturelle; the reviewers Douglas C. Daly and Gerardo Aymard C. for suggestions and comments that greatly improved the manuscript; and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for financial support (no. 471341/2006-1) and a research fellowship (no. 306395/2006-1). I also thank the curators of the herbaria HBCB, BM, CEPEC, HRCB, K, M, MBML, MO, NY, P, RB, and US for permission to examine the specimens or specimen loans.

Literature Cited


**Cnidoscolus monicanus** (Euphorbiaceae), an Endemic New Species of Laticiferous, Non-Stinging Spurge Nettle from Western Mexico

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**ABSTRACT.** *Cnidoscolus monicanus* J. A. Loneli, Sahagún & V. W. Steinmann (Euphorbiaceae), endemic to western Mexico, is described and illustrated. This new species belongs to *Cnidoscolus* Pohl sect. *Calyptrosolen* (Müller Argoviensis ex Pax) Pax & K. Hoffmann and is closely allied to *C. elasticus* Lundell and *C. tepiquensis* (Costantin & Gallaud) McVaugh. We provide an identification key to the *C. tepiquensis* complex. These species share an arborescent and little or non-urticating habit at maturity, inflorescences that are often unisexual, and large seeds. We hypothesize that these species constitute a monophyletic group within section *Calyptrosolen*. *Cnidoscolus monicanus* is characterized by the following combination of characters: tree with grayish non-exfoliating bark and verticilicate branching, pelti-oles with two discrete glands projecting outward from the epidermis, leaf laminas (16-)20-41(-60) × (25-)36-67(-75) cm, leaf margins entire or with a few obscure to rarely caudate teeth, staminate flowers with a pubescent zone on the staminal column 3-4 mm long, pistillate flowers with a tomentulose perianth, a tomentose to sericeous ovary, peduncles of the pistillate infructescence 1.7-5 cm long, capsule with distal ribs and an acute apex, pedicels 5-20 mm long, and seeds 24-32 mm long. The new species occurs at elevations of 750-1640 m in tropical deciduous and semideciduous forest. We applied the Method for Evaluation of Risk Extinction for Wild Species in Mexico (MER) to estimate the conservation status of *C. monicanus*, and we concluded that it is threatened. We also evaluated the new species using applicable IUCN criteria and found it to be Endangered (EN).

**RESUMEN.** Se describe e ilustra *Cnidoscolus monicanus* J. A. Loneli, Sahagún & V. W. Steinmann (Euphorbiaceae), especie nueva para la ciencia endémica del occidente de México. La nueva especie pertenece a *Cnidoscolus* sección *Calyptrosolen* (Müller Argoviensis ex Pax) Pax & K. Hoffmann y está cercanamente relacionada con *C. elasticus* Lundell y con *C. tepiquensis* (Costantin & Gallaud) McVaugh. Se proporciona una clave de identificación para las especies del complejo *C. tepiquensis*. Estas especies comparten el hábito arborescente poco o nada urticante en la madurez, las inflorescencias por lo general unisexuales y las grandes dimensiones de las semillas. Se hipotetiza que estos taxon forman un grupo monofilético dentro de la sección *Calyptrosolen*. *Cnidoscolus monicanus* se caracteriza por la combinación de los siguientes caracteres: árbol con corteza grisácea no exfoliante, ramificación verticilada, pici-ñol con dos glándulas discetras, hoja con lámina de (16-)20-41(-60) × (25-)36-67(-75) cm, margen foliar entero o con pocos dientes obscuros a raramente caudados, flores estaminadas con zona pubescente de la columna estaminal de 3-4 mm de largo, flores pistiladas con perianto tomentuloso, ovario tomentoso a sericéo, pedúnculo de la infructescencia pistilada de 1.7-5 cm de largo, cápsula con costillas distales y ápice agudo, pedicelo de 5-20 mm de largo, semillas 24-32 mm de largo. Crecen a altitudes de 750-1640 m en bosque tropical caducifolio y subcaducifolio. Se aplicó el Método de Evaluación del Riesgo de Extinción de las Especies Silvestres en México (MER) para estimar el estado de conservación de *C. monicanus* y se concluyó que está amenazada. También se evaluó la nueva especie con los criterios aplicables de la UICN y se encontró que está En Peligro (EN).

**Key words: Cnidoscolus, Euphorbiaceae, IUCN Red List, Jalisco, MER evaluation, Michoacán, western Mexico.**

During the examination of unidentified material of Euphorbiaceae at the herbarium of the Instituto de Ecología–Centro Regional del Bajío (IEB), specimens Novon 19: 68–75. Published on 19 March 2009.

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of an interesting species of Cnidoscolus Pohl came to light. The same species was also independently collected by botanists at the Universidad Autónoma de Guadalajara during their explorations in the southwestern region of the Mexican state of Michoacán between 1998 and 2002. The material, after careful study, appears to belong to an undescribed species and is herein described as new to science. The new species is currently known from only two municipalities of Michoacán and from a location near Casimiro Castillo, in the adjacent state of Jalisco.

The genus Cnidoscolus is characterized by stinging epidermal hairs, glands on the distal part of the petiole, white pith, a single-whorled white perianth, and a style with three to five dichotomous branches ending in slender tips. In addition, the pistillate flowers develop rudimentary stamens and the staminate flowers have filiform sterile processes and a stipitate glandular disc that originates above the base of the staminal column (McVaugh, 1944).

Section Calyptrusolen (Müller Argoviensis ex Pax) Pax & K. Hoffmann includes the species of Cnidoscolus with palmately lobed leaves, single or paired petiolar glands, monadelphous stamens in two verticils, and relatively floriferous cymes (McVaugh, 1944). This section comprises about 40 species and reaches its center of diversity in Mexico (Breckon, 1975). The objective of this study is to describe, illustrate, and estimate the conservation status of C. monicanus, a new species belonging to section Calyptrusolen.

MATERIAL AND METHODS

Four trips were made to southwestern Michoacán in western Mexico to collect material and to take photographs of the undescribed species. An additional trip was made to the mountains of southern Sinaloa to collect and study Cnidoscolus tepiquensis (Costantini & Gallaud) McVaugh and C. elasticus Lundell, two apparently closely related species. Living plants of C. tepiquensis and C. monicanus are kept in cultivation in the “Jorge Victor Eller T.” Botanical Garden at the Universidad Autónoma de Guadalajara, and these were used to make the observations that support this study and to prepare the identification keys included below. Data from herbarium specimens housed at GUADA, IBUG, and IEB were also used. The Vascular Plant Types Catalog of the New York Botanical Garden, available at <http://sciweb.nybg.org/Science2/biocat/vascular/index.asp>, provided important information. Terminology and limits of plant structure measurements follow the criteria of Breckon (1975). Measurement ranges in Table 1 for C. elasticus and C. tepiquensis were partly based on the descriptions of Breckon (1975). To estimate the conservation status of C. monicanus, we used the Method for Evaluation of Extinction Risk for Wild Species in Mexico (MER) (SEMARNAT, 2002; Olson et al., 2005) and the criteria of the International Union for Conservation of Nature and Natural Resources (IUCN, 2001). MER evaluations are required by law in Mexico for native species to receive legal protection.

Cnidoscolus monicanus J. A. Lomelí, Sahagún & V. W. Steimmann, sp. nov. TYPE: Mexico. Michoacán: Mun. Chincuaca, Rancho El Tejón, on Aguila-Coaicomán hwy., 1640 m, 7 June 2002 (9 fl.), E. Sahagún 2396 with J. A. Lomelí & S. Parra (holotype, GUADA; isotypes, IEB, MEXU, MO). Figure 1.

Arbor 7–20 m alta, maturitate quasi totae inermis, trunci cortice griseo vel ferrugineo non exfoliato, ramificatione verticillata, ramulis monomorpho medulla fucta. Foliolum petiolo glabris seminatis discretis praedita; lamina (16–)20–41–(60) × (25–)36–67–(75) cm lata, margini integro vel dentibus paucis obscuris vel raro caudatis munita. Flos masculus columnae staminalis zona pubescent 3–4 mm longa; flos feminus perianthio adaxialiter tomentosulo, ovario tomentumo usque sericeo. Infrutescencia feminea pedunculo 1.7–3 cm longo insedens, pedicelis 5–20 mm longis. Capsula distaliter costata et acie acuta; seminibus 24–32 mm longis.

Drought deciduous tree 7–20 m tall, trunk ca. 30–50 cm DBH, urticating when young, virtually unarmed at maturity; bark light gray to light brown or reddish, non-exfoliating, slightly fissured with vertical, light-colored, spindle-shaped fissures and round ferruginous lenticels; latex white, copious; stem erect, monomorphic, with verticillate branching; current year branches 11–23 mm thick, fleshy, lustrous, glabrous, dark green with straw-colored lenticels; second year branches gray to brown, non-exfoliating, the pith solid even after drying. Young leaves with petiole tomentose to tomentulose; lamina yellowish green, depressed, palmatisect, with 5 to 7 lanceolate to elliptic lobes; margin entire, apex long caudate, tomentose on adaxial surface, the tomentum light brown, obscuring the veins and the epidermis, abaxial surface tomentulose, especially on the sides of the veins; mature leaves with stipules caducous, 4–6 mm, deltoid, green, abaxial surface glabrous, papillate-glandular with ca. 12 to 22 white glands, the apex acuminate, 2–3 mm, petiole terete, (14–)22–55 cm × 7–10 mm thick in fresh material, glabrous except sometimes for a longitudinal line of acicular slightly stinging trichomes on the adaxial surface, glands 2, discrete, projecting outward from the epidermis, cushion-like, 1–2 mm; lamina palmately parted to
Table 1. Principal differences between *Cnidoscolus monicanus* and closely related species.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>C. elasticus</em></th>
<th><em>C. monicanus</em></th>
<th><em>C. tepuiensis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation (m)</td>
<td>(500–)900–1600</td>
<td>750–1640</td>
<td>30–900</td>
</tr>
<tr>
<td>Branching</td>
<td>non-verticillate</td>
<td>verticillate</td>
<td>verticillate</td>
</tr>
<tr>
<td>Trunk bark</td>
<td>exfoliating, reddish</td>
<td>non-exfoliating, grayish to reddish</td>
<td>non-exfoliating, grayish</td>
</tr>
<tr>
<td>Stipules, abaxial surface</td>
<td>tomentose</td>
<td>glabrous</td>
<td>tomentose</td>
</tr>
<tr>
<td>Glands</td>
<td>2, discrete, projecting outward from the epidermis, cushion-like</td>
<td>2, discrete, projecting outward from the epidermis, cushion-like</td>
<td>1, U-shaped, flush with the epidermis</td>
</tr>
<tr>
<td>Lamina, length (cm)</td>
<td>15</td>
<td>(16–)20–41(–60)</td>
<td>(15–)19–49</td>
</tr>
<tr>
<td>Lamina, width (cm)</td>
<td>25</td>
<td>(25–)36–67(–75)</td>
<td>(19–)24–56</td>
</tr>
<tr>
<td>Lamina, primary veins</td>
<td>5 or 7</td>
<td>7 or 9</td>
<td>7 or 9</td>
</tr>
<tr>
<td>Lamina, marginal teeth*</td>
<td>0 to 9(26), obscure to rarely short caduate</td>
<td>0 to 3(6), obscure to rarely caduate</td>
<td>20 to 28, caduate</td>
</tr>
<tr>
<td>Staminate flower bud</td>
<td>strongly pyriform</td>
<td>conspicuously swollen about the disc, narrow-clavate above</td>
<td>conspicuously swollen about the disc, narrow-clavate above</td>
</tr>
<tr>
<td>Staminate flower. Pedicel length after abscission (mm)</td>
<td>&lt; 0.5</td>
<td>&gt; 1.5</td>
<td>≤ 1</td>
</tr>
<tr>
<td>Staminate flower. Length of pubescent zone (mm)</td>
<td>(1.5–)3.5–3.8</td>
<td>3–4</td>
<td>1–2</td>
</tr>
<tr>
<td>Pistillate perianth indumentum</td>
<td>tomentose, with few stinging hairs</td>
<td>tomentulose, not stinging</td>
<td>glabrous</td>
</tr>
<tr>
<td>Ovary, length (mm)</td>
<td>3–6</td>
<td>5–7.5</td>
<td>3.5–4</td>
</tr>
<tr>
<td>Ovary indumentum</td>
<td>sericeous</td>
<td>tomentose to sericeous</td>
<td>glabrous or with few adpressed hairs at base</td>
</tr>
<tr>
<td>Infructescence, length of peduncle (cm)</td>
<td>5–13</td>
<td>1.7–5</td>
<td>20.5–23.5</td>
</tr>
<tr>
<td>Capsule, length of pedicel (mm)</td>
<td>0–1.3</td>
<td>5–20</td>
<td>6–40</td>
</tr>
<tr>
<td>Capsule, apex at maturity</td>
<td>acute</td>
<td>acute</td>
<td>rounded</td>
</tr>
<tr>
<td>Pericarp</td>
<td>without ribs</td>
<td>with ribs</td>
<td>without ribs</td>
</tr>
<tr>
<td>Columella, length (mm)</td>
<td>23</td>
<td>30–35</td>
<td>27–29</td>
</tr>
<tr>
<td>Seeds, length (mm)</td>
<td>17–23</td>
<td>24–32</td>
<td>22–27</td>
</tr>
</tbody>
</table>

* The primary veins extending at the apices of the lobes were not considered in the count.

palmaisect, with 5 to 7 lobes and 7 to 9 primary yellowish palmate veins, (16–)20–41(–60) × (25–)36–67(–75) cm, the lobes caduate at the apex, the apical lobe spatulate to obovate, 15–24 cm long, 2.3–7.2 cm wide at the widest point, the apex 2.6–4 cm, distal lateral lobes spatulate to obovate, 16–25 × 6.5–7 cm, proximal lateral lobes obovate to oblanceolate, 12–20 cm, base cordate, glabrous or with a few stinging hairs, the basal sinis 3.5 cm deep, margin entire except for 0 to 3(6) obscure to rarely caduate teeth distributed among the lobes, adaxial leaf surface hirtellous, slightly stinging, abaxial leaf surface hisute. Dichasia cymes 2 to 4, subapical, commonly unisexual, only stamine in juvenile trichets, staminate, pistillate, or mixed in adult trees; staminate inflorescences multiformus, up to 5× dichotomous and with a ringed scar between each dichotomy, the scar made from the early abortive immature pistillate flowers; pistillate inflorescences usually with a single dichotomy, panceforous (with 2 to 6 flowers), appearing umbellate; mixed inflorescences with 4 to 6 dichotomous branches, the pistillate flowers solitary at the base of proximal dichotomies and the staminate flowers in the distal dichotomies, 30 to 96 per inflorescence; in all cases the peduncle 2.2–8 cm, tomentose to tomentulose to glabrescent, the tomentum brown to dull white; bracts 3–8 mm, lanceolate, with a small basal lobe on each side, tomentose on both surfaces; perianth of the staminate flowers white, adaxial surface glabrous, abaxial surface tomentulose, not stinging, clavate in bud, swollen around the disc, salverform, 11.4–14 mm; perianth tube 8–11 mm, lobes 6–8 × 3–5 mm in fresh material, elliptic to oblong, reflexed; stamens 10, glabrous, filaments of the upper whorl 11–13.5 mm, those of the lower verticil ca. 8–9 mm, anthers dorsifixt, 2.5–3.3 mm, those of the upper whorl completely exserted, those of the lower whorl partially exserted, the pubescent zone of the staminal column 3–4 mm long with yellowish white indumentum ca. 1 mm, stipitate glandular disc (0.5–)1.1–1.2 mm, orange when fresh, stipe ca. 0.3 mm, staminal column 8–9.5 mm, apex with a pistillode represented by 3 sterile processes somewhat longer than 2 mm; perianth of the pistillate flowers white, adaxial surface glabrous, abaxial surface tomentulose,
Figure 1. *Cnidoscolus monicanus* J. A. Lomelí, Sahagún & V. W. Steinhämm. —A. Leaf showing adaxial surface; inset shows a detail of the petiolar glands. —B. Apex of a sprouting stem showing lenticels, foliar scars, stipules, young leaves, and four peduncles of staminate cymes. —C. Staminate cyme with bracts, flower buds, and one staminate flower at anthesis. —D. Senescent pistillate flower in lateral view showing one bract and the robust pedicel; note the ovary apex with deciduous stigma. —E. Apical section of the staminate inflorescence showing bracts, two flower buds, and one staminate flower in lateral view; note the scale bar above applies to both staminate flowers. —F. Staminate flower viewed from above. —G. Stamine flower in longitudinal section showing in ascending order the pedicel, sectioned single-whorled perianth, glandular disc, pubescent zone of staminal column, and stamens. —H. Nearly mature infructescence in lateral view (note the short peduncle). —I. Seed in dorsal view (left); dry mature dehiscence capsule showing a seed inside (right). A–C, E–G, from a plant cultivated at the Botanic Garden of Universidad Autónoma de Guadalajara (JVET 2234); D, from the holotype, Sahagún 2396 with Lomelí & Parra (GUADA); H, I, from Sahagún 2544 (GUADA).
not stinging, salverform, 17–18 mm, perianth tube 6–9 mm, subeylindrical, gradually narrower toward the throat, proximal diameter 5.5–6 mm, distal diameter 3.5–4 mm, lobes 6–10 × 2–3 mm; ovary pyriform to ellipsoid, 5–7.5 × 2.5–3.5 mm, sulcate or costate, tomentose to sericeous, styles 3, glabrous, 4 mm long, bifid for 1–1.5 mm, disc height 0.5–1 mm, tomentose or hirtellous, green when fresh, brown in pressed material; infructescence with a peduncle 1.7–5 cm × 2–4.5 mm thick, tomentose to tomentulose, the tomentum brown, pedicels glabrescent, 5–20 × 5–3 mm thick; capsule loculicidal, ovoid, 3–4.5 × 1.4–2 cm, the apex rostrate when young and acute at maturity, rostrum 1–3 mm, soon caducous; pericarp green when fresh or dark brown to nearly black in herbarium specimens, hispid, with stinging trichomes ca. 2 mm and 3 ribs to 3 cm on the distal part of each carpel, the lateral ribs longer than the central one, dehiscence lines light colored; columna 3–3.5 cm; seeds elliptic in outline, 2.4–3.2 cm long, 1–1.2 cm wide, 6–7 mm thick, base rounded, apex acute, rostrate, the rostrum 1.5–2 mm; the ventral side straight to shallowly concave, uniformly dark brown or light brown grained with dark brown, with a light brown stripe on the margin and a central longitudinal furrow, the dorsal side light brown grained with dark brown, with a longitudinal central costa.

Habitat and distribution. In Michoacán, the new species occurs in tropical deciduous forest (sensu Rzedowski, 1983) near the ecotone with oak-pine forest, at an elevation of 1430–1640 m with Agave gypsophila Gentry, Bursera Jacquin ex L., Clusia salvinii Donnell Smith, Ficus L., Lysiloma acapulcense (Kunth) Bentham, and Neobuxbaumia Backeberg. In Jalisco, it thrives in tropical semideciduous forest at an elevation of 750–900 m with Hura polyantra Baillon, Ceiba Miller, Ficus, Brosimum alicastrum Swartz, and Euphorbia tankauhuate Sessé & Mociño. Apparently endemic to the Sierra Madre del Sur in western Mexico, it is currently known from southwestern Michoacán, in the municipalities of Chincuila and Coalmamán. It also occurs in Casimiro Castillo, in the Sierra de Manantlán, southern Jalisco.

Conservation status. Conservation status of the new species was assessed using the Method for Evaluation of Extinction Risk for Wild Species in Mexico (MER) (SEMARNAT, 2002). The criteria were assessed as follows:

Criterion A: extent of the distribution of the taxon in Mexico. The territorial extension of Mexico totals about 1,964,375 km² (SEP, 1996; INEGI, 2005), while Cnidoscolus monicanus is only known from three locations in the municipalities of Chincuila and Coalmamán, in Michoacán, and from one location in the municipality of Casimiro Castillo, in Jalisco, which together add up to 4873.13 km² (INEGI, 1986), or 0.25% of the territory of Mexico. This is considerably less than the 5% of the Mexican territory set as a limit by this criterion; thus, the distribution of C. monicanus is considered as “very restricted,” which corresponds to a score of 4.

Criterion B: status of the habitat regarding the natural development of the taxon. Cnidoscolus monicanus grows in tropical deciduous or semideciduous forest on soils that range from shallow-rocky to relatively deep, usually with abundant calcareous rocks, conditions that are common in southwestern Michoacán Colima, and southern Jalisco, which led us to consider the habitat as favorable or less limiting and to assign this criterion a score of 1.

Criterion C: intrinsic biological vulnerability of the taxon. This species is noteworthy for its tendency to produce unisexual trees, a trait that requires the simultaneous presence of flowers of both sexes in the vicinity for pollination to take place. Also, we observed few juveniles of about one or two years old but did not observe recently germinated seedlings; this suggests that the rate of recruitment in this species is low, which is confirmed by the small number of populations with few individuals known. We also observed that only fully grown trees produced pistillate flowers and seeds, while younger trees produced only stamine flowers. Thus, we observed few mature trees in fruit. This has obvious reproductive implications, making this species vulnerable. Furthermore, Cnidoscolus monicanus produces the largest seeds in section Calyptratosum, which apparently limit their dispersal unless a vector is involved. We also observed partly eaten seeds among rocks near parent trees, which suggests predation by mammals, as birds normally would eat the seeds whole; this may also have some potential for dispersal. In addition, unlike other species of Cnidoscolus, the capsules of C. monicanus apparently lack explosive dehiscence, and consequently the seeds fall near the parent plant. We consider that these factors limit the dispersal and reproductive potential of this species and make it vulnerable. The fact that some recruitment is occurring despite the arguments discussed above leads us to consider the vulnerability of this species as intermediate and to assign this criterion a score of 2.

Criterion D: impact of human activities on the taxon. In the locations where this species is known to occur, the native vegetation is cut to grow corn or to induce grasslands as pasture for cattle, which leads to habitat loss and poses a risk to this and other species in these areas. However, a few trees were observed growing on very rocky ground that was unsuitable for
human use. Furthermore, the Jalisco population occurs within the Manantlán Biosphere Reserve, which affords it protection. We concluded that impact of human activities is intermediate and assigned this criterion a score of 3.

To evaluate the status of a species, the scores of the various criteria are summed. Species with total scores between 12 and 14 are considered in danger of extinction, those with a score of 10 or 11 are threatened, and those with scores of 9 or below are considered to be at little current risk. The sum of the scores of all criteria totaled 10, thus \textit{Cnidoscolus monicanus} is considered threatened.

We also evaluated the conservation status of \textit{Cnidoscolus monicanus} using the applicable criteria of the International Union for the Conservation of Nature and Natural Resources (IUCN, 2001). The distribution as presently known is severely fragmented. Only four confirmed localities are known to exist. In all of them, except in the Manantlán Biosphere Reserve, habitat loss is creating pressure on existing populations. With the information currently at hand, we estimated the total population size to be fewer than 2500 mature individuals. Due to the limited use of the new species by rural people, a continuing decline in the populations due to land-use change is observed. However, this is not the case in the Manantlán Biosphere Reserve, which is estimated to contain the majority of mature individuals. The Michoacán populations have only a handful of mature trees. The new species may very likely also occur in Nayarit, but we do not have any confirmed collections or population size estimates from that state. Based on the analysis of IUCN Red List criteria given here, we conclude that \textit{C. monicanus} is Endangered (EN).

**Phenology.** Foliage is present from mid-June to October, with flowering from April to June, and fruiting from September to October.

**Etymology.** The specific epithet honors Mónica Edith Lomelí-Zavala, a young student of biology and daughter of the senior author.

**Common name.** Chicle (Nicanor Mendoza, 2001, pers. comm.).

**Potential use and economic value.** Although no actual uses were observed in the sites where \textit{Cnidoscolus monicanus} was recorded, the species produces abundant white latex, which has potential as a source of natural rubber. The latex of the closely related \textit{C. tepiquensis} is used in Talpa de Allende, in western Jalisco, and in Huajicori, Acaponeta, in northern Nayarit, to produce colorful art crafts. The seeds are reportedly edible either raw or roasted, and are known as “cucarachos” as they resemble cockroaches.

**Discussion.** \textit{Cnidoscolus monicanus} is closely related to \textit{C. elaticus} and \textit{C. tepiquensis}, with which it shares an arboreous, nearly unarmed habit at maturity, solid pith, similar pistillate perianth length, and large fruits and seeds. Based on these characteristics, we hypothesize that the three species comprise a monophyletic group in section Calyptrosolen. All three species of this complex produce abundant latex, which according to Williams (1962, for \textit{C. elaticus} and \textit{C. tepiquensis}) contains a high percentage of hydrocarbons and resin. In addition, the plants in this group have a tendency to produce unisexual cymes. They are restricted to the Pacific slope of western Mexico, and the species are allopatrically distributed north to south as follows: \textit{C. elaticus}, \textit{C. tepiquensis}, and \textit{C. monicanus}. Although the southern distribution limit of \textit{C. elaticus} seems to overlap slightly with the northern distribution limit of \textit{C. tepiquensis} in southern Sinaloa, the taxa are separated by elevation, with the former restricted to the highlands in the mountains and the latter found at low elevations. Similarly, altitudinal differences farther south also separate \textit{C. tepiquensis} and \textit{C. monicanus}, with the latter occurring at higher elevations than the former. Although the elevation ranges shown in Table 1 overlap slightly, there is no evidence that any of the species grow sympatrically. Because of the absence of herbarium specimens and his inability to find \textit{C. tepiquensis} in the municipality of Concordia, in Sinaloa, Breckon (1975) questioned Lundell’s (1945) assertion that this municipality is the northern limit of this species. However, we collected \textit{C. tepiquensis} near Cacalotán (23°04'28"N, 105°51'17"W), growing at an elevation of 50 m in the municipality of Rosario, which is adjacent to Concordia (J. A. Lomelí-Sencién, 3658 with E. Ramírez M. & C. L. Lomelí Z., GUADA). This finding supports Lundell’s distributional limit indicated above.

This new taxon is closely related to \textit{Cnidoscolus elaticus}, with which it shares two discrete petiolar glands, few, obscure marginal teeth in the leaf lamina that are only rarely caudate, staminate flowers with a long pubescent zone (usually 3–4 mm) on the staminal column, pistillate flowers with an abaxially pubescent perianth, a pubescent ovary, short peduncles of the infructescence, capsules that are acute at maturity, and a habitat at higher elevations. However, \textit{C. monicanus} differs from \textit{C. elaticus} in its grayish non-exfoliating bark, verticillate branching, glabrous stipules, longer capsule pedicels, and larger leaf lamina, fruits, and seeds (Table 1).

\textit{Cnidoscolus monicanus} is also related to \textit{C. tepiquensis}, with which it shares verticillate branching, grayish to light brown non-exfoliating bark, large leaf laminae with seven or nine primary palmate veins,
similar staminate flower bud shape, longer capsule pedicles, and longer columnellas and seeds. However, *C. monicanus* is distinguished from *C. tepiquestus* by its glabrous stipules, petioles with two discrete glands, leaf margins that are entire or with few obscure to rarely ciliate teeth, staminate flowers with a longer pubescent zone on the staminal column, pistillate flowers with a tomentulous perianth, longer tomentose to sericeous ovaries, shorter peduncles of the pistillate infrutescences, capsules with distal ribs and acute apex, and a habitat at a higher elevation (Table 1). These two species’ contrasting adaptations to climate, brought about by the varying elevation, is very evident in the plants cultivated at “Jorge Victor Eller T.” Botanical Garden, which is located at an elevation of 1700 m and has a mean annual temperature of 23.3°C. These conditions are similar to those found in the habitat of *C. monicanus* but have been stressfully cold for *C. tepiquestus*, which has grown slowly in 15 years of cultivation. Contrarily, *C. monicanus* has grown vigorously, reached the same height as *C. tepiquestus*, and attained a thicker trunk in nine years of cultivation.

Breckon’s (1975) concept of *Cnidoscolus tepiquestus* includes what we describe here as *C. monicanus*. This conclusion is based on his description of the species and on his identification of a specimen (McVaugh 19850, MICH) as *C. tepiquestus*, a duplicate of which (IEB) we identify as *C. monicanus*. Furthermore, in the illustration he presents for *C. tepiquestus* (Breckon, 1975: pl. 30a), the leaf is more typical of *C. monicanus*. Unfortunately, we were unable to see the specimen on which the drawing is based (Breckon & Breckon 1378 [DAV]) and cannot confirm our determination based on the illustration. A typical leaf of *C. tepiquestus* may be seen in Williams (1962: fig. 11).

It is presently unclear which species of the complex is more closely related to *Cnidoscolus monicanus*. Although our key shows *C. monicanus* and *C. elaticus* together in couplet 2, that does not indicate a closer affinity. The key is artificial and was built using the most distinctive characters available. A cladistic study is needed to clarify the affinities within the complex.

**KEY TO THE SPECIES OF THE Cnidioscolus tepiquestus COMPLEX IN MEXICO**

1a. Leaves rarely with 0 to 3(6) ciliate teeth similar to the ciliate lobe apices; petiolar glands 2, discrete, projecting outward from the epidermis, cushion-like; ovary tomentose to sericeous; fruiting peduncle ≤ 13 cm long; staminate flowers with the pubescent zone of the staminal column ≥ 3 mm long; capsule with apex acute at maturity

2a. Trunk bark non-exfoliating, gray or reddish brown; branching verricellate; mature leaves glabrescent, 16–60 × 25–75 cm, stipules glabrous; pedicel of staminate flower > 1.5 mm long after abscission, capsule pedicel 5–20 mm long; pericarp ribbed; columnella 30–35 mm long; seeds 24–32 mm long

2b. Trunk bark exfoliating, reddish brown; branching not verricellate; mature leaves tomentose, smaller, to 15 × 25 cm, stipules tomentose; pedicel of staminate flower < 0.5 mm long after abscission; capsule pedicel 0–1.3 mm long; pericarp not ribbed; columnella 23 mm long; seeds 17–23 mm long

1b. Leaves with 20 to 28 ciliate teeth similar to the ciliate lobe apices; petiolar glands 1, U-shaped, flush with the epidermis, not cushion-like; ovary glabrous; fruiting peduncle ≥ 20 cm long; staminate flowers with the pubescent zone of the staminal column ≤ 2.5 mm long; capsule with apex rounded at maturity


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**Literature Cited**


Two New Species of Sonerila (Melastomataceae) from South India

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ABSTRACT. The two new species Sonerila anaimudica Lundin & B. Nordenstam and S. coriacea Lundin & B. Nordenstam, from Kerala and Tamil Nadu, respectively, are recognized in connection with a taxonomic revision of the South Indian species of Sonerila Roxburgh (Melastomataceae). Descriptions, discussions, and illustrations are provided. Both species are endemic to the Western Ghats in South India. Sonerila anaimudica is a small succulent herb, and the usually single terminal flower has very obtuse or even retuse obovate petals with glandular margins. Sonerila coriacea is a somewhat woody succulent herb with a coriaceous layer on the stems, coriaceous leaves, and showy racemose flowers. Both species have restricted distribution and small populations and are regarded as Vulnerable (VU) and Endangered (EN), respectively, based on IUCN Red List criteria.

Key words: IUCN Red List, Melastomataceae, Sonerila, South India, Western Ghats.

Sonerila Roxburgh is an Asiatic genus of the Melastomataceae with ca. 175 species of herbs and shrubslet all characterized by the trimerous flowers. The genus is well represented in South India, where five species groups were distinguished by Lundin (1998). Two new species of Sonerila from South India are described, S. anaimudica Lundin & B. Nordenstam, which belongs to the S. speciosa Zenkger group, and S. coriacea Lundin & B. Nordenstam, which belongs to the S. grandiflora R. Brown group. The two new species are locally endemic with very limited distribution areas.

After conducting a field trip in southern India in 1982, the first author recognized six new taxa of Sonerila on the basis of collected and herbarium material. Material of the South Indian species of Sonerila was studied mainly in the herbaria of BM, CAL, K, MH, and S. Subsequently, four of these six new taxa have been described elsewhere, viz. S. cannabifera G. S. Giri & M. P. Nayar (Gir & Nayar, 1985), S. lamivakumariana Gopal & A. N. Henry (Gopal & Henry, 1988), S. talbotii G. S. Giri & M. P. Nayar (Gir & Nayar, 1986), and S. parasmeswaranii K. Ravikumar & V. Lakshmanan (Ravikumar, 1999). This last-mentioned species was provisionally recognized in Lundin (1998) as S. pedicellaris Lundin ined. (without Latin diagnosis), but because the species was validly published by Ravikumar and Lakshmanan (Ravikumar, 1999), their name, S. parasmeswaranii, must be used.


Herba erecta parva; caules basi bulbosi, carnosissimi, simplices, bruneo-virentes, pilis glanduliferas albis vestiti. Folia petiolar; petioli pilis glanduliferis albis dispersis; lamina ovata cordata carnosas serulata 5-7-nervis, supra atra-virens pilis glanduliferis albis dispersis, subtus rubella calba vel pilis paucis vestita. Flores solitarii vel in inflorescentiam 2-vel 3-florum pedunculatum dispositi; pedunculus et pedicelli glanduliferi. Petala rosea ovario apicibus retusis. Capsula campanulata pilis dispersis vestita, sepalis tribus viridibus coronata.

Small herb, 1–3.5 cm high, with basally bulb-like stems; succulent; stems unbranched, 3–6 mm thick, terete, brownish green, with whitish glandular hairs. Leaves petiolate; lamina ovate to broadly ovate, fleshy, cordate to deeply cordate with overlapping margins at the base, obtuse with the central nerve extending into the mucronate apex, 0.5–3 × 0.5–2 cm, dark green with scattered white hairs adaxially, reddish green and glabrous abaxially, or with few hairs (especially at the veins), finely serrate, 5–7-nerved; petioles 0.5–2.5 cm, greenish and with scattered, whitish glandular hairs. Flowers solitary or in 2- or 3-flowered peduncled subdichotomous scorpiooid raceme; peduncles 1–2.5 cm, with whitish glandular hairs, brownish green; pedicels ca. 0.5 cm, bright green, with glandular hairs, with a minute, membranaceous, subulate bract at the base. Petals pink, ovate, with glandular hairs on margins and abaxial veins, ca. 0.7 × 0.7 cm, with rounded or retuse apex; anthers yellow, 0.2–0.3 cm, ovate, cordate at the base, acute at the apex; filaments simple, striate, reddish. Capsule campanulate, with scattered hairs, ca. 0.7 cm, crowned with 3 green persistent sepals.

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Discussion. Sonerila anaimudica (Fig. 1) is a small, unbranched, very succulent herb with a basally bulbous stem. The stems are sometimes sparsely branched when cultivated in the greenhouse, and extend to 1–5 cm long, opposite branches (cultivated from the type J. Klackenberg & R. Lundin 429). The species does not otherwise change its habit during cultivation. The peduncles often have only one terminal flower. The petals are characteristically glandular-pubescent on margins and abaxial veins and are very obtuse or retuse, not pointed as in other species of Sonerila in South India. This species is locally endemic and occurs only in the Anaimalais, growing in shaded rock crevices at the adjoining hills to Anai Mudi in the mountain region above 2000 m. Based on the paucity of known localities (two) and the small population size as observed in the field (less than 12 individuals in the type locality), the species may be classified as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

This new species belongs to the Sonerila speciosa group (Lundin, 1998), which now consists of three species, viz. S. speciosa Zenker, S. gamblei G. S. Giri & M. P. Nayar, and S. anaimudica, all confined to the Nilgiris and the Anaimalais of the Western Ghats of South India. The species of this group are characterized by stems with short internodes and leaves almost whorled, like an elongated rosette, terminated by a distinct peduncle with a few-flowered subdichotomous inflorescence or a solitary flower.

Paratype. INDIA. Tamil Nadu: Coimbatore Distr., Konalar, Anamalai Hills, 2150 m, 1980, Chandrasekhar 69018 (K, MH).

2. Sonerila coriacea Lundin & B. Nordenstam, sp. nov. TYPE: India. Tamil Nadu: Kanyakumari Distr., Mahendragiri Peak, 4500 ft., R. H. Beddome 30351 (holotype, K). Figure 2.


Erect herb, 30–50 cm high, robust and semi-woody, glabrous, younger shoots succulent; stems and branches thick, ± terete, covered with a thick reddish corium, with prominent leaf scars, sparsely branched. Leaves ovate to lanceolate, extremely coriaceous, green adaxially, reddish green abaxially, 5-nerved, fleshy, obtuse to acute and symmetrical at the base, serrate in the upper 2/3, acute at the apex; lamina 2–5
× 1–2.5 cm; petiole 1/4 the length of the lamina. Flowers showy in 3- to 6-flowered scorpionoid racemes; peduncles 2–4.5 cm; petals red, ca. 1.5 cm, ovate, pointed; anthers narrowly ovate, rostrate, ca. 0.7 cm, connective simple. Capsule obconical, glabrous, lusterless (dull), ca. 0.8 cm, tapering into ca. 0.7 cm pedicel; sepals caducous in fruit.

Discussion. Despite its semi-woody coriaceous habit, *Sonerila coriacea* (Fig. 2) belongs to the largely herbaceous succulent *S. grandiflora* group, now consisting of seven montane species from the Nilgiris in the north to the Timnevelleys in the south of India (Lundin, 1996). The species of this group are glabrous and large-flowered with red or purple petals 1.5–2 cm long. The new species much resembles *S. devicola-mensis* M. P. Nayar in habit, but is more robust and semi-woody. The plant has developed a characteristic coriaceous layer on the stems and leaves that could be mistaken for a very dense and short tomentum. *Sonerila coriacea* has a very restricted distribution in the area around Mahendragiri Peak in the Timmevelley Hills and is locally endemic and rare. Also, no recent collections have been recorded since it was last collected in 1969. Therefore, its conservation status may be classified as Endangered (EN) according to IUCN Red List criteria (IUCN, 2001).

Paratype. INDIA. Tamil Nadu: Kanyakumari Distr., Mahendragiri Peak, 1480 m, 6 Dec. 1969, B. V. Shetty 33060 (MH).

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Literature Cited


New Species of Eugenia sect. Racemosae (Myrtaceae) from the Atlantic Forest, Eastern Brazil

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ABSTRACT. Morphological characters support the description of four new species of Eugenia L. sect. Racemosae O. Berg (Myrtaceae) from Brazilian Atlantic Forest. The new species are described, illustrated, and compared with putatively related species. They are: E. brunneopubescens Mazine from Paraná, E. capixaba Mazine from Espírito Santo, E. costatifructa Mazine from Bahia and Sergipe, and E. longibracteata Mazine from São Paulo.


Key words: Atlantic Forest, Brazil, Eugenia, IUCN Red List, Myrtaceae.

Eugenia L. is the largest genus in Myrtaceae, with ca. 500 (Holst et al., 2003) to 2000 species (Sanchez-Vindas et al., 2001) distributed from southern Mexico, Cuba, and the Antilles, to Uruguay and Argentina, with a smaller number of species (ca. 60) in Africa (Merwe et al., 2005). Some species with edible fruits have been cultivated in tropical and subtropical regions (e.g., E. uniflora L., E. brasiliensis Lamark). Eugenia is the genus with the highest number of species of trees in the ombrophilous dense forest surrounding Brazil’s Atlantic border, locally called the Mata Atlântica (Oliveira-Filho & Fontes, 2000).

Eugenia sect. Racemosae O. Berg can be distinguished by flowers arranged exclusively in racemes and/or panicles, with a distinct axis bearing the flowers in which the pedicel:internode ratio is 2:1 or less. During the preparation of a monograph of Eugenia sect. Racemosae O. Berg for the Flora Neotropica project, several new species were found, and descriptions of four new species from the Atlantic Forest of Brazil are presented here. Distribution data, illustrations, and comments for the described species are also provided.

1. Eugenia brunneopubescens Mazine, sp. nov.

TYPE: Brazil. Paraná: Quatro Barras, Morro Sete, 14 Jan. 1993, J. M. Silva & M. Sobral 1206 (holotype, ESA; isotypes, C, MBM, SPF, W). Figure 1A–C.

Hae species Eugeniae oblongatae O. Berg affinis, sed ab ea foliis 6–9.2 cm (nec 10.5–24.5 cm) longa sine laevis pubescentibus circularibus atque racemo tenui distincta.

Tree 5–12 m; young branches moderately pubescent, glabrescent. Leaf blade elliptic, 6–9.2 × 2–3.2 cm, coriaceous, without rounded injuries, glabrescent to densely pubescent on abaxial surface, with brown trichomes, glabrescent to moderately pubescent on adaxial surface, with simple and dibrachiate trichomes, apex acuminate, base attenuate, midvein sulcate, moderate to densely pubescent on both surfaces, the lateral veins indistinct or plane on adaxial surface, marginal vein doubled, the inner one 2.5–4 mm from the margin; glandular dots impressed on adaxial surface; petiole 1.2–1.4 cm. Raceme axillary, slender with 2 to 5 pairs of flowers, peduncle 5–8 mm, rachis 0.4–1.5 cm, densely pubescent, with brownish trichomes; floral bracts persistent, 1.5–2 mm; pedicel 4–5 mm, densely pubescent, bracteoles ca. 1 mm, basally connate, apex acute, persistent, subglabrous, midvein pubescent, with ciliate margin. Flower bud ca. 2 mm diam., sepals 1–1.5 mm, apex rounded, subglabrous to moderately pubescent, with ciliate margin, persistent; petals 4–5 mm, oblong or orbicular, apex obtuse; stamen filaments 4–5 mm, glabrous; hypanthium densely pubescent, style ca. 5 mm, glabrous. Fruit globular, 6–9 × 5–8 mm, red, moderately pubescent, surface glandular, not costate.

Distribution and habitat. Eugenia brunneopubescens is endemic to Quatro Barras, Paraná State, Brazil, from the Floresta Pluvial de Encosta de Morro and Floresta Montana.

IUCN Red List category. Eugenia brunneopubescens is considered Vulnerable (VU D1) according to IUCN Red List criteria (IUCN, 2001).
Discussion. *Eugenia bruneopubescent* has been collected only in Quatro Barras, in Paraná State, Brazil. The new species is distinguished by its pubescent hypanthyum, persistent floral bracts and bracteoles, and brownish trichomes on the abaxial surface of the leaves and inflorescences. The leaf indument is deciduous. The new species has morphological affinity with *E. oblongata* but can be distinguished from that species by its smaller leaf blades (6–9.2 cm vs. 10.5–24.5 cm long) without rounded injuries and its slender racemes (vs. stout racemes in *E. oblongata*). Furthermore, *E. bruneopubescent* occurs only in Paraná State, whereas *E. oblongata* has a broader distribution, as it is known from the states of Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo in Brazil.


2. *Eugenia capixaba* Mazine, sp. nov. TYPE: Brazil. Espírito Santo: Linhares, Vale da Lagoa, Juparaná, 17 July 1970, T. S. Santos 959 (holotype, CEPEC; isotype, MBML). Figure 2A–C.

Haec species *Eugeniae pruniformis* Cambessedes affinis, sed ab ca foliis pilis bifurcatis (nec simplicibus) pubescentibus, racemis floribus partia 7 ad 13 (nec 2 ad 8) ferentibus rachidi 2.5–4 cm (nec 0.5–3.5 cm) longis atque alabastris ca. 4 mm (nec 2–2.5 mm) diam. distincta.

Shrub ca. 3 m; young branches densely pubescent, glabrescent. Leaf blade elliptic, 9.8–12.3 × 4.7–5.7 cm, chartaceous, sparsely pubescent on both surfaces, trichomes diaphractiae; blade apex shortly acuminate, base acute; midvein sulcate, moderately pubescent on both surfaces; lateral veins slightly sulcate, marginal vein doubled, the inner one ca. 3 mm from the margin; glandular dots indistinct on adaxial surface; petiole 7–9 cm. Raceme axillary, subsessile, with 7 to 13 pairs of flowers, peduncle 0–2 mm, rachis 2.5–4 mm, densely pubescent, trichomes ferrugineous; floral bracts persistent; pedicel 1–4 mm, densely pubescent, bracteoles ca. 1 mm, free, not basally connate, ovate, apex acute, persistent, densely pubescent. Flower bud ca. 4 mm diam.; sepals ca. 2 mm, apex rounded, glabrous to subglabrous, persistent; petals 4–5 mm, elliptic-orbicular, apex obtuse; stamen filaments 4–5 mm, subglabrous; hypanthium very densely pubescent, not costate, style 5–6 mm, subglabrous. Fruit not observed.

Distribution and habitat. *Eugenia capixaba* is known by a single flowering collection from 1970, from Linhares, Espírito Santo State, Brazil, from the Atlantic Forest region, and has evidently not been collected again.

IUCN Red List category. *Eugenia capixaba* is considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Discussion. *Eugenia capixaba* belongs to the group in *Eugenia* sect. *Racemosae* characterized by racemes with ferruginous trichomes, flowers with persistent bracts and bracteoles, and a pubescent hypanthyum. It is very similar to *E. pruniformis*, which is also part of this species group. However, *E. capixaba* can be distinguished from *E. pruniformis* by its longer, multi-flowered racemes (rachis 2.5–4 cm long and 7 to 13 pairs of flowers vs. rachis 0.5–3.5 cm long and 2 to 4 to 8 pairs of flowers). Furthermore, the leaves of the new species have diaphractiae trichomes (vs. simple ones).

3. *Eugenia costatifruta* Mazine, sp. nov. TYPE: Brazil. Bahia: Entre Rios, Subaúma, 12°13'S, 37°52'W, 8 Dec. 1982, G. Pinto, J. Arouck, H. Battista & A. Araújo 16782 (holotype, CEPEC). Figure 1D–F.

Haec species a congeneris brasiliensis ad *Eugeniæ sect. Racemosae pertinentibus foliis coriaceis nitidis base rotundatis, racemo longo, bracteis floribus persistentibus, hypanthe fruticoque costato distinguitur.

Shrub to tree 3–4 m; young branches sparsely puberulous. Leaf blade widely elliptic, 6.5–12 × 5.2–7.2 cm, coriaceous, lustrous, moderately puberulous on both surfaces, apex shortly acuminate, base rounded, midvein sulcate, moderately puberulous on both surfaces, lateral veins slightly prominent, marginal vein 2–4 mm from the margin; glandular dots prominent on adaxial surface; petiole 0.8–1.2 cm. Raceme axillary, with 2 pairs of flowers, peduncle 0.5–2.3 cm, rachis 0.2–1 cm, glabrous to sparsely puberulous, with white trichomes; floral bracts persistent, pedicel 0.6–1.4 cm, glabrous to sparsely puberulous, bracteoles ca. 1 mm, basally connate, cordate, persistent. Flower bud 3–4 mm diam.; sepals 1.5–2 mm, apex rounded, subglabrous, persistent; petals not observed; stamen filaments 3–4 mm, subglabrous; hypanthyum subglabrous to sparsely puberulous, costate; style ca. 5 mm, subglabrous. Fruit globular, 2.3–3.5 × 2.2–3.3 cm, yellow to orange, subglabrous, surface costate, glanular.

Distribution and habitat. *Eugenia costatifruta* grows in restinga vegetation from the Brazilian states of Bahia and Sergipe.
IUCN Red List category. *Eugenia costatifructa* is considered Vulnerable (VU Bla[cii]) according to IUCN Red List criteria (IUCN, 2001).

**Discussion.** This new species has long racemes and flowers with persistent floral bracts. The principal characters of *Eugenia costatifructa* are the flowers with costate hypanthium and fruits also with a costate surface. The leaves are coriaceous and shiny, with a rounded base.


This species ab *Eugenia mosseii* (Kausel) Sobral racem tiachidi longa atque bracteis floribus 6–10 mm (sec 2–3.5 mm) longis caducis ante anthesim differt.

**Tree ca. 4 m, branches sparsely puberulous. Leaf blade elliptic-obovate or elliptic-oblong, 10–15.8 × 4.1–5.5 cm, chartaceous, subglabrous to sparsely puberulous on adaxial surface, subglaurose to sparsely pubescent on abaxial surface, with simple trichomes, blade apex contracted-acuminate, base attenuate, midvein slightly sulcate, subglaurose to sparsely puberulous on adaxial surface, subglaurose to sparsely pubescent on abaxial surface, lateral veins prominent, marginal vein doubled, the inner one 3–5 mm from the margin; glandular dots slightly impressed to slightly prominent on adaxial surface; petiole 1.5–1.7 cm. Raceme axillary, sessile, with 5 to 7 pairs of flowers, rachis 4.5–7.5 cm, densely pubescent, with brownish trichomes; floral bracts deciduous before anthesis, 0.6–1 cm, pedicel 0.7–2.2 cm, densely pubescent, bracteoles 3–3.5 cm, free, not basally connate, apex acute, sparsely pubescent. Flower bud 5–8 mm diam., sepals 4–6 mm, apex rounded, pubescent, persistent; petals not observed; stamen filaments not observed; hypanthium very densely farruraceous, indumentum more evident than indumentum of the calyx lobes, bracteoles, rachis, and pedicel, surface not costate, style not observed. Fruit not observed.

**Distribution and habitat.** *Eugenia longibraetecta* is only known from Cunha, in São Paulo State, Brazil, from Atlantic Forest.

IUCN Red List category. *Eugenia longibraetecta* is considered Vulnerable (VU D1) according to IUCN Red List criteria (IUCN, 2001).

**Discussion.** *Eugenia longibraetecta* is known from two collections, both with only floral buds, from Cunha, in São Paulo, Brazil. Its floral bracts are caduceous, dehiscing before anthesis. The new species has morphological affinity with *E. mosseii*, a species that occurs in Atlantic Forest in São Paulo and Paraná. *Eugenia longibraetecta* can be distinguished from *E. mosseii* by its caducous bracts that dehisce before anthesis (vs. bracts persistent on the fruit or deciduous after anthesis), long racemes with rachis 4.5–7.5 cm long (vs. short racemes, generally reduced to fascicles, with rachis 0–0.8 cm long), and long floral bracts (0.6–1 cm vs. 2–3.5 mm long).


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**Literature Cited**


Two New Species and a Nomenclatural Synopsis of *Myriocarpa* (Urticaceae) from Mesoamerica

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Abstract. *Myriocarpa* Bentham (Urticaceae), a genus endemic to Central and South America, is characterized by string-like pendent pistillate inflorescences. Among Mesoamerican species, there is significant confusion over the application of names, especially *M. bifurca* Liebm., *M. cordifolia* Liebm., and *M. heterospicata* Donnell Smith. Two new species from Mesoamerica are described and illustrated: *M. ebuligueseitzensis* A. K. Monro and *M. trifurca* A. K. Monro. In addition, a key to the seven species recognized for Mesoamerica and a nomenclatural review are provided. The names *M. bifurca* Liebm., *M. cordifolia* Liebm., and *M. longipes* Liebm. are lectotypified, and the name *M. colipensis* Liebm. is neotypified.

Key words: Guatemala, Mesoamerica, Mexico, *Myriocarpa*, Urticaceae.

*Myriocarpa* Bentham is a genus of shrubs and small trees endemic to Central and South America. Within the Urticaceae, *Myriocarpa* is characterized by its long, pendulous, string-like, spicate, pistillate inflorescences of apparently naked flowers and stems that release a watery latex when cut. Estimates for the size of the genus range from five to 10 (Burger, 1977) to 18 (Friis, 1989) species. Research for *Flora Mesoamericana* suggests that there are probably 15 to 20 species throughout the range of the genus.

The genus was described by Bentham in 1846 based on Colombian material of *Myriocarpa stipitata* Bentham collected by Barelay (Barelay, unpublished). Weddell placed *Myriocarpa* in the Urticaceae tribe Boehmerieae (Weddell, 1856, 1869) despite its anomalous pubescence, cystolith morphology, and wood anatomy. Friis (1989), in his review of the genus's position within the Urticaceae, retained its position within the Boehmerieae, presumably because its position in any other Urticaceae tribe would be equally ambiguous. The position of *Myriocarpa* within the Boehmerieae is not supported by recent phylogenetic analyses of trnL-F sequence data (Monro, 2006: fig. 2) that recovered *Myriocarpa* within a strongly supported clade including both the tribes Urticaceae and Lecantheae. Its position within either of these tribes, however, is unresolved. Based on hair, leaf, and flower morphology, *Myriocarpa* could equally well be placed in the Lecantheae (absence of hooked hairs) or the Urticaceae (alternate leaves, pistillodes not ejecting the achene). Further research, both molecular and morphological, is clearly warranted.

In the last major revision of the genus, six species were recognized (Weddell, 1869). Since this revision, *Myriocarpa* has attracted little taxonomic interest outside of floristic treatments (e.g., Standley & Steyermark, 1952; Burger, 1977), despite its unusual pistillate inflorescence morphology and ambiguous position within the Urticaceae. Currently, a total of 24 species names have been published (IPNI, 2006).

Materials and Methods

In preparing revisionary accounts of *Myriocarpa* for *Flora Mesoamericana*, 762 North, Central, and South American collections from BM, C, CAS, CR, DS, F, GH, LAGU, LL, MEXU, MO, NY, PMA, TEX, and US were examined. The macro-morphological characters most frequently used by previous authors have been: leaf shape, pistillate inflorescence branching, orientation of "bracts," and pistil and fruit (achene) morphology. In this study, emphasis was also placed on cystolith arrangement and morphology, stipule morphology, pistillate inflorescence disposition, and staminate flower morphology.

The circumscription of a single character, the fused bract/tepal-like structures located at the base of the perigonium, has remained ambiguous. Bentham (1846) ascribed these to the perigonium and so described them as tepals. Weddell (1856), however, ascribed them to the inflorescence axis and described them as bracts (although in modern terms these would be considered bracteoles). From examination of these structures for the preparation of species accounts for *Flora Mesoamericana*, they appear independent of the pedicel and to form an envelope around the constricted base of the ovary. The number of these structures associated with each flower (2, 3, or 4) also corresponds to pistillate tepal numbers frequently encountered in the Urticaceae. In addition, staminate *Myriocarpa* flowers are subtended by a single

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Plants evergreen, rarely deciduous; peduncle glabrous, pubescent, or densely pubescent, the visible or completely obscured by the hairs, where completely obscured by hairs these cause conspicuous bracteoles. Staminate flowers 4-parted, tepals equal, lacking a subapical appendage; pistillode prominent. Pistillate flowers with 2, 3, or 4 equal tepals; stigma foot-shaped. Achene subcompressed, ovoid. Ca. 12 spp., Neotropics.

**Taxonomic Treatment and Key to the Mesoamerican Species of Myriocarpa**


Shrubs or trees to 17 m. Stems without stinging hairs, frequently releasing watery latex when cut. Leaves alternate; stipules intrapetiolar, simple, caducous, rarely persistent; blades with margins toothed to subentire; cathodium fusiform, frequently appearing branched. Inflorescences unisexual; pistillate and staminate inflorescences few-branched racemes or spikes; pedicels, where present, subtended by inconspicuous bracteoles. Staminate flowers 4-parted, tepals equal, lacking a subapical appendage; pistillode prominent. Pistillate flowers with 2, 3, or 4 equal tepals; stigma foot-shaped. Achene subcompressed, ovoid. Ca. 12 spp., Neotropics.

**Key to Staminate Material**

1a. Cystoliths present on abaxial leaf surface.
   2a. Leaves subcoriaceous to chartaceous, adaxial surface not minutely pitted, cystoliths randomly scattered throughout, occasionally perpendicular to veins; pedicel 3.5–21 mm.... 6. *M. obsoleta*
   2b. Leaves membranous to subchartaceous, adaxial surface minutely pitted, cystoliths arranged radially around hair bases and/or glands, perpendicular to veins; pedicel 13–98 mm.... 3. *M. cabilguitezinsis*

1b. Cystoliths absent on abaxial leaf surface.
   3a. Adaxial leaf surface with cystoliths randomly scattered, minutely pitted occasionally in part.... 4. *M. heterospicata*
   3b. Adaxial leaf surface with cystoliths arranged radially around hair bases and glands, not minutely pitted.
      4a. Plants deciduous; peduncle very densely pubescent, surface completely obscured by hairs which cause it to dry silvery gray in color.... 1. *M. bifurca*
      4b. Plants evergreen, rarely deciduous; peduncle glabrous, pubescent, or densely pubescent, the surface visible or completely obscured by the hairs, where completely obscured by hairs these cause it to dry orange-brown in color.
         5a. Inflorescence < 90 mm.... 7. *M. trifurca*
         5b. Inflorescence ≥ 90 mm.
            6a. Flowers 2–2.75 mm diam. immediately prior to anthesis, stamens 2–3 mm; pedicels 0.13–0.25 mm.... 2. *M. cordifolia*
            6b. Flowers 1.13–2 mm diam. immediately prior to anthesis, stamens 1.25–1.75 mm; pedicels 0.25–0.75 mm.... 5. *M. longipes*

**Key to Pistillate Material**

1a. Cystoliths present on abaxial leaf surface.
   2a. Leaves subcoriaceous to chartaceous, adaxial surface not minutely pitted, cystoliths randomly scattered throughout, occasionally perpendicular to veins; pedicel 3.5–21 mm. Inflorescences 11–150 mm.... 6. *M. obsoleta*
   2b. Leaves membranous to subchartaceous, adaxial surface minutely pitted, cystoliths arranged radially around hair bases and/or glands, perpendicular to veins; pedicel 13–98 mm. Inflorescences 140–300 mm.... 3. *M. cabilguitezinsis*

1b. Cystoliths absent on abaxial leaf surface.
   3a. Adaxial leaf surface with cystoliths randomly scattered throughout.... 4. *M. heterospicata*
   3b. Adaxial leaf surface with cystoliths arranged radially around hair bases and glands.
      4a. Inflorescences coiled or curled in part, especially at the tip, drying very dark brown or almost black to very dark purple, peduncle densely pubescent; plants deciduous.... 1. *M. bifurca*
      4b. Inflorescences not curled or coiled, drying green, green-brown, pale brown, or red-brown to dark brown, but never dark purple, peduncle sparsely pubescent to pubescent; plants evergreen.
         5a. Inflorescence < 2.5 mm diam., flower density 10 to 36 per cm.... 5. *M. longipes*
         5b. Inflorescence ≥ 2.5 mm diam., flower density 36 to 112 per cm.
            6a. Inflorescence 3.5–5.5 mm diam., bearing > 2000 flowers; flower 1.75–2.25 mm.... 2. *M. cordifolia*
            6b. Inflorescence 2.5–3.25 mm diam., bearing < 2000 flowers; flower 1.25–1.5 mm.... 7. *M. trifurca*

Discussion. There are two sheets of the type collection at C, both have been numbered Oersted 5850. However, they appear to have been collected in different months, one sheet being annotated “12/47” and the other “11/47,” and therefore probably represent different collections. The sheet annotated “12/47” has been selected as lectotype.

Habitat and distribution. **Myriocarpa bifurca** is found in disturbed and secondary deciduous broadleaf forest, riparian vegetation, and shade coffee farms, at elevations of 100–1300 m and is distributed from Mexico to Costa Rica (see below).

Selected specimens examined. COSTA RICA. [s. loc.]: Brenes 6672 (F, NY), Téllez 4289 (MEXU). Alajuela: Hummel 18751 (BM), Guanacaste: Chavarria 9570 (CR), Flores & Herrera 65 (MO), Loozer 4968 (CR, MO).

Discussion. The collection selected as lectotype for **Myriocarpa cordifolia** was designated a lectotype through an annotation by Dennis Woodland (in sched.) in 1894. The collection selected as lectotype was made on the basis that it was cited by Liebmann in the original species description, that the sheet selected had been annotated by Liebmann, and that this was the duplicate with the most fertile material.

No type specimen was cited in the original description of **Myriocarpa colensis**, and no material annotated by Liebmann with this epithet and locality has been located at C or elsewhere. For this reason, a neotype has been designated. This collection was selected because it includes pistillate inflorescences, is in a good state of preservation, and originates from the same state in Mexico (Veracruz) as the locality given for this species by Liebmann (Colipa).

Habitat and distribution. **Myriocarpa cordifolia** is found in riparian vegetation; disturbed and undis turbed wet tropical-, montane-, and cloud-forest; and oak-pine-liquid amber forest formations, from sea level to 2500 m, from Mexico to Costa Rica.


Species nova Myriocarpae obovatae Donnell Smith simulis, sed ab ea folis membranaceis subchartaceis semper merothale atque petiolo sape longiore, cystalithis radialiter dispositis et inflorosae nitidissimae pistillatae ramulis majoribus differint.

Shrub or tree to 9 m, evergreen. Young shoots pubescent to sparsely pubescent, the hairs 0.25–0.5 mm, erect or appressed, weakly curved, straight, or crooked; internodes 6–25 × 2.5–4 mm. Stipules 5–11 mm; petioles 13–98 × 1–2 mm, petioles of younger leaves pubescent, becoming glabrous, the hairs 0.5–0.75 mm; leaf blade 80–206 × 32–79 mm, obovate, rhombic, oblanceolate, or ovate, membranous to subchartaceous; adaxial surface minutely pitted, glabrous, the cystaliths fusiform and V-shaped fusiform, arranged radially around hair bases and/or glands, perpendicular to veins; abaxial surface sparsely pubescent to glabrous, the hairs when present ca. 0.75 mm, appressed, weakly appressed, or erect, weakly curved, straight, or crooked, cystaliths fusiform, V-shaped fusiform, and X-shaped fusiform, arranged radially around hair bases and/or glands, perpendicular to veins; principal veins 3, lateral principal veins visible for 1/2–2/3 of leaf length, secondary veins 2 to 4 pairs, forming a 30–60° angle with the midrib, domiatia absent; base acute or obtuse to cuneate; margins serrate toward apex, basal 1/10–1/5 entire; apex cuspidate or subcuspidate. Stamine inflorescences 20–110 mm, a single order of branching, with a total flower-bearing branch length of 15–122 mm; peduncular bracts 2–2.5 mm; peduncle glabrous to sparsely pubescent, the hairs 0.25–0.375 mm; flowers sessile to subsessile. Pistillate inflorescences 1 to 5 per stem, pendent, 140–300 × 3–4 mm, bearing 1083 to 2950 flowers, pales green-gray when fresh, pale brown when dry, dichotomously and/or trichotomously branched 1 or 2X, with a total flower-bearing branch length of 550–770 mm and flower density of 16 to 50 per cm; peduncular bract ca. 1 mm; peduncle 11–30 mm, sparsely pubescent to glabrous, when pubescent the hairs ca. 0.25 mm, erect, straight; flowers pedicellate to subsessile, pedicels where present 0.13–0.25 mm. Stamine flowers 0.75–1 × 1.5–2 mm immediately prior to anthesis, tepals 1.5–1.75 mm; stamens ca. 2 mm. Pistillate flowers/fruits 1.75–2.5 × 0.68–1 mm; tepals 2, 0.75–1 mm, appressed; ovary 0.75–1 mm, ellipsoid, constricted from base for 1/3–1/2 of length, sparsely to moderately pubescent, the hairs 0.25–0.5 mm; style 0.5–0.75 mm; stigma very strongly asymmetrical.

Habitat and distribution. Myriocarpa cubilgietzensis is found in lowland forest in rocky areas and in riparian vegetation. It is distributed in northern Mesoamerica, Mexico (Chiapas, Oaxaca, Tabasco, Veracruz), and Guatemala (Alta Verapaz) at elevations of 130–600 m.

IUCN Red List category. Conservation for Myriocarpa cubilgietzensis must be considered as Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001), owing to the fact that the species has been collected 11 times in several localities in Mexico and Guatemala.

Etymology. The species is named after the locality of the type collection.

Discussion. Myriocarpa cubilgietzensis most closely resembles M. obovata Donnell Smith in the presence of cystaliths on the abaxial leaf surface (these unique to these two species) and the pale green-gray (when fresh), strongly bilaterally compressed pistillate flowers. Material of this species has frequently been determined as M. heterospicata Donnell Smith. The three species may be distinguished from each other as follows: (1) in M. cubilgietzensis, cystaliths present on abaxial leaf surface, adaxial surface minutely pitted, cystaliths arranged radially around hair bases and/or glands, perpendicular to veins; leaves membranous to subchartaceous; petiole 13–98 mm; pistillate inflorescence 140–300 mm; (2) in M. heterospicata, cystaliths absent from abaxial leaf surface, adaxial surface minutely pitted, cystaliths randomly scattered throughout or occasionally radially around hair bases and/or glands; leaves chartaceous; petiole 6.5–125 mm; pistillate inflorescences 62–330 mm; and (3) in M. obovata, cystaliths present on abaxial leaf surface, adaxial surface not minutely pitted, cystaliths randomly scattered throughout, occasionally perpendicular to veins; leaves subcoriaceous to chartaceous;
petiole 3.5–21 mm; pistillate inflorescence 11–150 mm.


Discussion. Donnell Smith (1888) sought to correct his hybrid (Latin-Greek) species epithet heterospicata by superfluously publishing Myriocarpa heterochactha Donnell Smith, which has subsequently been widely used in error.

Habitat and distribution. Myriocarpa heterospicata is found in disturbed and undisturbed evergreen wet forest, cloud forest, or oak-pine-liquid amber forest formations from Mexico to Nicaragua at elevations of 100–1800 m. Material from the Atlántida Department in Honduras (Liesner 26318 [BM, MO], Yuncker 8477 [BM, F, MO, NY, US], and Yuncker 8761 [F, NY]) is notable for having significantly longer (to 33 cm) and more floriferous (to 2400 flowers) pistillate inflorescences than other material from Mesoamerica.

Selected specimens examined. BELIZE. [s. loc.]: Whitefoord 1118 (BM, MEXU, MO), TOLEDO. Schipp 1033 (BM, F, MO, NY), Gentle 6647 (F, LL), GUATEMALA. [s. loc.]: Sketch 895 (BM, NY, US), Alta Verapaz: Smith 1645 (NY), Standley 70302 (BM, F, US), Standley 70999 (F), Standley 89901 (F, TEX), Steyermark 44187 (F), Steyermark 43919 (F), Tenorio L. et al. 14703 (BM), Tuerckheim 1350 (NY), Tuerckheim 11053 (BM, F, MO, NY), Tuerckheim 892 (GH, US), Williams et al. 40159 (F, US), Williams et al. 40201 (BM, F, NY), Williams et al. 43648 (BM, F, US), Wilson 40846 (F), Wilson 46386 (F), ENSINITANO: Standley 63395 (F), Standley 89583 (F), HUCHETNETANO: Steyermark 49507 (US), PETÊM: Contreras 6674 (LL), Contreras 10061 (F, LL), Contreras 3548 (LL), Contreras 10636 (F), Lundell & Contreras 20104 (LL), Lundell 17759 (LL), Lundell 16261 (F, LL), Smith 6674 (BM), Steyermark 46073 (F, LL), Zomer 133 (F), QUEZALNETANO: Roe et al. 722 (BM, F), SAN MARCOS: Croat 40799 (MEU, MO). SUCHITPEÜQUE: Standley 66687 (US), HONDURAS. ATLÁNTIDA. Líesner 26318 (BM), Yuncker et al. 8761 (F, NY), Yuncker et al. 8477 (BM, F, MO, NY, US). COMAYAGUA. Molina R. 10866 (F), Molina R. 5824 (F), Molina R. 5834 (F), Molina R. 10680 (F), Yuncker et al. 6353 (F, MO), Yuncker et al. 5998 (F, MO), COPÍN: Molina R. & Molina R. 50782 (F), MEXICO. [s. loc.]: Breedelobe 49023 (MEU), Matuda 4318 (MEU, MO), Mejia et al. 47 (MEU), CHIAPAS: Breedelobe 33068 (F), Breedelobe 23847 (MO, NY), Breedelobe 57964 (MEU), Breedelobe 33881 (MO), Breedelobe 9711 (F, LL), Breedelobe & Thorne 21397 (MEU, NY, MO), Cabrera & Cabrera 3866 (MEU), Croat & Honnol 65129 (MEU, MO), Duran & Levy 440 (MEU), Hampshire & Reyes G. 1226 (BM, F), Langman 3878 (BM), Levy & Durán 318 (MEU), Martínez 1986 (BM, MO), Matuda 18135 (F, MEU), Matuda 18080 (F, MEU), Matuda 4037 (F), Mejia et al. 712 (MEU), Mendez T. & Mitz. de López 9492 (MEU, TEX), Mendez T. et al. 6562 (BM), Mendez T. & Shihom A. 7177 (BM), Mendez T. et al. 4999 (BM), Mendez T. et al. 5176 (BM), Mendez T. 6470 (MEU), Miranda 7697 (MEU), Miranda 35086 (MEU), Miranda 5153 (MEU), Narvaez F. 1286 (MEU), Shihom T. 1406 (US), Shihom T. 3643 (MEU, NY), TABASCO. Magana & Zamudio 870 (MEU), Ventura A. 21482 (MEU), VERACRUZ. Cedillo T. 2501 (BM), Neo & Taylor K. 29414 (BM, NY), Purpus 16265 (F, TEX, US), NICARAGUA. ESTELí: Grijalva 960 (BM, MO), Martinez & Grijalva 1901 (BM), Moreno 19426 (MO). JIOTECA: Heinrich & Stevens 235 (BM, MO), Moreno 7694 (BM, MO), Sandino 1021 (BM, MO), Standley 10727 (F, Stevens & Krukoff 21843 (BM), MATAGALPA. Gentry et al. 40402 (MO), Gentry et al. 40403 (MO), Grijalva et al. 3027 (MO), Gazman et al. 386 (BM, MO), Krukoff & Stevens 23023 (BM, MEU, MO), Krukoff & Stevens 23024 (BM, C), Krukoff & Stevens 23025 (MO), Moreno 17011 (BM, MEU, MO), Molina R. 22885 (BM, F, MO, NY), Molina R. 30549 (MO), Nee 27659 (BM, MEXU, MO),Neill 829 (BM, MO), Stevens et al. 21313 (BM, MO), Stevens et al. 20127 (BM, MO), Tomlin 22 (BM, MO), Williams et al. 23847 (F, MEU).}


Myriocarpa magnifica Rushby, Deser. S. Amer. Pl. 11. 1920.


Discussion. The collection selected as lectotype for Myriocarpa longipes was designated a lectotype through an annotation by Dennis Woodland (in sched.) in 1984. This typification was, however, never published. The collection selected as lectotype was made on the basis that it was cited by Liebmann in the original species description and that this was the duplicate with the most fertile material.

The collection selected as lectotype for Myriocarpa inaequalis was designated a lectotype through an annotation by Dennis Woodland (in sched.) in 1984. This typification was, however, never published. The collection selected as lectotype was made on the basis that it was cited by Liebmann in the original species description.

Habitat and distribution. Myriocarpa longipes is found in disturbed, undisturbed, and secondary evergreen wet forest, essentially streamside or riverside, from sea level to 2,400 m, and is distributed from Mexico to South America (Colombia, Bolivia, Brazil). This species is very variable for leaf shape size and fruit color. Leaf shape varies from ovate to lanceolate, elliptic, or obovate to obovate, encompassing the full range of shapes and dimensions of other Mesoamerican Myriocarpa species. The black shiny fruit cited by Donnell Smith as one of the diagnostic characters for M. longipes var. yzabalensis (later raised to specific rank by Killip) appears to be variable within Central American species. For example, it also occurs in some collections of M. heterosperma, and it may be that it is associated with the maturity of the fruit.

Selected specimens examined. [s. loc.]: Oersted A. 14346 (C), BELLIZE. [s. loc.]: Schipp 1178 (BM, F, NY), Schipp 8472 (F), Cayo: Gentle 2223 (LL, MEXU, NY, US), Hawkins 1277 (BM), Stanis Creek: Deyrer et al. 555 (MO), Gentle 2849 (NY), Gentle 3179 (NY). Toledo: Croatt 24329 (MO), Gentle 7178 (LL), Gentle 5289 (LL, MEXU), Gentle 5490 (LL), Whiteford 1830 (BM), Whiteford 1582 (BM, MEXU), Stevenson 14494-91 (F), Stevenson 14894-112 (F), COSTA RICA. [s. loc.]: Burgar & Matta U. 4211 (F), Burger & Matta U. 4745 (NY), Burger & Matta U. 4657 (F), Leon 606 (F), Mier 1926 (C), Mier 1612 (C), Smith 6776 (NY), Valero 396 (F), Alajuela: Brenes 6568 (F), Brenes 6584 (F, NY), Brenes 6536 (F, NY), Guiral & Herrera 3 (BM), Haber 1232 (MO), Haber ex Bello C. 6427 (MO), Herrera C. 1007 (BM, CR), Herrera C. et al. 429 (BM), Jimenez M. 1719 (F, NY, US), Molina R. et al. 17405 (F, NY, US), Oersted A. 5851 (F, US), Smith 1422 (MO, NY), Utle & Utle 3854 (F, Utle & Utle 3859 (F, MO), Utle & Utle 3950 (F, MO), Burger et al. 11652 (BM, CR, F, NY). Cartago: Lent 3622 (F), Lena 5053 (NY), Little 20063 (CR), Polakowsky 486 (BM), Taylor 18035 (NY), Guanacaste: Garwood et al. 809 (BM), Grayum & Herrera 4835 (BM, MEXU), Martin 3272 (BM), Tebb & Vickery 1063 (BM, MO). Heredia: Folsom 8784 (F, TEX), Frankie 69 (F), Grayum 22274 (F), Grayum 22278 (BM), McDowell 1067 (F), Vargas 272 (BM), Limon: Burger et al. 10335 (NY), Burger & Lissner 6993 (BM), Antonio 609 (F), Burger & Lissner 11292 (MEXU), Quiros 506 (F), Robles 1499 (BM), Robles 2652 (BM, CR, F), Puntarenas: Allen 5739 (DS, F), Burger & Gentile L 88721 (F), Burger & Swogel 12273 (F), Castro 214 (MO), Castro 203 (MO), Castro 83 (MO), Cordero 163 (MO), Cordero 86 (BM, MO), Delporte 5175 (TEX), Haber & Zuchowski 11270 (BM, MO), Haber 1340 (MEXU, MO, TEX), Haber 11020 (MO), Jimenez et al. 1492 (BM, MO), Kornan 17 (BM, CR, F), Lent 3075 (F), Moos et al. 7898 (BM), Raven 20860 (F, MO), Skutch 1947 (CR), Skutch 5379 (CR), Skutch 6775 (BM, NY), Tondus 4826 (BM). San Jose: Burger & Barringer, K. 11621 (CR, F), Morales et al. 1126 (BM), Skutch 2320 (MO, NY), Skutch 2321 (NY), Tellas et al. 4228 (MEXU), Williams et al. 284516 (NY), Zamora & Carlson 419 (MEXU). GUATEMALA. Alta Verapaz: Croatt 41595 (MO, US), Croatt 41594 (MO), Croatt & Stewart 36 (CAS), Goll 223 (NY). Chimaltenango: Standley 80161 (F), El Quiche: Ventur 227 (F), Izabal: Contreras 11564 (LL), Kellerman 4719 (NY, US), Kellerman s.n. [125402] (MEXU), Smith 1644 (US), Stevens et al. 25498 (BM), Steyermark 41791 (US), Steyermark 41824 (F), Steyermark 39952 (US), Steyermark 39263 (F), Steyermark 39901 (F), Steyermark 184180 (F). Peten: Contras 6630 (F, LL), Contras 9298 (LL, TU), Contras 6055 (F). Sacatepequez: Standley 88993 (F), San Marcos: Croatt 40081 (MEXU, MO), Deyrer 14403 (BM, MO), Standley 80275 (F), HONDURAS. [s. loc.]: Wilson 253 (NY), Atlantida: Barkley & Hernandez M. 40035 (TEX), Croatt & Hannon 64621 (BM, MO), Lissner 26401 (NY), Standley 52953 (F), Standley 54061 (US), Standley 54626 (F), Comayagua: Edwards P. 454 (F), Mendoza 1400 (NY), Guatacondo: Sanders 1193 (NY), Yoro: Hackett 3157 (BM, F, MEXU). MEXICO. [s. loc.]: Hanau 290 (MEXU), Juzcpec 1925-26 (F), Mendez T. 9581 (MEXU). Chiapas: Bosque 8747 (F), Breedlove 11085 (LL), Breedlove & Smith R. 22132 (MEXU, MO), Breedlove 14922 (LL, US), Breedlove 23096 (LL, MO), Breedlove 8844 (F, LL), Breedlove 24236 (MEXU), Breedlove 21924 (LL), Britt 280 (TEX), Burnham 10 (BM), Chaves P. et al. 691 (MEXU), Chaves P. et al. 1286 (MEXU), O. F. Clarke 224 (NY), Croatt & Hannon 6220 (BM), Flores C. & Espijo 546 (MEXU), Fuentes s.n. "Ene 24 1955, 50270" (MEXU), Hernandez G. 705 (LL), Hoover 140 (MO), Juzcpec 1806 (F), Laughlin 207 (F, LL), Mendez T. et al. 5470 (BM), Mendez G. 8052 (LM, MEXU, MEXUS), Martinez S. 17654 (BM, MEXU), Martinez S. 17905 (BM, MEXU), Martinez S. et al. 3138 (BM, MEXU), Sanchez s.n. "Nov 1977" (TEX), Shikom T. 2906 (LL), Spellman et al. 193 (MO), Ventura L. 2842 (MEXU), Tabasco: Cowan & Zamudio 3361 (MO, NY), Croatt et al. 65348 (MEXU), Martinez S. 34708 (BM), Veracruz: Fay & Hernandez 829 (NY, US), Gentry et al. 32306 (MO), Hernandez O. 50 (MEXU), Ibarra M. 2267 (MO), Ibarra M. 789 (MO, MEXU), Martinez C. 1745 (MO, NY), Neck & Taylor 29888 (MO, NY), Perino & Perino 3102 (NY), Nicasa C. 800 (MO, Sato & Horrets 47 (NY), Williams 8559 (US), Williams 8403 (US), Vazquez Y.

Habitat and distribution. Myriocarpa obovata is found in semi-evergreen and evergreen disturbed and undisturbed tropical moist forest, from sea level to 1400 m, and is distributed from Mexico to Costa Rica.

A few collections from Guatemala and Oaxaca (Mexico) (Caldéron 1360 [NY], Williams et al. 40159 [US], and Williams et al. 40201 [BM, F, NY]) have minutely pitted adaxial leaf surfaces as opposed to the usual smooth surface. These minute pits are characteristic of Myriocarpa heterosperma and M. trifurca, but their function and homology to other structures (e.g., glans or hairs) are unknown.


Veracruz: Dorantes 2991 (MO), Wendi et al. 2229 (MO), M. Vázquez T. et al. 24104 (MO). NICARAGUA. CHONTALE: Stevens & Kruckoff 6105 (BM, MO), Vinnelli 94 (MO). GRANADA: Banks 854 (US), Blake 2489 (BM, CAS, DS, F, GH, MO, US), Grijalva et al. 2889 (BM, MEXU, MO), Moreno 6326 (BM, MO), Moreno 6307 (BM, MO), Moreno 6385 (BM, MO), Moreno 6449 (BM), Moreno 15942 (BM, MO).

Mudria: Williams & Molina R. 20247 (F, NY). MANAGUA: Garnier 806 (US), Garnier 1736 (US), Grant 952 (BM, F), Grant 1093 (US). MASAYA: Standley & Antonio G. 8108 (F). MATATLALPA: Castro 2375 (MO), Castro 2355 (MO), Kruckoff & Stevens 11837 (BM, MO), Moreno 25418 (BM, MO), Moreno 25358 (MO), Stevens et al. 21361 (MO). RIVAS: Moreno 19813 (BM, MO), Moreno 19607 (MO), Neil & Vinnelli 3218 (BM, MO), Robledo 927 (BM, MO), Robledo 338 (BM, MO), Robledo 147 (BM, MO), Sandino 4149 (MO), Sandino 4264 (MO), Sandino 4259 (MO), Sandino 566 (MO), Stevens & Kruckoff 6592 (BM, MO), Zelaya: Neill 4302 (BM, MO), Ortiz

7. Myriocarpa trifurca A. K. Monro, sp. nov.

TYPE. Mexico. Veracruz: ca. 4 km al N de Xalapa, por la carretera a México, ladera expuesta N del Río Sedeño, 1450 m, 1 Mar. 1981, A. Rebolledo V. 302 (holotype, F; isotype, NY). Figure 2.

Species nova Myriocarpaceae heteroscopicae Donnell Smith similis, sed ab lamina supra efoveata, cystolithis radialiter dispositis atque inflorescentia staminalis ramulis minoribus differt.

Shrub or tree to 6 m, evergreen. Young shoots pubescent to densely pubescent, the hairs to 0.5 mm, appressed or weakly appressed, straight to curved, internodes 7–17 × 2.5–4 mm. Stipules 6.5–10 mm; petioles 17–62 × 1–1.5 mm, pubescent to densely pubescent, the hairs 0.25–0.75 mm; leaf blade 100–185 × 41–110 mm, elliptic, frequently asymmetrically so, membranous, subchartaceous to chartaceous; adaxial surface not minutely pitted, pubescent, the hairs 1–1.25 mm, crooked, straight, or weakly curved, the cystoliths fusiform, V-shaped fusiform, and Y-shaped fusiform, appearing flattened at their margins, arranged radially around hair bases and/or glands and perpendicular to veins; abaxial surface pubescent to densely pubescent, the hairs 0.25–0.75 mm, appressed, weakly curved or straight, cystoliths absent; principal veins 3, principal lateral veins not prominent, visible for 1/3–1/2 of the leaf length, secondary veins 3 to 5 pairs, forming a 45–60° angle with midrib, domatia present in axils of primary and secondary veins; base cuneate, acute, or obtuse; margins serrate to base; apex cuspidate. Staminate inflorescences 42–85 mm, with 2 or 3 orders of branching, with a total flower-bearing branch length of 69–102 mm; peduncular bracts ca. 1.5 mm; peduncle densely pubescent, the hairs ca. 0.5 mm; flowers subsessile or sessile. Pistillate inflorescences 3 to 14 per stem, pendent to spreading, 45–240 × 2.5–3.25 mm, bearing 707 to 1204(5600) flowers, green or green-brown when fresh, pale brown when dry, trichotomously and/or dichotomously branched 1 or 2×, with a total flower-bearing branch length of 108–500 mm and flower density of 52 to 112 per cm; peduncular bract 1.5–9 mm; peduncle 8–30 mm, pubescent or sparsely pubescent, the hairs 0.38–0.5 mm, appressed or erect, weakly curved, crooked, or straight; flowers/fruit subsessile to sessile, pedicles when present ca. 0.13 mm. Staminate flowers ca. 0.68 × 1.75–2 mm immediately prior to anthesis; tepals immediately prior to anthesis ca. 1.5 mm; stamens not seen. Pistillate flowers/fruit 1.25–1.5 × 0.38–0.5 mm; tepals 2, 0.5–0.675 mm, weakly appressed; ovary 0.68–0.75 mm, elliptic or ovate, constricted from base for 1/4–1/3 ovary length, pubescent, the hairs 0.13–0.5 mm; style ca. 0.5 mm; stigma asymmetrical.

Habitat and distribution. Myriocarpa trifurca is found in pine-oak forest formations, wet forest, and riparian and secondary forest at elevations of 1000–1600 m in southern Mexico (Chiapas and Veracruz).

IUCN Red List category. Conservation status for Myriocarpa trifurca must be considered as Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001), owing to the fact that the species has been collected 34 times in several localities in Chiapas and Veracruz.

Etymology. The species is named for the fact that the pistillate inflorescences are frequently trichotomously branched, a relatively uncommon branching arrangement within Myriocarpa.

Discussion. Collections of Myriocarpa trifurca are most frequently determined as M. longipes or M. heterostachya (= M. heteroscopic). Myriocarpa trifurca is most similar to M. heteroscopic because of its frequently short staminate inflorescences and elliptic leaves, and to M. cordifolia because of its broad pistillate inflorescence branches. The three species may be distinguished from each other as follows: (1) in M. cordifolia, adaxial leaf surface not minutely pitted, cystoliths radially arranged around hair bases and glands; staminate inflorescence 90–310 mm; pistillate inflorescence branches 3.5–5.5 mm diam.; pistillate flowers/fruit 1.75–2.25 mm; (2) in M. heterostachya, adaxial leaf surface minutely pitted, cystoliths randomly scattered; staminate inflorescence 25–170 mm; pistillate inflorescence branches 1.75–3 mm diam.; pistillate flowers/fruit 1–2 mm; and (3) in M. trifurca, adaxial leaf surface not minutely pitted, cystoliths radially arranged around hair bases and glands; staminate inflorescence 42–85 mm; inflorescence branches 2.5–3.3 mm diam.; pistillate flowers/fruit 1.25–1.5 mm.

Paratypes. MEXICO. Chiapas: Mun. Pueblo Nuevo Solistahuacan, near Clinica Yerba Buena, 3 km NW of Pueblo Nuevo Solistahuacan, 1700 m, 11 July 1972, D. E. Breedlove 26038 (LL); Mun. Ocosingo, 15 km SE of Ocosingo on rd. to San Cristobal de Las Casas, 1372 m, 1 Sep. 1981, D. E. Breedlove 52903 (LL); Mun. Ocosingo, 70 km SW of Palenque on rd. to Ocosingo along the Jol’uk’am, 500 m, 4 Dec. 1980, D. E. Breedlove & F. Almeda 48404 (LL); Mun. Mapastepec, Reserva El Triunfo poligono 1, 15°39’N, 92°48’W, 1450 m, 17 June 1990, M. Heath & A. Long 1074 (MEXU); Mun. Pueblo Nuevo Solistahuacan, along the ridge above Pueblo Nuevo Solistahuacan, 2000 m, 15 Aug. 1967, A. Shilom T. 2904 (LL). Veracruz: carretera Teocelo-Ishuacan de los Reyes, Ishuacan de los Reyes, 1610 m, 12 Mar. 1976, S. Arredondo et al. 181 (MO, NY); al lado N de Ejido La Perla de San Martin, ca. 15 km al N de Catemaco,

Catemaco, 18°31′N, 95°05′W, 700 m, 2 Mar. 1972, J. H. Beaman 5826 (NY, TEX); becche de la Martinica a 2 km, Banderilla rancho del Sr. González Parra, Mun. Banderilla, 19°35′N, 96°57′W, 1480 m, 11 Nov. 1977, G. Castillo C. et al. 124 (NY); carretera Xalapa–Naolinco, zonas cafetaleras, Jilotepec, 1400 m, 2 Mar. 1976, C. Hernández A. et al. 54 (BM, MO); Jardín Botánico, Estación de Biología Tropical Los Tuxtlas, 18°34′–36′N, 95°04′–09′W, 200 m, 20 July 1983, G. Ibarra M. 739 (MO); Estación de Biología Tropical Los Tuxtlas, 18°34′–36′N, 95°04′–09′W, 160 m, 15 May 1984, G. Ibarra M. 1664 (MO); Estación de Biología Tropical Los Tuxtlas, 18°34′–36′N, 95°04′–09′W, 160 m, 13 Dec. 1983, G. Ibarra M. 1123 (MO); Estación de Biología Tropical Los Tuxtlas, 18°34′–36′N, 95°04′–09′W, 160 m, 25 Jan. 1984, G. Ibarra M. 1120 (MO); Estación de Biología Tropical Los Tuxtlas, 18°34′–36′N, 95°04′–09′W, 200 m, 3 Apr. 1984, G. Ibarra M. 1453 (MO); Mun. Orizaba, Cerro San Cristóbal, frente a Orizaba, 1400 m, 17 Dec. 1970, A. Lot 1105 (BM, MEXU not seen, TEX, XAL not seen); colonia militar Balzapote, San Andres Tuxtla, 100 m, 28 July 1970, G. Martínez C. 3115 (MO); gorge of Rio Melac, just downstream and beneath the bridges of the Córdoba–Orizaba hwy., 150 m
above Cuota México, 1 km (by air) W of Fortín, Mun. Iztaccioatlán, 18°54’N, 97°30’W, 900 m, 7 Feb. 1983, M. Nee & K. Taylor 29414 (BM, MO, NY); along very winding rd. from Naolino to Misantla, 13 km by rd. S of turnoff to Yecuatla and 6 km by rd. N of Paz de Enríquez, Mun. Yecuatla, 19°51’N, 96°48’W, 1200 m, 2 Apr. 1983, M. Nee et al. 26354 (NY); 2 km al NE de Izapaan, camino a Dos Pozitos, Tonayan, 1200 m, 28 Nov. 1975, R. Ortega et al. 32 (MO); ravines near Orizaba, 4000 ft., 18 Jan. 1895, C. G. Pringle 6093 (BM, US); Zacunapan, Jan. 1905, C. A. Purpus 2964 (BM, US); on rocks, barranca near La Palmilla, 1934, C. A. Purpus 16265 (F, US); the brincedero, cerca de un arroyo que atraviesa el camino de Jilotepec a Naolino, 28 Dec. 1975, C. H. Ramos 354 (US); ca. 4 km al N de Xalapa por la carretera a México, ladera exposición N del Río Sedeño, 1450 m, 1 Mar. 1981, A. Rebolledo V. 302 (MO, NY); Apalancan 2 km N de Santa Ana Atzalan, 1300 m, 4 Jan. 1967, M. Rosas R. & R. Hernández 130 (BM); Cerro de Escamela al N de Orizaba, 1450 m, 17 Jan. 1968, M. Rosas R. 989 (BM); Cerro de Chicahuaxtla–Cuautlapan, 1600 m, 22 Jan. 1968, M. Rosas R. 1041 (BM); Cerro de San Cristóbal, 5 km al SW de Orizaba, 1300–1600 m, 15 Dec. 1959, J. Kędzicki 12171 (MO); Cerro Lázaro Cádenas lote 71, Estación de Biología Tropical Los Tuxtlas, 18°34’–36’N, 95°04’–09’W, 600 m, 9 Aug. 1965, S. Sinaca C. 186 (MO); limites con Ometepec, Mun. Coateza, 600 m, 16 July 1976, V. Vázquez T. 469 (NY); Tonancalco, Zongolica, 1150 m, 4 Mar. 1976, C. Velázquez L. 22 (MO); Mun. Teocelo, La Barranca, 1000 m, 22 Feb. 1979, F. Ventauro A. 15799 (TEX); Mun. Teocelo, Barranca de Teocelo, 1020 m, 23 Dec. 1975, M. G. Zola B. 116 (NY).

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Literature Cited

Nitidobulbon, a New Genus of Maxillariinae (Orchidaceae)

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ABSTRACT. Nitidobulbon Ojeda, Carnevali & G. A. Romero, a new genus of the Maxillariinae (Orchidaceae), is described and illustrated. Its circumscription is supported by morphological, anatomical, and molecular evidence. The three species of Nitidobulbon are characterized by long flower peduncles, smooth, shiny pseudobulbs, and distinctive leaf anatomy. We present a taxonomic key to differentiate Nitidobulbon from related genera and also provide a key to the species within the genus. Three new combinations are established: N. cymbioides (Dodson, J. T. Atwood & Carnevali) Ojeda & G. A. Romero, N. nasutum (Reichenbach f.) Ojeda & Carnevali, and N. proboscideum (Reichenbach f.) Ojeda & Carnevali. In synonymy to N. nasutum, the name Maxillaria oxysepala Schlechter is lectotypified.

Key words: Heterotaxis, Maxillaria, Maxillariinae, Nitidobulbon, Orchidaceae, Ornithidium.

As currently circumscribed, Maxillariinae (Orchidaceae) consists of two groups of genera. The first group is the complex of genera around Lycaste Lindley and Bifrenaria Lindley, which is composed of genera basal in the phylogenetic tree of the subtribe that feature (1) plicate or subcoriaceous leaves always with convolute vernation (Romero & Carnevali, 2001) and (2) racemose or 1-flowered inflorescences. The phylogenetic relationships within the Lycaste alliance (sensu Dressler, 1993) were studied by Ryan et al. (2000), while the relationships within the Bifrenaria alliance were analyzed by Koehler et al. (2002). Further into the phylogenetic tree, there is another large, internal clade (ca. 650 spp., Govaerts et al., 2005) corresponding to Maxillariinae sensu Dressler (1993). This clade is characterized by 1-flowered inflorescences and conduplicate leaves, and will hereafter be referred to as the Core Maxillariinae (sensu Whitten et al., 2007).

Past classification systems (Dressler, 1993) and floristic treatments (e.g., Atwood & Mora Retana, 1999; Carnevali & Ramírez, 2003) have traditionally recognized eight genera within Core Maxillariinae, although often admitting that generic boundaries were unsatisfactory, probably unnatural, and required phylogenetic research. These eight genera are Anthosiphon Schlechter, Chrysocyclus Linden & Reichenbach f., Cryptocentrum Bentham, Cyrtochilus Rauschert, Maxillaria Ruiz & Pavón, Mormolyca Fenzl, Pitypsyllum Schlechter, and Trigonidium Lindley.
Among these eight genera, *Maxillaria* has always been the largest, containing most of the species of the subtribe, while the remaining seven genera were defined by several floral apomorphies. A recent phylogenetic work using several DNA regions, both nuclear and plastid (Whitten et al., 2007), identifies 17 clades within Core Maxillariinae, which are deemed worthy of generic recognition due to morphological and geographical coherence and distinctness, as well as high bootstrap support. A first striking conclusion from the phylogenetic topologies recovered from this phylogenetic analysis is the fact that, as previously circumscribed, *Maxillaria* is grossly polyphyletic with all of the other genera traditionally recognized as embedded within it. A second conclusion is that generic concepts of past taxonomy had overemphasized homoplasious floral characters, leaving the genus *Maxillaria* as a catch-all taxonomic recipient for members of Core Maxillariinae lacking these floral apomorphies. It is obvious from this recent phylogeny that vegetative morphology and geography were as good (or better) predictors of relationships as floral morphology.

The phylogenetic structure revealed by Whitten et al. (2007) is reflected in a classification system proposed by Blanco et al. (2007). One of the clades, located in a basal position within Core Maxillariinae, will be referred to as the *Heterotaxis* clade and consists of three internal subclades. The *Heterotaxis* clade received 100% bootstrap support in the combined nuclear ribosomal ITS (nrITS), matK + trnK, and atpB-rbcL spacer analysis in Whitten et al. (2007). A five-region analysis performed by these same authors for a smaller sample of taxa using the plastid rpoC1 region yielded a similar topology and level of support for the *Heterotaxis* clade (Whitten et al., 2007). The three internal subclades are less well supported (see below) but are morphologically distinctive. These subclades were earlier recovered in the morphology + anatomy + nrITS analyses by Ojeda (2003) and Ojeda et al. (2003). An alternative classification system would treat these three subclades as a single genus, but such a taxonomic aggregation would be morphologically undiagnosable. Because there are already generic names for two of these subclades, including the proper combinations for many of the species, we have chosen to treat the three subclades as different taxa at the generic level. These three clades are *Heterotaxis* Lindley (71% bootstrap support in the four-region analysis; 74% in the five-region analysis), *Ornithidium* Salisbury ex R. Brown (60% and 77% support, respectively), and the complex of species around *Maxillaria nasuta* Reichenbach f. (81% and 79% support, respectively) (Whitten et al., 2007: 1862). This last species group lacks a generic name and is herein proposed as such, as the new genus, *Nitidobulbon*. In the combined molecular analysis (Whitten et al., 2007), the relationships of the three clades are unresolved. However, in the combined morphology + anatomy + nrITS analysis (Ojeda, 2003: 67), *Nitidobulbon* is sister to *Heterotaxis* + *Ornithidium*, clades receiving 97% and 100% jackknife support, respectively. Thus, we feel confident that the hypothesis of relationships here proposed will be supported by further phylogenetic analyses. Furthermore, the fact that the three clades are morphologically distinct and easily diagnosable, both florally and vegetatively, warrants and supports the recognition of three distinct genera.

*Heterotaxis* comprises 11 orchid species of mainly sympodial growth, which are characterized by short rhizomes and laterally compressed, obovate, unifoliate pseudobulbs subtended by various leaf-bearing sheaths. The flowers are yellow to orange, although the labellum can rarely be purple and the calli vary in size and texture (Carnevali, 1991).

Within *Heterotaxis*, two major clades have been recovered (Ojeda, 2003), with one clustered around *H. sessilis* (Swartz) F. Barros (i.e., the *Sessilis* clade) and a second clustered around *H. discolor* (G. Lodidges ex Lindley) Ojeda & Carnevali (i.e., the *Discolor* clade). The *Sessilis* clade comprises species with small vegetative and floral parts, with pseudobulbs mostly hidden by the leaf sheaths, and the leaves succulent and typically deeply concave to triquetrous (Ojeda, 2003). In contrast, the *Discolor* clade contains robust, taller species exceeding 40 cm with large vegetative and floral parts, pseudobulbs that are well exposed, and leaves that are flat and coriaceous (Ojeda, 2003).

The *Maxillaria nasuta* clade, which includes *M. cymbidioides* Dodson, J. T. Atwood & Carnevali and *M. proboscidea* Reichenbach f. (Ojeda, 2003; Ojeda et al., 2005), has previously been included in the *Heterotaxis* alliance (Carnevali, 1991; Barros, 2002; Christenson, 2002). The three species in this clade are commonly misidentified and confused with those of the *Discolor* clade of *Heterotaxis*, especially when working with sterile specimens. However, current evidence from morphology and gross floral anatomy can identify six synapomorphies in *M. nasuta* and relatives (see the key below): (1) bracts are large, wrapping the internodes of the peduncle, largely obscuring the peduncular axis; (2) the inflorescence peduncle is longer than the pseudobulb; (3) the floral bract covers the pedicel and part of the ovary; (4) the surface of the column is papilllose; (5) the dorsal (adaxial) surface of the petals is papillose; and (6) the leaves exhibit a type IV vascular pattern, with three sizes of vascular bundles (large, usually occupying the
entire mesophyll from adaxial to abaxial epidermis; medium; and small, with medium and small bundles alternating several times between two larger vascular bundles) (Ojeda, 2003). We decided to include M. nasuta, M. cymbioides, and M. probosidea in a new genus rather than lumping Heterotaxis, Ornithidium, and the M. nasuta clade (where Ornithidium has nomenclatural priority). In our opinion, such a broad circumscription of Ornithidium would be morphologically too heterogeneous and therefore recognizable only on the basis of molecular evidence.

**Nитидобулон** Ojeda, Carnevali & G. A. Romero, gen. nov. TYPE: *Nitidobulon nasutum* (Reichenbach f.) Ojeda & Carnevali.

Hoc genus *Heterotaxis* Lindley affinias, sed ab ea bracteis floribus ovario excedentibus atque pseudobulbis nitidis valde compressis recessit.

Plants caespitose epiphytes, more rarely lithophytes or subterrterrials, erect, ca. 20–40 cm tall; rhizomes with reduced internodes; pseudobulbs large, 6–9 cm tall × 3–5 cm wide, laterally compressed, without ridges, smooth, appearing varnished; generally unifoliolate, rarely bifoliolate. Leaves coriaceous, erect on the pseudobulb apex, basally attenuate and forming a 2–4 cm pseudopetiole, apex bilobed; 3 sizes of vascular bundles in a medial cross section of the leaves: (1) large (usually occupying the entire mesophyll from adaxial to abaxial epidermis), (2) medium, and (3) small, arranged as type IV (Ojeda, 2003). Inflorescence 1-flowered, borne on axes of pseudobulb-subtending leaves; peduncle fleshy, 12–14 cm, ca. twice as long as the pseudobulb, with 4 internodes, generally the 2 closest to the ovary shorter than the 2 distant from the ovary; covered by triangular bracts usually as long as the internodes; floral bract similar to peduncular bracts, membranous, triangular, acute, ca. 2 cm, similar in length to ovary. Flowers relatively large, 3–5 cm wide, resupinate, yellow to brown; lateral sepals similar to the dorsal sepal, oblanceolate to spatulate, acute, yellow to brown, externally papilllose; petals ± similar to sepals, but shorter and narrower; labellum articulate to column foot, usually red to brown, surface shiny, lacking a raised pad of glandular hairs (as in Heterotaxis); pollinia 4, unequal, on a squarish to oblong tegula; column 8–10 mm, hemicylindric, papilllose, arcuate and with a poorly defined foot. Fruit a capsule with lateral dehiscence.

_Etymology_. The new genus name is taken from the Latin “nitidus,” meaning shiny, and “bulbus,” meaning bulb, in reference to the shiny, varnished texture of the pseudobulbs.

**Key to the Genera Nitidobulon, Heterotaxis, and Ornithidium**

1a. Caespitose, sympodial, or pseudomonopodial plants; internodes reduced, with a single 1-flowered inflorescence per leaf axil; column arcuate; labellum free, mostly flat to concave; fruits laterally dehiscent. ......................... 2

1b. Caespitose, pseudomonopodial, or monopodial plants; internodes reduced to elongated, with 1 to many 1-flowered, simultaneously inflorescences per leaf axil; column sigmoid; labellum basally adnate to the column or free (if so, then ≤ 10 mm long, variously lobed, recurved to sigmoid, often ciliate or fimbriate), often saccate; fruits apically dehiscent. ......................... *Ornithidium*

2a. Floral peduncle almost always as long or longer than pseudobulb; pseudobulbs laterally compressed, without ridges and with a shiny varnished surface; petals without a subapical macron; leaf cross section with 3 sizes of vascular bundles, the largest spanning the entire mesophyll. .................. *Nitidobulon*

2b. Floral peduncle shorter than to equal in length to pseudobulbs; pseudobulbs (when present) laterally compressed, with longitudinal ridges and without shiny varnished surface; petals with a subapical macron; leaf cross section with 2 sizes of vascular bundles, the largest not spanning the entire mesophyll. ..................... *Heterotaxis*

**Key to the Species of Nitidobulon**

1a. Plants relatively small, pseudobulbs 4.5–5.5 cm long; leaves 20–24 mm wide; sepals 25–27 mm long; labellum 14–15 mm long. ........... *M. cymbioides*

1b. Plants relatively large, pseudobulbs 8–12 cm long; leaves 25–50 mm wide; sepals 27–35 mm long; labellum 18–25 mm long. ......................... 2

2a. Sepals widely spreading, apices obtuse or acute; labellum apically broadly obtuse to rounded, bracts of the inflorescence not inflated; floral bract shorter than the pedicellate ovary. .................. *M. probosidea*

2b. Sepals either ± parallel to the petals or reflexed, apices acuminate; labellum ± acuminate or acute; bracts of the inflorescence usually ± inflated; floral bract longer than or nearly equal to the pedicellate ovary. ..................... *N. nasutum*


_Distribution_. *Nitidobulon cymbioides* is currently known with certainty only from the western slopes of the Andes in northern Ecuador, although it may also occur in neighboring southwestern Colombia (Nariño Department).


*Amarillo, 1600 m, 19 Sep. 1925, A. Alfaro 190* (holotype, US).


**Distribution.** As currently circumscribed, *Nitidobulb. nasutum* ranges from southern Mexico, throughout Central America, and into Bolivia along the Andean Range, the Venezuelan Coastal Range, the Guianas, and the northern Amazon Basin.
Discussion. The holotype of *Maxillaria oxysepalula*, originally at B, was destroyed. We have selected AMES 25122 as lectotype because it is the most representative specimen we examined.

3. *Nitidobulbon proboscideum* (Reichenbach f.)

Distribution. *Nitidobulbon proboscideum* is likely restricted to northern Venezuela, possibly into the Guayana Region (Carnevali & Ramirez, 2003). Plants from outside this area that are referred to this species in floristic treatments may belong to *N. nasutum* or to other, possibly undescribed taxa.

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Literature Cited


Stonesia ghoguei, Peculiar Morphology of a New Cameroonian Species (Podostemaceae, Podostemoideae)

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Abstract. The traditional circumscription of the genus Stonesia G. Taylor (Podostemaceae, Podostemoideae) includes three species restricted to western tropical Africa. Here, a new species, S. ghoguei E. Pfeifer & Rutishauser, is described, which represents the first Cameroonian member of the genus. There are another three Stonesia species restricted to western tropical Africa (Guinea and Sierra Leone). The genus Stonesia is characterized by capsule valves with five or seven ribs each, with the ribs nearest the sutures shorter and not reaching the ends of valves. This unique pattern is shared with the two Madagascan genera Endocallosus C. Cusset and Paleodicraea C. Cusset. Molecular (matK) data indicate that this capsule pattern is homoplastic, occurring in Madagascar and (with Stonesia) in tropical Africa. Various characters of Stonesia (including S. ghoguei) are also found in other African podostemoids. These include flower buds inverted in the sac-like spathella; crustose roots or broad ribbons with exogenous root lobes (daughte roots); stems usually simple (rarely branched), up to 10–40 cm long; flowers arising primarily from endogenous buds inside the stem cortex in S. ghoguei and S. fascicularis G. Taylor; and leaves repeatedly forked into narrow segments, with epiphyllous flowers arising from the clefts of these forks in S. ghoguei and S. heterophylla G. Taylor. Unlike the western African Stonesia species, S. ghoguei has pollen mainly released in monads (not only dyads), one stamen per flower with two lateral tepals (not two stamens with three tepals), and unilocular ovaries (not bilocular ones).

Key words: Cameroon, cauliflory, endogenous floral buds, epiphyllous flowers, IUCN Red List, Ledernanniella, Podostemaceae, Stonesia, structural diversity.

The Podostemaceae (river weeds) are mainly restricted to tropical rivers, waterfalls, and cataracts in regions with distinct seasonality, where they grow attached to rocks or other solid substrata without penetrating them. The vegetative plants are completely submerged in swiftly running water during the rainy season. Emergent flowers and fruits are formed when the water recedes during the dry season. The Podostemaceae are the largest group of strictly aquatic flowering plants (Cook, 1999). Most of the ca. 290 species and many of the 49 genera are endemic to small geographical areas such as a single river or a country (Ameka et al., 2003; Cook & Rutishauser, 2007). They show three main centers of biodiversity: Latin America, tropical Africa, and South to Southeast Asia (Engler, 1928; Cusset, 1987; Kato, 2006). There are 16 genera and ca. 85 species known from Africa and Madagascar; except for Tristicha Thouars, all of them are endemic to Africa and/or Madagascar. Eight of the 15 endemic genera occur with just one species in Africa or Madagascar. Most genera, including Stonesia, consist of six or fewer species. Ledernanniella Engler (as defined by Cusset, 1974, 1983, 1984) is the only species-rich exception in Africa, containing ca. 46 species. This genus, however, seems to be artificial, because—based on molecular and morphological evidence—various small African genera of Podostemaceae are nested in it. According to Moline et al. (2007), all podostemoids studied from Continental Africa form a clade that is sister to the Madagascan genera Endocallosus C. Cusset and Thelebiylax C. Novon 19: 102–116. Published on 19 March 2009. doi: 10.3417/2007080
Stonesia as a new podostemoid genus was described by Taylor (1953). There have been three Stonesia species described; these are confined to a small region in Guinea and Sierra Leone, western tropical Africa (Cusset, 1973; Lebrun & Stork, 1991; Cook & Rutishauser, 2007). The genus Stonesia as known until now was distinguishable by the combination of three unique characters: (1) the number of capsule ribs varies from 12 to 18 (i.e., there are five to seven ribs per valve plus the sutures, usually marked by twin ribs that disappear after dehiscence); (2) the ribs nearest to the sutures do not run the whole capsule length but begin on the suture above the base and, curving parallel to the other ribs, rejoin it below the apex; and (3) flowers show two stamens on a common foot (androdium) and three subulate tepals, one tepal on each side of the androdium, and the third tepal in the fork between the filaments.

We studied recently collected accessions from Cameroon, which represent a new species attributed to Stonesia.

MATERIALS AND METHODS

The plant specimens used in the present study were fixed and preserved in 70% ethyl alcohol. The wet plant material is deposited in the National Herbarium of Cameroon (YA) and the Herbarium of Zurich Universities (Z/ZT). For scanning electron microscopy, the dissected plant parts were critical point dried and sputter-coated with gold. The electron micrographs were taken with a JEOL scanning electron microscope (JEOL Ltd., Tokyo) at 20 kV. For microtome sections, specimens were embedded in Kulzer’s Technovit 7100 (2-hydroethyl methacrylate; Heraeus Kulzer GmbH, Wehrheim, Germany) and sectioned with a MICROM HM 355 rotary microtome (GMI, Inc., Ramsey, Minnesota, U.S.A.) and conventional microtome knife types C and D. The mostly 7 μm thick sections were stained with ruthenium red and toluidine blue.

To test possible relationships of Stonesia ghoguei to African and non-African taxa, we conducted a phylogenetic analysis based on matK sequence data. A modified data set by Moline et al. (2007) (tree base M2581) was used. Of these taxa, Cladopus japonicus Inamura (selected outgroup = OG), Dionaea muscipula (Koch) (OG), Hydrobryum japonicum Inamura (OG), Ledermanniella bifurcata (Engler) C. Cusset, L. cf. bosii C. Cusset, L. bowingii (J. B. Hall) C. Cusset, L. ledermannii (Engler) C. Cusset (accessions 1 and 2), L. neozygeii C. Cusset, L. linearifolia Engler, Podostemum ceratophyllum Michaux (OG), Polylepis stylosum (Wight). J. B. Hall (OG), Thelothelyx minutiflora (Tulasse) C. Cusset, and Zeylanidium olivaceum Engler (OG) were included, and S. ghoguei (from the type Ghogue GHO 1665; GenBank Acc. No. AM937251) was added. A maximum likelihood (ML, Felsenstein, 1981) analysis was performed using PAUP 4.0 (Swoford, 1998). To determine the noble substitution model that best fits the data, the hierarchical likelihood ratio test was used in Modeltest 3.0 (Posada & Crandall, 1998). ML analyses specifying the TVM + G model were implemented as heuristic searches with a 10 random-addition-sequence, tree bisection-reconnection, and steepest descent options. The same options were used for ML bootstrap analyses (100 replicates).

RESULTS


Hace species a congeneris tepalis lateribus duobus, stamine in quoque flore solitario, ovario uniloculari atque polline plenunque in monads liberato distinguetur.

Caulis herbaceus, attached to rocks; roots (thallus) dorsiventrally flattened, ribbon-like, more rarely crustose, root cap lacking, root with exogenous daughter roots or lobes; vegetative stems and reproductive short shoots arising from endogenous buds inside root, arranged along root margin, or in cleft of lobed root; vegetative stems to 10 cm, simple, giving rise to leaves on one side (due to dorsiventral distichy). Foliage leaves with repeatedly forked segments, to 8.5 cm, distal segments linear, slightly flattened and when young provided with hairs on one side. Bracts below or between flowers of reproductive short shoots 1 or 2, entire or bifid, usually inconspicuous; spathellas (sae-like covers) around each floral bud are ovoid, with papillate surface; flowers along root margin, or sessile on upper root surface; flowers also along stems, arising from endogenous buds inside stem cortex; additional flowers on leaves (epiphyllous), arising from clefts of leaf forks; flower bud inside spathella completely inverted; flower in anthesis 1.5–1.5 mm; with pedicel ca. 2 mm, curved at apex, at last erect, elongating to 4 mm; tepals 2 and stamen 1; pollen released in monads, rarely dyads; ovary unilocular, lacking
Figure 1. *Stonesia ghoguei* (from the type *Ghogue* GHO 1665). Roots and root-born shoot buds. —A. Ribbon-like root twisted around stem base (see Fig. 6K). Arrow points to foliage leaf arising from endogenous site along root margin. Note adhesive hairs on flat lower root surface. Scale bar = 1 mm. —B. Distal portion of flattened root (R) becoming crustose due to the outgrowth of exogenous lateral lobes (R'). Arrows point to foliage leaves arising from endogenous sites along root margin. Scale bar = 1 mm. —C. Cross section of ribbon-like root with young endogenous shoot bud (arrowhead). Note inconspicuous layer of vascular tissue inside root and adhesive hairs along lower surface. Scale bar = 500 μm. —D. Cross section (left half) of another ribbon-like root. Arrowheads point to layer of vascular tissue. Scale bar = 250 μm. —E. Close-up of lower (ventral) root side with adhesive hairs. Scale bar = 100 μm. —F. Cross section of flattened crustose root. Arrow points to reproductive short shoot arising from root margin. Scale bar = 500 μm.
Figure 2. *Stonesia ghogueli* (from the type Ghogue CHO 1665). Leafy stems, compound leaves, and epiphyllous shoots.

- **A.** Growing tip of vegetative shoot (as drawn in Fig. 6C, E), with two nearly mature leaves (11, 12) removed except for their petiole bases. Outgrowing leaf 13 with forked blade. Note hairs covering lower side of distal blade segments. Outgrowing young leaf 14 is observable on backside between 12 and 13. Scale bar = 1 mm. 
- **B.** Close-up of young leaf 14 arising from pocket between 12 and 13. Arrowhead points to lateral stipule attached to leaf 13. Scale bar = 500 μm. 
- **C.** Distal portion of nearly mature compound blade. Few hairs along lower surface of distal leaf segments still present. Scale bar = 1 mm. 
- **D.** Cross section of distal leaf segment (flattened, with indistinct vascular bundle). Scale bar = 100 μm. 
- **E.** Proximal portion of compound blade, with two forks occupied by epiphyllous flower clusters. Scale bar = 1 mm. 
- **F.** Cross section of proximal blade fork, its cleft occupied by an epiphyllous short shoot with four flower buds, surrounded by a spathella each. Scale bar = 500 μm. 
- **G.** SEM graph of another proximal blade fork, with epiphyllous leaf arising from cleft. Scale bar = 1 mm.
Figure 3. *Stonesia rhognesia* (from the type *Ghogue GHO 1665*). Mature stems with endogenous initiation of floral buds. — A, B. Two views of distal portion of 4.5 cm long stem (as drawn in Fig. 6L, M). Stem cortex ruptured due to endogenous formation of reproductive short shoots (asterisks). Arrowheads point to additional endogenous floral buds in between. Scale bars: A = 1 mm; B = 500 μm. — C. Cross section of mature stem. L = stem sector exactly below insertion area of a foliage leaf, consisting of large parenchyma cells. Arrowheads point to sites in stem cortex with endogenous formation of floral buds. Note presence of scattered vascular tissue (asterisk) in stem center. Scale bar = 500 μm. — D. Cross section of another stem portion. Arrowheads point to floral buds with scale-like bracts rupturing the stem cortex. Asterisks indicate vascular tissue in stem center. Scale bar = 500 μm.
Figure 4. *Stonesia ghoguei* (from the type Ghogue GHO 1665). Reproductive structures, especially floral buds arising from stems and roots. —A. Cluster of floral buds on stem surface. Note presence of papillose spathellae (Fc), most of them ruptured in order to release anthers and gynoecia (G). Scale bar = 1 mm. —B. Strongly inclined floral bud (spathella removed), with young anther (A), ovary (G), and tepal (T). Scale bar = 200 μm. —C. Similar stage of strongly inclined floral bud inside spathella, with prominent papillae (Fc). Abbreviations as above. Scale bar = 100 μm. —D. Longitudinal section of young ovary, showing early stage of anatropous ovule, arising from central placenta. Note nucellar region (arrowhead) with megaspore cell projecting beyond the two primordial integuments. Scale bar = 100 μm. —E. Completely inverted floral bud on elongated pedicel (P) prior to anthesis (spathella removed). Ovary (G) with two linear stigma lobes. Note deep cleft between the two thecae (A). Scale bar = 400 μm. —F. Another completely inverted floral bud (spathella removed). The ovary (young capsule) partly dehisced. Note central placenta with few ovules (immature seeds) and without septum. Scale bar = 500 μm. —G. Cross section of ribbon-like root (R) with short shoot consisting of two flowers in spathellae (Fc). Arrowhead points to the “inflorescence axis,” surrounded by scale-like bracts. Scale bar = 500 μm.
septum, ellipsoidal, with 2 thread-like stigmas; capsule widely ellipsoid, valves 2, equal or nearly so, ribs best observable when capsules mature; capsule valve with 5 or 7 ribs, ribs nearest the sutures shorter; seeds 15 to 20 per capsule.

Habitat and distribution. *Stonesia ghoguei* has been found in a strong waterfall on gneissic rock, on a 75°–80° slope. Due to the small population size, the very limited area of occupancy with just one location, and yet the lack of data on change in population size,
Figure 6. Stonesia ghoguei (from the type Ghogue GHO 1665: A–G; I–M; from the paratype Ghogue GHO 1668: H). —A. Nearly mature capsule with peculiar rib pattern as typical for Stonesia, Endocauloa, and Paleodicraea. Scale bar = 0.5 mm. —B. Two vegetative shoots arising from ribbon-like root (R). Scale bar = 15 mm. —C. Distal portion of elongate vegetative shoot, lower leaves (1 to 6) dropped, upper leaves (7 to 13) with repeatedly forked blade. Scale bar = 15 mm. —D. Scheme illustrating dorsiventral dichotomy of vegetative shoot, leading to second leaf arrangement (1 to 4) along stem (X). Scale bar = 1 mm. —E. Relative position of shoot tip shown in Figure 6C. Leaves 8 to 11 removed except for their petioles (see also Fig. 2A, B). Scale bar = 5 mm. —F. Nearly mature leaf with blade repeatedly forked. Scale bar = 5 mm. —G. Close-up of distal blade portion with three bifurcations. Scale bar = 5 mm. —H. Older stem portion (X, 4 cm long), covered with many sessile flower buds; arrowheads point to spathellas that rupture to release flowers for anthesis. Scale bar = 5 mm. —I. Portion of broad root ribbon (R), seen from above, with sessile flower buds (F) along margins and on upper root surface. Scale bars = 3 mm and 1.5 mm, respectively. —K. Proximal portions of two root (R)-borne stems (X), with basal leaves (L) already dropped. Arrowheads point to outgrowth of young roots coiling around stem base (see close-up, Fig. 1A). Scale bar = 5 mm. —L, M. Two opposite views of 4.5 cm long stem portion with proximal leaves (1 to 4) dropped and distal leaves (5 to 7) still present. Arrowheads point to emerging flower buds along oblique stem lines (see also close-ups in Fig. 3A, B). Scale bar = 10 mm.
we suggest the IUCN conservation status of Vulnerable (VU D1+2) (IUCN, 2001).

Etymology. The epithet of the new species honors the Cameroonian botanist Jean-Paul Ghogue (National Herbarium Yaoundé), who discovered this species in 2005.

Roots. Root architecture of *Stonesia ghoguei* is shown in Figures 1A–F, 6I–K. The roots are usually broad ribbons (to 5 mm broad), more rarely crustose structures resembling foliose lichens. Ribbons can turn into crusts by adding exogenous daughter lobes (Fig. 1B). Transverse sections show dorsiventrally flattened ribbons with a more or less planar lower surface fixed to the rock by adhesive hairs (Fig. 1C, E). The upper side of the ribbon contains some silica bodies, mainly in its hypodermis. The vascular tissue is a two-dimensional network of fine strands consisting of procenchymatous cells, with phloem and xylem elements not distinguishable. Endogenous shoot buds and flowers originate from the root flanks (Fig. 1A, C, F), also from the sinus between two root lobes (Fig. 1B), and from the upper root surface (Fig. 6I, J). Additional roots grow out from the stem bases next to the mother root (Fig. 6K).

Vegetative shoots and leaves. Stem and leaf features of *Stonesia ghoguei* are shown in Figures 2A–G, 6B–F. The leaves appear to be restricted to one stem sector with internode lengths of 1 cm or less (Fig. 6C, E). This second leaf arrangement is a dorsiventral variant of distichous phyllotaxis (as illustrated in scheme Fig. 6D). Dorsiventral distichy results from repetitive leaf initiation from the backside of the so far youngest leaves (Fig. 2A, B). Leaves of older stem portions are coiled backward (Fig. 6C), whereas young leaves next to the shoot tip are straight (Fig. 2B). Young leaves have stipular lobes, which become inconspicuous later. Mature foliage leaves consist of wiry petioles, which carry lacinate blades resulting from repeated bifureations (Figs. 2C, 6F, G). Distal blade segments are slightly flattened, with chloroplasts restricted to the small-celled epidermis (Fig. 2D). Ultimate segments contain a weak vascular bundle each, whereas petioles and proximal segments are provided with a strong bundle each (Fig. 2F, G). No obvious phloem and xylem elements were detected in the leaves. The slightly concave side of young distal leaf segments are covered by hairs that soon wither and drop (Fig. 2A, C).

Position of flower buds. Flower buds (each covered with a sac-like spathella) arise along the root flanks and the upper root surface (Fig. 6I, J). These flowers are part of root-borne endogenous short shoots (Figs. 1C, F, 4G). Flower buds (solitary or in clusters) also arise along the stem without subtending leaves. Occasionally, there are hundreds of flowers covering a stem (Fig. 6H), or they are restricted to oblique stem lines, continuing the insertion zones of the leaves along the stem, with the stem sector just below leaf insertion not covered by flowers (Fig. 6L, M). The endogenous buds inside the stem cortex have the morphogenetic potential to create new floral buds ad infinitum or nearly so, intermingled with rudimentary scaly leaves (Fig. 3A–D). However, the rather large-celled tissue in the stem sector just below a leaf (L in Fig. 3C, D) lacks this morphogenetical potential. The vascular tissue of mature stem portions consists of narrow cells (again, no obvious phloem and xylem), being compact (Fig. 3C) or arranged in a bow surrounding a parenchymatous pith (Fig. 3D). Flower buds were also observed on the leaves, arising from the clefts of proximal blade forks (Fig. 2E). There may be one or few floral buds per fork (Fig. 2F). Epiphyllous buds occasionally start with a small leaf prior to the outgrowth of flowers (Fig. 2G).

*Spathellas as covers for flower buds.* The sac-like spathella covering a flower bud is four to five cells thick (Figs. 2F, 3D). It lacks any vascular tissue and carries papillae except for the basal zone (Fig. 4C, G). Young flower buds are inclined, with the pedicel axis and the ovary axis forming angles of 45°–90° (Fig. 4B, C). Fully developed flowers are pedicellate and completely inverted inside the spathella, with the stigma facing the base (Figs. 4E, 5C). At anthesis, the spathella ruptures with irregular distal teeth (Fig. 4A).

Flowers and their parts. Flowering and fruiting in the natural habitat (Tello Waterfalls) reached a peak in February and March 2005, when the type and paratype (GHO 1665 and GHO 1668) were collected by J. P. Ghogue. The pedicel (floral stalk) continues to elongate as the spathella ruptures, pushing the young flower out of the broken spathella. The inverted stalked ovary and the single stamen assume an inclined to upright position (Figs. 4A, 6A). Each flower has two subulate (linear) tepals (Fig. 4B, F). The androecium consists of a single stamen with a prominent distal incision between the two thecae (Fig. 4E). Pollen sac dehiscence is introrse (Fig. 5C). The ovary is ellipsoidal, 1–1.5 mm long. There are two linear stigma lobes (Fig. 4E). The ovary is unilocular with free central placentaion of 15 to 20 ovules, most of them becoming seeds (Figs. 4F, 5C, D). The mature ovules are anatropous, bithecate, and tenuinucellate, with the nucellus exceeding the inner integument. This nucellar protruberance (containing the megaspore cell) is already observable in young ovules (Fig. 4D) when both integuments are still much shorter. Pollen grains during anthesis are mainly
monads (Fig. 5B) besides few dyads, whereas immature anthers contain mainly dyads (Fig. 5A). Thus, it looks as if the dyads in this species fall apart quite easily. The pollinar wall is slightly echinate and has three inconspicuous colpi (Fig. 5B).

Capsules. After anthesis, the flower stalks (pedicels) elongate up to 4 mm; a gynophore is lacking (Figs. 5F, 6H). The pedicels initially consist of a sclerenchymatous central cylinder and a parenchymatous cortex (Fig. 5C). The capsule walls and the capsule stalks (pedicels) lose their parenchymatous cortex during the maturation process, as is typical for Podostemaceae. Thus, the rib pattern as already observable in anthetic ovaries becomes more prominent afterward. There are five to seven ribs per capsule valve plus the sutures, as is typical for Stonesia in general (Fig. 5C–F). The ribs nearest to the sutures do not run the whole capsule length, but begin on the suture above the base and, curving parallel to the other ribs, rejoin it below the apex (Fig. 6A). One (rarely both) of the equal valves is shed after capsule dehiscence. The capsules may split along one suture first, and later along the second one (Figs. 4A, F, 5F).

Molecular data. The aligned sequence length was 1542 bp. The selected optimal model of sequence evolution was the TVM + G model: unequal base frequencies (A = 0.3320, C = 0.1467, G = 0.1263) and six substitution types (A/C: 1.3211, A/G: 1.4110, A/T: 0.2497, C/G: 0.9004, C/T: 1.4110), gamma distribution of rates among sites with alpha shape parameter 0.4785. The analysis using these parameters yielded one optimal ML tree with a log-likelihood score of −InL = 4932.70 (Fig. 7). The African podostemoid species included in the current analysis were monophyletic, with the two Madagascan genera Endocalosus and Thelthenylax as sister. Ledermanniiella subg. Phyllosoma C. Cusset (including L. ledermannii, L. cf. bovi) was paraphyletic to all other Podostemoideae studied from the African continent, including Dicraeanthus Engler, Djingga C. Cusset, Stonesia, and four species belonging to Ledermanniiella subg. Ledermanniiella. The results shown in Figure 7 are identical to those presented by Moline et al. (2007) with respect to the set of non-African podostemoids.

Paratype. CAMEROON. Adamawa: Ngaoundere, Tello Waterfalls, 10 Mar. 2005, J.-P. Ghoghe GHO 1668 (K, YA, Z). Figure 6H.

Discussion

Molecular data

Recently published molecular data indicate that there are two large groups among African Podostemoideae (Kita et al., 2005; Moline et al., 2007). One is a grade composed of Ledermanniiella subg. Phyllosoma, the other one is a clade composed of Ledermanniiella subg. Ledermanniiella and various small genera nested within, e.g., Dicraeanthus (two species, Cameroon) and Djingga (monotypic, Cameroon). In the present study, we show that GHO 1665, which we regard as a new Cameroon member of the genus Stonesia, is also nested in this large clade (Fig. 7), confirming the artificialness of the genus Ledermanniiella, especially its subgenus Ledermanniiella. The genus Stonesia is characterized by an increased number of capsule ribs and the ribs close to the sutures not reaching the base and tip of the capsule. This pattern is similar to Endocalosus and Paleodendrea C. Cusset (both from Madagascar), but unlike all other Podostemoideae from Continental Africa. With the molecular data shown in Figure 7, the phylogenetic distance between Stonesia and Endocalosus becomes obvious, and we can confirm the peculiar pattern of capsule ribs they have in common as homoplasies. However, we should consider that the inclusion of additional genes and additional taxa may change the topology of the African podostemoids already studied. As shown above, there are no conclusive molecular data available at the moment, except for the view to merge genera such as Dicraeanthus, Djingga, and Stonesia into the large African genus Ledermanniiella, which appears paraphyletic without them (Fig. 7). Alternatively, splitting the heterogenous Ledermanniiella into monophyletic, morphologically uniform groups could be implemented when sufficient molecular data become available.

How to define genera in African podostemoideae?

As shown in Cook and Rutishauser (2007), a set of few easily recognizable features was enough to describe a new podostemaceous genus in earlier days, until the advent of molecular systematics. Podostemoid genera, which are not difficult to define morphologically, include in Africa Dicraeanthus, Djingga, and Stonesia. Djingga (one sp.) is recognizable because of globular smooth capsules (lacking ribs or nearly so), also by oblique flower buds inside the spathella (i.e., not being completely inverted as in typical Ledermanniiella). Dicraeanthus and Stonesia (both with completely inverted flower buds) are recognizable by other characters not observable in Ledermanniiella: Dicraeanthus showing elongate ovaries (capules) with short conical stigma lobes; Stonesia showing an increased number of capsule ribs with the ribs close to the sutures not reaching the base and tip of the capsule. Thus, we prefer as a preliminary hypothesis to acknowledge the value of
Figure 7. Maximum likelihood tree (–lnL = 4932.70) of phylogenetic analysis of Podostemaceae—Podostemoideae from Continental Africa (species of Dicraeanthus, Djinga, Ledermanniella, Stonesia), Madagascar (Endocaulus, Thelethlyax), Asia (Cladopus H. Möller, Polyleurum, Hydrobryum Endlicher, Zeylanidium), and America (Podostemum), based on matK sequence data (aligned sequence length 1542 bp). A modified data set by Moline et al. (2007) (tree base M2581) was used, and Stonesia ghoguei (GenBank Acc. No. AM937251) was added. A maximum likelihood (ML, Felsenstein, 1981) analysis was performed using PAUP 4.0. The analysis using these parameters yielded one optimal ML tree with a log-likelihood score of –lnL = 4932.70. Bootstrap support is indicated above branches. For further explanation, see text.
crisp sets of morphological characters, which allow identification of podostemoid genera in the field, over monophyly (cf. Nordal & Stedje, 2005). By keeping genera such as Dicraeanthus, Djinga, and Stonesia, these sets of characters have a label, which makes communication about African Podostemoideae easier. Moreover, we think it is best to describe S. ghoguei (GHO 1665 and GHO 1668) as a new Cameroonian species of the genus Stonesia. Further molecular studies, including the Stonesia members from Guinea and Sierra Leone, are needed to verify or falsify this mainly morphological approach to taxonomy. Unfortunately, the three western Stonesia species seem to be endangered too and are not readily available for comparative and molecular studies.

**STONESIA GHOGUEI AS A SOMEWHAT ABERRANT MEMBER OF THE GENUS STONESIA**

The genus Stonesia has capsule valves with five or seven ribs, the ribs nearest to the sutures are shorter than others and do not reach the ends of the valves. Unlike the western Stonesia species (from Guinea and Sierra Leone), S. ghoguei has pollen released mainly in monads (not dyads), one stamen per flower with two lateral tepals (not two stamens with three tepals), and moreover, S. ghoguei has unilocular ovaries, not bilocular ones as described for the western Stonesia species. Comments for these three seemingly deviating characters will be given below:

**Monads versus dyads.** Most podostemoids show tricolpate pollen (Cook & Rutishauser, 2007). The pollen grains in the presumably basal New World genera such as Apinagia Tulasne, Marathonum Bonpland, and Mouera Aublet are shed in monads. In more derived podostemoids, including all Asian, all Madagascan, and many African taxa, they are shed in dyads (Cook & Rutishauser, 2007). According to Jäger-Zürn et al. (2005), occurrence of monads in Podostemaceae appears to be correlated with simultaneous microsporogenesis, whereas dyads are mainly found in podostemoid taxa with successive microsporogenesis, e.g., Polyleurum (Tulasne) Warming and Zeylanidium Engler from southern Asia. The large African genus Ledermanniella shows both monads and dyads, depending on the species (Cusset, 1983, 1984, 1987). In Djinga (monotypic, Cameroon) and Stonesia (S. ghoguei), the dyads seem to decay easily into monads. Ghogue et al. (in prep.) found ca. 80% dyads and ca. 20% monads in nearly mature anthers of *D. felicis*. In *S. ghoguei*, most pollen grains leave the dehiscing anthers as monads. However, many dyads are still observable in the premature anthers (Fig. 5A, B). In the three western Stonesia species, the released pollen are also described as dyads (Taylor, 1953; Cusset, 1973). Thus, it is best to accept the two character states “monads” versus “dyads” as less contrasting and exclusive as usually thought for the distinction of podostemoid genera (Cook & Rutishauser, 2007).

**One stamen versus two stamens per flower.** Unlike Stonesia ghoguei, the flowers of the three western Stonesia species show two fused stamens on a common foot (called “andropodium”) plus three subulate tepals, one tepal on each side of the andropodium, and the third tepal in the fork between the filaments. This character state also occurs in the Madagascan genus Thelethylax and the American genus Podostemum Michaux (Philbrick & Novelo, 2004; Moline et al., 2006). In both genera (Podostemum, Thelethylax), there are known species or populations lacking the third median tepal (Grob et al., 2007). The switch from two stamens with andropodium to flowers with a single stamen may appear as crucial for species delimitation. However, both patterns can be found even within the same species. For example, flowers with two stamens (on a common andropodium) besides flowers with a single stamen are known in Lesteviella tisseranti G. Taylor (western tropical Africa) and Oserya couleriana Tulasne (Mexico), as already described by Warming (1899), Taylor (1953), Cusset (1980), and Novelo and Philbrick (1997).

**Unilocular versus bilocular ovaries.** The bicarpellate ovary of Podostemoideae can be either bilocular, with a prominent central placenta and a thin septum, or it can be unilocular lacking a septum, as found in Stonesia ghoguei. Bilocular ovaries represent the plesiomorphic condition in podostemoids, occurring in most non-African members, but in only a few African and Madagascan taxa such as Endocaulos, Sphaerothyllax Bischoff ex C. Krauss, Thelethylax, and Saxicolella Engler p.p. (Jäger-Zürn, 2000; Ameka et al., 2002; Cook & Rutishauser, 2007; Moline et al., 2007). Cusset (1973) described the three western Stonesia species as having bilocular ovaries. Taylor (1953) did not yet consider this character. We checked additional herbarium material of *S. fascicularis* G. Taylor and *S. heterospathella* G. Taylor in ZIZT, confirming the presence of a septum. Thus, both unilocular and bilocular ovaries are found as character states in Stonesia. Here we have to keep in mind that unilocular ovaries also have a rudimentary septum in the basal ovary region, as observable in Djinga felicis (Ghogue et al., in prep.) and Ledermanniella bowingii (Ameka et al., 2003).
Various characters of Stonesia (including S. ghoguei) are found in some or a few other African podostemooids. Comments are given below regarding six characters:

**Flower buds are inverted in spathella.** The inverted flower in the unruptured spathella is a synapomorphy of various African and Madagascan members (including Stonesia), whereas an upright (erect) flower in the unruptured spathella is plesiomorphic (Moline et al., 2007). African podostemooids such as Stonesia have completely inverted flowers inside fully developed spatellas, even though they start with inclined ovaries in early developmental stages. They become inverted by pedicel elongation inside the growing spathella (Fig. 4B, C). The Madagascan podostemooids with an increased number of capsule ribs (similar to Stonesia) are Endocalos and Paleodieraea. The two latter genera, however, show erect or only slightly inclined flower buds inside the spathella (Cook & Rutishauser, 2007; Grob et al., 2007).

Crustose roots or broad ribs have exogenous daughter roots covering the rocky substrate. The three Stonesia species from Guinea and Sierra Leone (i.e., the western Stonesia species) are described as having crustose roots, whereas, for example, the roots of other African genera and the Madagascan Paleodieraea and Thelelythax are narrow to broad ribs, with the root cap absent or present (Ameke et al., 2002; Rutishauser & Moline, 2005; Koi et al., 2006; Moline et al., 2007; Rutishauser et al., 2008). Stonesia ghoguei behaves somewhat intermediate by producing ribs that can turn into crusts by adding broad lateral lobes (daughter roots) that arise exogenously from the mother root (Fig. 1A–F). Stonesia ghoguei roots lack a cap, similar to the western Stonesia species.

**Stems are usually simple, up to 10 cm long in Stonesia ghoguei.** Prominent and rather thick stems (monopodial, rarely branched) are also found in the western Stonesia species. In S. fascicularis the stems can be up to 40 cm long, whereas S. heterospathella and S. taylorii C. Cusset have stem lengths around 10 cm, i.e., similar to S. ghoguei (Taylor, 1953; Cusset, 1973). Simple or rarely branched stems of 10–30 cm lengths are also known from Dicraeanthus africanus and Ledermanniella lewezyi (Moline et al., 2007). We could not observe double-sheathed leaves in S. ghoguei. These are leaves with two sheaths that are inserted laterally and opposite each other. Double-sheathed leaves occur in many podostemooids with elongate stems that are branched (Moline et al., 2006, 2007).

Cauliflory is due to endogenous origin of flower buds inside the stem cortex. Stonesia ghoguei has plenty of sessile flower buds covering the stem surface and not being subtended by leaves. These flowers arise from endogenous buds inside the stem cortex, they protrude the stem periphery, rupturing the outer cortex layers and the epidermis (Fig. 3C, D). Similarly, Dicraeanthus africanus, Ledermanniella lewezyi, and Macropodiella heteromorpha (Baillon) C. Cusset are able to produce hundreds of flowers from endogenous buds formed inside the stem cortex (Rutishauser & Moline, 2005; Cook & Rutishauser, 2007; Moline et al., 2007; Rutishauser et al., 2007; Pfeifer et al., unpublished data). The drawings of M. Stones (published in Taylor, 1953) show a similar floral arrangement (i.e., cauliflory) in the western Stonesia species, especially in S. fascicularis. Because Stones and Taylor did not present microtome sections, we only can assume that cauliflory in S. fascicularis is also due to endogenous bud inception inside the stem cortex. Stonesia taylorii (described as additional Guinean species by Cusset, 1973) carries either rudimentary or well-developed flowers along two stem sectors.

Leaves are repeatedly forked into narrow segments, with epiphyllous flowers arising from the clefts of the forks. Stonesia ghoguei is peculiar by carrying additional flowers on the leaves. There are up to 15 epiphyllous flowers arising from each of the proximal clefts of the repeatedly forked blade (Fig. 2E–G). Epiphyllous flowers are also known from two Cameroononian Ledermanniella species: L. lewezyi and L. prasina J. J. Schenk & D. W. Thomas (Schenk & Thomas, 2004; Rutishauser & Moline, 2005; Moline et al., 2007). The drawings by M. Stones (published in Taylor, 1953) show similar patterns in the western Stonesia species, especially in S. heterospathella.

There are few scale-like leaves (bracts) below each spathella. The three western Stonesia species are distinguishable from each other by the shape of the bracts of the reproductive short shoots. Stonesia taylorii (as described by Cusset, 1973) is characterized by two to six trifid or quadrifid bracts per one-flowered short shoot, whereas in the two other western Stonesia species the few bracts below each spathella are entire or inconspicuous. Similarly, the bracts accompanying the few-flowered short shoots in S. ghoguei are usually entire and only rarely lobed (Figs. 3C, D, 4G). Two types of spatellas, as described by Taylor (1953) in S. heterospathella, were not observed in S. ghoguei.
CONCLUSIONS

The developmental and morphological studies of the Cameroonian specimens collected by J. P. Ghogue (GHO 1665 & GHO 1668) indicate that it is best to describe them as a new species, belonging to Stonesia, mainly due to the presence of the very peculiar pattern of capsule ribs. The similar rib pattern in Madagascan genera (Endocaulos, Paleodicraea) evolved independently in a clade also comprising Thelechylax (Grob et al., 2007; Thiv et al., in prep.).

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Literature Cited


Name Changes in the *Mentzelia multicaulis* Complex (Loasaceae)

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**Abstract.** Results from molecular phylogenetic analyses indicate that three varieties of *Mentzelia multicaulis* (Osterhout) J. Darlington (Loasaceae) are more closely related to other species of *Mentzelia* sect. *Bartonia* Torrey & A. Gray than to *M. multicaulis* var. *multicaulis*. We elevate three varieties of *M. multicaulis*, originally described from Utah, to specific rank, recognizing them as *M. librina* (K. H. Thorne & F. J. Smith) J. J. Schenk & L. Hufford, *M. flumensevera* (N. H. Holmgren & P. K. Holmgren) J. J. Schenk & L. Hufford, and *M. uintahensis* (N. H. Holmgren & P. K. Holmgren) J. J. Schenk & L. Hufford. Both stamen and leaf shape characters support evolutionary relationships of these species with their closest relatives among the mentzelias found in the Intermountain West of the United States.

**Key words:** Intermountain West, Loasaceae, *Mentzelia*, United States, Utah.

*Mentzelia* L. (Loasaceae) has its greatest taxonomic and morphological diversity in western North America. Much of this diversity is centered in *Mentzelia* sect. *Bartonia* Torrey & A. Gray, which has presented considerable taxonomic problems (Holmgren & Holmgren, 2002). Recent studies of mentzelias in the Intermountain West have expanded our knowledge of morphological diversity and increased substantially the number of recognized taxa in *Mentzelia* sect. *Bartonia* to approximately 50 species (Thompson & Prigge, 1984, 1986, 2004; Prigge, 1986; Thorne, 1986; Thorne & Smith, 1986; Christy, 1997, 1998; Holmgren & Holmgren, 2002; Reveal, 2002; Welsh et al., 2003; Holmgren et al., 2005).

Some of the recently discovered diversity in *Mentzelia* sect. *Bartonia* has been circumscribed as varieties of *M. multicaulis* (Osterhout) J. Darlington (Thorne & Smith, 1986; Holmgren & Holmgren, 2002). Osterhout (1903) first used the specific epithet *multicaulis* in *Toueterea* Eaton & Wright to denote collections from Eagle County, Colorado, on the western slope of the Rocky Mountains. *Toueterea* was later combined with *Mentzelia* by Darlington (1934). The concept of *M. multicaulis* was expanded by Thorne and Smith’s (1986) description of *M. multicaulis* var. *librina* K. H. Thorne & F. J. Smith. This endemic of the Book Cliffs of eastern Utah was distinguished from *M. multicaulis* var. *multicaulis* as a more robust plant with trilobed rather than pinnatifid to linear leaves and shorter seeds (Thorne & Smith, 1986). Holmgren and Holmgren (2002) further expanded the concept of *M. multicaulis* with the description of the varieties *uintahensis* N. H. Holmgren & P. K. Holmgren and *flumensevera* N. H. Holmgren & P. K. Holmgren. Holmgren and Holmgren (2002) recognized the four varieties of *M. multicaulis* as sharing a subshrubby habit comprised of shoots with many zigzagged branches arising from a subterranean, woody caudex and possessing short (1.5–3[–5] cm) cauline leaves that are deeply pinnatifid with three to seven (to 11) segments or entire, flowers that have five, broadly spatulate or suborbicular, shortly clawed petals that are 9–20 × 2–9(–11) mm and five petaloid stamens that are 7–12(–15) × 1.2–7(–9) mm, and seeds with coats that have straight anticinal walls and three to 10 papillae per cell among other traits.

Holmgren and Holmgren (2002) also called attention to several other *Mentzelia* species of the American Intermountain West, including *M. argillicola* N. H. Holmgren & P. K. Holmgren, *M. argillosa* J. Darlington, *M. rhizomatosa* Reveal, and *M. shultziorum* Prigge, that shared many morphological attributes with, and were geographically close to, one or more of the *M. multicaulis* varieties. These Intermountain species, like *M. multicaulis*, were also found on steep slopes of talus or otherwise loose substrate. Our molecular phylogenetic studies, which have broadly sampled species of *Mentzelia* sect. *Bartonia* for variation in sequences of the ITS-1 and ITS-2 and the ETS region of nuclear ribosomal DNA, recovered a paraphyletic *M. multicaulis* sensu Holmgren and Holmgren (2002). Our results showed the varieties of *M. multicaulis* to be more closely related to other Intermountain West species than to each other (Schenk & Hufford, in prep.). For example, *M. multicaulis* var. *multicaulis* was recovered as sister to *M. rhizomatosa*, *M. multicaulis* var. *librina* was sister to *M. shultziorum*, *M. multicaulis* var. *uintahensis* was sister to the *M. multicaulis* var. *librina* and *M. shultziorum* clade, and *M. multicaulis* var. *flumensevera* was sister to *M. argillicola*. Based on the robust phylogenetic signal, including substantial patristic
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distance among the varieties of M. multicaulis, and the morphological distinctiveness of the species most closely related to the different varieties of M. multicaulis, we elevate the varieties flumensevera, librina, and wintahensis of M. multicaulis to specific rank.


Distribution and habitat. Mentzelia multicaulis occurs on the western slope of the Rocky Mountains, in Eagle, Summit, and Grand counties, Colorado. It occurs on sparsely vegetated slopes at 1800–2600 m elevation.

Relationships. Mentzelia multicaulis is most closely related to M. rhizomata, which is also distributed on the western slope of the Colorado Rocky Mountains. The variety multicaulis was distinguished from the other varieties by, among other traits, its much broader petals (5–9 mm; measurements from Holmgren & Holmgren, 2002) and the width of its median antesepalus stamens (the single outermost stamen directly opposite each sepal, sensu Hufford [1990, 2003]: 2–3.5–4.5 mm). Mentzelia rhizomata is similar in possessing broad petals (6.1–9.6–11.2 mm) and slightly wider median antesepalus stamens (4.2–6.2 mm). The basal leaves of M. multicaulis are lobed, whereas the more distal leaves are less prominently lobed to entire (Fig. 1A). The basal leaves of M. rhizomata are less prominently lobed, having undulate to toothed margins, and, like M. multicaulis, have more distal leaves that are usually entire (Fig. 1B).

Additional specimens examined. U.S.A. Colorado: Eagle Co., on hills 0.3 mi. N of Walcott [Wolcott], H. J. Thompson 3205 (UTC); Colorado River Canyon, State Bridge, N of bridge, N. H. Holmgren & P. K. Holmgren 14486 (NY, UTC); along State Rte. 9, 0.8 km N of Summit Co. line, 17.4 km S of downtown Kremmling, N. H. Holmgren & P. K. Holmgren 15062 (NY, UTC); State Rte. 131, 12.7 km N of Wolcott, N. H. Holmgren & P. K. Holmgren 14485 (NY, UNL, UTC, WS); N of Wolcott along State Rte. 131, 0.5 km N of Eagle River bridge, N. H. Holmgren & P. K. Holmgren 14484 (NY, RENO, UTC); along Colorado Hwy. 131, 0.4 mi. N of U.S. Hwy. 6 at Wolcott, J. L. Reveel 27246 (NY); Wolcott, Bessey 5290 (NY); E rim of Dotsero Crater, 1 mi. NE of Dotsero, W. Baker & T. Naumann 32–370 (NY); Rte. 131, just N of Wolcott on E side of rd., J. Schenk 1867 (WS); Rte. 1, just N of jct. with Colorado River, J. Schenk 1884 (WS); Grand Co., S of Kremmling, 1.8 mi. SW on Co. Rd. 1 from Rte. 9, K. W. Eberle 495 (UTC); Red Mtn., 1.5 mi. E of Kremmling, B. E. Neely 5166 (UTC); W side of Muddy Creek, 2 mi. NW of Kremmling, E. Neese & O. Graf 17166 (NY); Sulphur Springs, G. E. Osterhout 3562 (NY); Rte. 191, just N of intersection w/Rte. 1, J. Schenk 1894 (WS); Summit Co., SE end of Green Mtn. Reservoir, along State Rte. 9, 10.8 km S of Grand Co. line, N. H. Holmgren & P. K. Holmgren 15061 (NY, UTC).


Distribution and habitat. Mentzelia flumensevera is narrowly distributed along the Sevier River Canyon in the Tushar Mountains of Piute County, Utah. Mentzelia flumensevera occurs between 1800 and 1900 m elevation on steep south- or southwest-facing talus slopes comprised of gypsum-rich soils.

Relationships. Mentzelia flumensevera is most closely related to M. argillicola, which is located in Lincoln County, Nevada. Populations of M. argillicola, which is sister to the M. flumensevera and M. argillicola clade (Schenk & Hufford, in prep.), are found as close as 30 km to the northeast of M. flumensevera in Sevier and Sanpete counties, Utah. Like M. flumensevera, both M. argillicola and M. argillicola occur on gypsum-rich substrates. Median antesepalus stamens that have petaloid forms in which the filaments are narrowly spatulate to oblancoellate with attenuate bases have been used to distinguish the Mentzelia multicaulis varieties flumensevera and multicaulis from librina and flumensevera (Holmgren & Holmgren, 2002; Holmgren et al., 2005). These stamen characters are also found in M. argillicola and M. argillicola, most likely due to their common evolutionary history. The leaf margins of M. argillicola (Fig. 1C) are mostly entire and similar leaf forms are found on the shoots of M. argillicola (Fig. 1D), although some of the more distal leaves of the latter are shallowly lobed. Mentzelia flumensevera differs from its closest relatives in having leaves that are distinctly lobed over the length of the shoot system (Fig. 1E). Leaves of all three of these species appear grayish green due to their copious trichomes.

Additional specimens examined. U.S.A. Utah: Piute Co., Tushar Mtns., Big Rock Candy Mtn., A. Taye 4247 (RM); Marysvale Canyon, ca. 2.7 mi. NNW of Marysville, A. Taye 3424 (NY, RM); Sevier Canyon, along U.S. Hwy. 89, 7 km N of downtown Marysville, W of hwy., N. H. Holmgren & P. K.

*Holmgren 14460* (NY, RENO, UTC, WS); along Hwy. 89, 3.4 mi. N of jct. of Bellion Ave. & Hwy. 89 in Marysvale, L. Hufford 4147 (WS); Hwy. 89, 3.4 mi. N of Marysvale in small ravine on W side of rd., J. Schenk 1744 (WS).

Distribution and habitat. Mentzelia librina is a narrowly distributed endemic of the Book Cliffs in Emery and Carbon counties, Utah, at 1700–2000 m elevation.

Relationships. Mentzelia librina is most closely related to M. shultziorum, which is found south of the Book Cliffs near the Colorado River on steep slopes that rise to the La Sal Mountains in Grand County, Utah. The monophyly of the two species is strongly supported by DNA sequence data (Schenk & Hufford, in prep.). The median antesepalus stamens of M. librina are obovate and taper abruptly to a basilar claw; these are similar to those of M. shultziorum, although the latter have a broader claw. The leaves of M. librina differ from the other varieties of M. multicaulis by having a broader rachis with long dentate lobes (Fig. 1F). The leaves of M. shultziorum are much broader than M. librina, with ovate to obovate laminas and dentate margins (Fig. 1G).

Additional specimens examined. U.S.A. Utah: Emery Co., at base of Book Cliffs just N of mouth of Horse Canyon, 0.8 km NW of where State Rte. 124 terminates, along abandoned railroad tracks, 10 km air distance S of Dragerton, N. H. Holmgren & P. K. Holmgren 14462 (NY, RENO, UNLV, UTC, WS); just S of Columbia & below railroad grade, J. Anderson 85-124 (UTC); CC Summerville, 13 mi. NW from Green River, Buckwheat Plateau, S. Welsh & K. Taylor 13218 (NY). Carbon Co., E of unimproved rd. located NE of mile marker 2 on Rte. 124, SE of East Carbon City, below abandoned railroad, J. Schenk 1865 (WS).


Distribution and habitat. Mentzelia uintahensis is among the most widely distributed of the aforementioned species, occurring on the Colorado Plateau from Carbon, Duchesne, and Uintah counties, Utah, east to Rio Blanco, Grand, Mesa, and Moffat counties, Colorado. Individuals occur mostly on rocky cliffs or road-cuts of white shale or loose talus at 1575–2750 m elevation. Its location and habitats are generally continuous with those of M. librina, and M. uintahensis is sister to the clade consisting of M. librina and M. shultziorum.

Relationships. The median antesepalus stamens of Mentzelia uintahensis are flabellate and have bases that narrow abruptly to a claw, which also characterizes the median antesepalus stamens of M. librina and M. shultziorum, although in the latter the claws are not as prominently narrowed. The basal leaves of M. uintahensis (Fig. 1H) are larger than those of the other species discussed here and have pinnate lobes that are much longer than those of M. flumensetora or M. shultziorum.

Additional specimens examined. U.S.A. Colorado: Rio Blanco Co., Piceance Creek Rd., at mouth of Cascade Gulch, 16.9 km NW of Rio Blanco, N. H. Holmgren & P. K. Holmgren 14492 (NY, UTC); Piceance Creek Rd., 5.5 km S of State Rte. 64, N. H. Holmgren & P. K. Holmgren 14475 (NY, UTC); Piceance Creek Rd., 15.1 km S of State Rte. 64, N. H. Holmgren & P. K. Holmgren 14476 (NY, UTC, WS); Piceance Creek Rd., across rd. from Piceance Creek Ranch, 18.3 km NW of Rio Blanco, N. H. Holmgren & P. K. Holmgren 14490 (NY, UTC, WS); Piceance Creek Rd., ca. 9 mi. below Rio Blanco, W. A. Weber 17009 (UTC); 11 mi. W of Rio Blanco on Piceance Creek, T. Beegle 766 (UTC); Piceance Creek near mouth of Cascade Gulch, Hwy. 26, S. Goodrich 23158 (NY, UTC); on a road-cut along Co. Rd. 122 just W of jct. w/Co. Rd. 24, P. Lyon 9176 (NY); Story Gulch, 0.3 mi. SE of Piceance Creek Ranch, J. Walker & S. Sigstedt 42-334 (NY); alt. 955 m, Piceance Creek Rd., 9.5 mi. NW of jct. w/Hwy. 13 at Rio Blanco, L. Hufford 4137 (WS); W of Rio Blanco, Piceance Creek Rd., 6 mi. W from its intersection w/ Rte. 13, J. Schenk 961 (WS). Moffat Co., 1/2 mi. up the Yampa River from confluence of Green & Yampa Rivers in Echo Park, N. H. Holmgren et al. 549 (NY, UTC), Mesa Co., Grand Junction, May 1892, A. Eastwood (NY), M. E. Jones 5472 (NY). Utah: Carbon Co., 1.6 mi. NE of Mt. Barrels Summit, S of Nine Mile Canyon, E. Neese & L. England 6181a (BRY); Uintah Co., 14 mi. due S of Ouray, S. Welsh et al. 14395 (M, UTC); Split Mountain Gorge Campground, Dinosaur Natl. Monument, K. S. Dever & R. A. Wolf 5280 (UTC); Ouray-Rainbow Rd., 37 mi. SE of Ouray at jct. of rd. along ridge betw. Sweetwater Creek & Main Canyon, N. H. Holmgren et al. 2270 (ID, NY, UTC); Klondike Canyon, J. S. Peterson 1470 (NY, UTC); above Green River, E from Sand Wash Ferry, 6 mi. W of Wrinkles Rd., L. M. Shultz & J. S. Shultz 3798 (UTC); South Canyon Quadrangle, 30 July 1975, J. Baker (UTC); Uinta Basin, rd. from Bonanza to Watson, 1 km E of Evacuation Creek bridge, N. H. Holmgren & P. K. Holmgren 14608 (NY, UTC); Uinta Basin, Watson-Rainbow Rd., 0.5 km S of State Rte. 45 & 0.6 km N of Evacuation Creek bridge, 62.5 km air distance SE of downtown Vernal, N. H. Holmgren & P. K. Holmgren 14466 (NY, UTC, WS); Uinta Basin, 6.5 km air distance SSE of Bonanza, overlooking confluence of Evacuation Creek & White River, N. H. Holmgren & P. K. Holmgren 14492 (ID, NY, RENO, UNLV, UTC, WS); Dugway in upper Three Mile Canyon, W of Evacuation Creek, Book Cliffs, N. D. Atwood 39480 (RENO); Hell's Hole Canyon, SE of Bonanza, N. D. Atwood 20471 (RENO); E Tavaputs Plateau, Big Pack, Little Pack Mtn., 24 mi. & 185 degrees from Ouray, S. Goodrich & D. Atwood 14686 (NY); ca. 4 mi. W of Maeser, along Utah Hwy. 245, S. L. Welsh & C. Moore 6750 (NY); Hell's Hole Canyon, 1.5 mi. W of Colorado-Utah border, K. Thorne & B. Neely 1935 (NY); E base of Blue Mtn., head of Cub Creek, E. Neese & C. Fullmer
11750 (NY); Uinta Basin, rd. into Hell's Hole Canyon, 1.4 km down rd. from Bonanza-Watson rd., 9.5 km air distance SE of Bonanza, N. H. Holmgren & P. K. Holmgren 14495 (NY); clay hills by Thorne Ranch, Willow Creek, N. D. Atwood 1564 (NY); on white shale banks along Evacuation Creek 2 mi. S of White River, H. D. Ripley & R. C. Barney 8735 (NY); 15 mi. S of Bonanza & 1.3 mi. W of Colorado border, E. Neese et al. 11659 (NY); Weaver Ridge E of White River, N. D. Atwood 30475a (NY, UNM); Hell's Hole Canyon, SE of Bonanza, N. D. Atwood 30471 (NY); 37 mi. S of Ouray, R. C. Barney 13155 (NY); W of Vernal, Rte. 121, 7.9 mi. W of intersection w/Hwy. 191, J. Schenk 1526 (WS); Duchesne Co., 3.5 mi. N of Nine Mile Canyon jct. w/Myton Rd., thence ca. 20 mi. E on dirt rd., N. D. Atwood 26655 (NY); W Tavaputs Plateau, Wrinkle Rd., 11.7 km E of Myton-Wellington rd., 40 km air distance SSW of Myton, N. H. Holmgren & P. K. Holmgren 13233 (NY).

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Literature Cited


Two New Species of *Bulbophyllum* (Orchidaceae) from Brazil

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**ABSTRACT.** Two new species of *Bulbophyllum* Thouars (Orchidaceae) from Brazil belonging to section *Xiphizusa* (Reichenbach f.) Cogniaux are described and illustrated. Both species are epiphytic, but grow in different vegetational types. *Bulbophyllum gehrtii* E. C. Smidt & Borba is native to cerrado vegetation in São Paulo and Minas Gerais states and is related to *B. plumosum* (Barbosa Rodrigues) Cogniaux, while *B. teimosense* E. C. Smidt & Borba grows in the Atlantic rainforest in southeastern Bahia State and is related to *B. chlororhizum* Reichenbach f. According to IUCN Red List criteria, *B. gehrtii* is categorized as Endangered and *B. teimosense* as Critically Endangered.

**Key words:** Atlantic rainforest, Brazil, *Bulbophyllum*, IUCN Red List, Orchidaceae.

The pantropical *Bulbophyllum* Thouars is the largest orchid genus, including over 1000 species (Vermeulen, 1991; Dressler, 1993). The large majority of species occurs in the Old World, mainly in southeastern Asia, and nearly 70 species are present in the Neotropics. In the most recent checklist for Brazilian orchids, Pabst and Dungs (1975) cited 54 species for Brazil. However, with the addition of recently described species and new occurrences for this country (e.g., Borba et al., 1998; Fraga, 1999, 2004; Toscano de Brito, 2000; Borba & Smidt, 2004; Fraga & Smidt, 2004; Ribeiro et al., 2005), this number has increased to about 65.

The Neotropical *Bulbophyllum* sect. *Xiphizusa* (Reichenbach f.) Cogniaux comprises about 25 species and is characterized mainly by the small discoid, compressed, aggregated, monophyllous pseudobulbs; the long scape with the flowers arranged distichously on a thin rachis; the presence of a conspicuous jugae (extension of the ovary tissue) at the petal base; long fused lateral sepals forming a synsepal in most species; and the petals oblong to narrowly lanceolate and pilose in most species, with long hairs along the petal margins. In addition, the lip is trilobed; the lateral lobes are erect, obtuse, and sometimes pilose; and the disc is smooth or presents a longitudinal ridge at the middle. For convenience, the lip is sometimes described in two parts: a basal portion called the hypochile, which possesses the lateral lobes and the disc, and the upper portion, known as the epichile. The epichile may be thin and membranaceous or somewhat thick, and in some species it is sessile or more usually constricted; the limb may be flat or concave, and is usually smooth or rarely ciliate in the margin and the face. The column has two long arms at the apex and two small teeth on the adaxial margins.

The species of *Bulbophyllum* sect. *Xiphizusa* are generally epiphytic in forest and cerrado areas. They are occasionally lithophytic in campo rupestre vegetation (e.g., *B. plumosum* (Barbosa Rodrigues) Cogniaux and *B. bidentatum* (Barbosa Rodrigues) Cogniaux). The campo rupestre vegetation of the Espinhaço Range in southeastern Brazil is the main center of species diversity for *Bulbophyllum* sect. *Xiphizusa* (Smidt & Borba, 2007; Smidt et al., 2007), but the section has a disjunct distribution between southeastern Brazil and the northern Andes, with one species in Jamaica. In the course of a revision of the Neotropical *Bulbophyllum* species, we found two new species belonging to section *Xiphizusa*.

1. *Bulbophyllum gehrtii* E. C. Smidt & Borba, sp. nov. TYPE: Brazil. São Paulo: São Paulo, Cidade Jardim, 23°32'S, 46°38'W, 23 May 1930 (fl.), A. Gehrt s.n. (holotype, SP 27855). Figure 1.

Hae species *Bulbophyllum plumosum* (Barbosa Rodrigues) Cogniaux similis, sed labello hypochilo pubescente non nisi ad apicem crista inter lobos lateralis laevi et foliis lineatibus differt.

Mostly epiphytic herbs; rhizome inconspicuous; pseudobulbs ca. 0.7 × 0.7 cm, deltoid, transversely elliptic, green, rugose, monophyllous. Leaves 4.5–6 × 0.2–0.3 cm, linear, plane, base constricted, apex acute, coriaceous. Inflorescence a raceme to 10 cm, erect, scape cylindrical, basal bract of the scape inconspicuous, the others not imbricate; bracts of the rachis sessile, not imbricate; rachis 1–2 cm, pendulous, thin, 3 to 5 flowers arranged distichously, anthesis simultaneous. Flowers pendent, membrana-
aceous, jugae present and conspicuous; sepals erect, smooth, brown; dorsal sepal ca. 9 × 2 mm, lanceolate, plane, 3-nerved, margin glabrous, base dilated, apex acuminate; lateral sepals ca. 9 × 3 mm, lanceolate, fused from base to near the apex, 3-nerved, margin glabrous, apex acute; petals ca. 4 × 0.8 mm, lanceolate, slightly falcate, erect, plane, 1-nerved, base sessile, apex acute, margin ciliate with long purple hairs, whitish, translucent, midvein purple; lip ca. 9 × 1 mm, trilobed, differentiated as epichile and hypochile; hypochile with lateral lobes erect, obtuse, pubescent on the distal half, apex attenuate, disc between the lateral lobes with a smooth discrete ridge; epichile membranaceous, concave, lanceolate, margin glabrous, base constricted, apex acute, mostly brown with purple dots; column glabrous adaxially; stellidia present, erect, entire, apex acute; teeth present, erect, apex acute; column foot short, stigma large; anther incumbent. Fruit not seen.

Distribution and habitat. Bulbophyllum gehrtii grows as an epiphyte on cerrado vegetation. The two known collections for this species were found ca. 300 km apart. Within this area, there is a vegetation mosaic of cerrado, Atlantic rainforest, and campo rupestre, where it is possible to find the majority of the Brazilian species of Bulbophyllum (Smidt & Borba, 2007).

IUCN Red List category. Because the new species is known only from two Brazilian collections from two of the most extensively sampled areas in Minas Gerais and São Paulo states, with extent of occurrence estimated to be less than 5000 km², its conservation status must be considered as Endangered (EN B1ab[iii]) according to IUCN Red List criteria (IUCN, 2001). The species appears to be endemic to those areas of cerrado vegetation, which is one of the most deforested biomes in the past decades due to implementation of pastures and soybean plantations (Klink & Machado, 2005).

Etymology. This species is named in honor of Augusto Gehrt, who collected the holotype material. Gehrt was one of the main field assistants of Frederico Carlos Hochne at the inception of the Instituto de Botânica de São Paulo (IBt-SP). He accompanied Hochne on his initial field trips, mainly in São Paulo State and adjacent regions. Because of Hochne, Gehrt, and Oswaldo Hando (another important collector at the beginning of the IBt-SP), we know about the orchid species that occurred in important regions of São Paulo State, such as the margins of the Tietê and Pinheiros rivers, which are now unfortunately entirely urban areas.

Relationships. Bulbophyllum gehrtii is closely related to B. pluminosum, differing by having short hairs only on the distal part of the hypochile, by the disc with a smooth ridge, and by the linear leaves. In contrast, B. pluminosum has a lip with a densely hairy hypochile throughout, a disc possessing a deep ridge with transverse ribs inside, and oblong to widely lanceolate leaves. In addition, the epichile of B. gehrtii is concave with an obtuse and entire apex versus plane with an emarginated or occasionally entire apex in B. pluminosum.

Paratype. BRAZIL. Minas Gerais: Cerrados, 16°33’S, 42°54’W, Apr. 2000 (IL), E. L. Borba s.n. (HUEFS 116101).


Species hæc Bulbophyllum chlorogaster Reichenbach f. similis, sed labello hypochilo piloso et floribus minoribus brunneis differt.

Mostly epiphytic herbs; rhizome inconspicuous; pseudobulbs 0.7–1 × 0.9–1 cm, deltoid, transversely elliptic, green, smooth, monopodial. Leaves 2–4 × 0.4–0.6 cm, elliptic, plane, base constricted, apex acute, coriaceous. Inflorescence a raceme to 15 cm, erect, scape cylindrical, basal bract of the scape inconspicuous, the others not imbricate; bracts of the rachis sessile, not imbricate; rachis ca. 6 cm, pendulous, thin, ca. 10 flowers arranged distichously, anthesis simultaneous. Flowers pendent, membranaceous, jugae present and conspicuous; sepals erect, smooth, brown, margin glabrous, apex acute; dorsal sepal ca. 13 × 3 mm, lanceolate, plane, 3-nerved; lateral sepals ca. 14 × 3.5 mm, lanceolate, fused from base to near the apex, 3-nerved; petals ca. 5 × 2 mm, lanceolate, erect, plane, 1-nerved, base sessile, apex acute, margin ciliate with long hairs, brown, translucent, midvein purple; lip 10–12 × 1–1.5 mm, trilobed, differentiated as epichile and hypochile; hypochile with lateral lobes erect, obtuse, pilose; disc extending beyond the lateral lobes nearly to the middle of the lip, apex attenuate, disc with a smooth ridge, conspicuous; epichile membranaceous, plane, lanceolate, margin glabrous, base constricted, apex acuminate, mostly brown with purple dots; column glabrous adaxially; stellidia present, bidentate, erect, apex acute; teeth present, apex entire; column foot short, stigma large; anther incumbent. Fruit not seen.

Distribution and habitat. Bulbophyllum teimosense grows in areas of native and well-preserved Atlantic rainforest, as epiphytes in the forest canopy.
It is the only species from *Bulbophyllum* sect. *Xiphizusa* found so far in areas of Atlantic rainforest s. str.; the remaining species occur in gallery forests, cerrado, and campo rupestre vegetation.

**IUCN Red List category.** Because the new species is known only from the type material, which is from a well-collected region in Bahia State, its conservation status must be considered as Vulnerable (V B1ab[iii]) according to IUCN Red List criteria (IUCN, 2001). Furthermore, this species is microendemic to the Atlantic rainforest, one of the most endangered biomes in Brazil since the colonization of the country, which is currently reduced to 7% of its original area. This particular region of Atlantic rainforest in southern Bahia is considered one of the principal Brazilian hot spots, presenting high endemism (Mori et al., 1983; Thomas et al., 1998).

**Etymology.** The new species is named after the Reserva Particular do Patrimônio Natural (RPPN) Serra do Teimoso, in the municipality of Jussari in the southernmost part of Bahia State, where it was found.

**Relationships.** *Bulbophyllum teimosense* is the second species known in which the disc in the
hypochile extends as far as to the middle of the lip. In all other species of *Bulbophyllum* sect. *Xiphizusa*, in which the lip is clearly differentiated as hypochile and epichile, the disc is located only between the lateral lobes. *Bulbophyllum chloropterum* is the one other species with this characteristic. This species was described by Reichenbach f. in 1849 from a plant discovered by Hoffmannsegg in Rio de Janeiro State, of uncertain locality and indicated only as received from the Orquidário Binot. Recently, Ribeiro et al. (2005) and Toscano and Cribb (2006) reported the occurrence of *B. chloropterum* in the Chapada Diamantina, in central Bahia, growing as epiphytic and epipeliaceous plants in areas of campo rupestre. The sepals of *B. chloropterum* are green on the outer margins and brown inside, with a purple lip and smooth hypochile, while *B. teimosense* has brown flowers with a brown, purple-spotted lip and a densely pilose hypochile.

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References


About the Typification of *Myriophyllum aquaticum* (Haloragaceae)

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**Abstract.** In 1973, Verdcourt made the combination in *Myriophyllum* L.: *M. aquaticum* (Vellozo) Verdcourt based on *Enydra aquatic* Vellozo in the Haloragaceae. However, significant morphological differences exist between the study of the Vellozo 1825 protologue and the Vellozo 1831 plate of *E. aquatic*. Therefore, we propose the designation of an epitype to better fix the taxonomic application of the name *M. aquaticum* (Vellozo) Verdcourt.

**Resumen.** En 1973, Verdcourt realizó una nueva combinación en *Myriophyllum* L.: *M. aquaticum* (Vellozo) Verdcourt basándose en *Enydra aquatic* Vellozo. A través del estudio de la descripción original (1825) y lámina (1831) de *E. aquatic*, encontramos que los caracteres diagnósticos son diferentes. Por lo tanto en el presente trabajo se propone designar un epítipo para *M. aquaticum* (Vellozo) Verdcourt para la mejor aplicación del nombre.

**Key words:** *Enydra*, Haloragaceae, *Myriophyllum*.

The name *Myriophyllum brasiliense* Cambessèdes (Haloragaceae), described in 1830 (Cambessèdes, 1830), was applied to a species native to South America from Argentina, Brazil, Chile, Paraguay, Peru, and Uruguay (Meijden & Caspers, 1971; Bottique & Verdcourt, 1973; Ayres Fevereiro, 1975; Orchard, 1979, 1981; Li & Hsieh, 1996; Negritto & Anton, 1996; Zuloaga & Morrone, 1999). However, this aquatic species has become almost cosmopolitan in distribution, growing as an adventitious plant in temperate and tropical regions of the world, where it was at least initially cultivated as an ornamental plant. *Myriophyllum brasiliense* is commonly found in freshwater bodies, where it grows in shallow quiet water, usually associated with other free-emergent floating species.

Until 1973, this aquatic plant taxon was known by the name *Myriophyllum brasiliense*, but as a result of Verdcourt’s (1973) identification of the Vellozo (1827 [1831]) plate of *Enydra aquatic* Vellozo (1825 [1829]), the combined name *M. aquaticum* (Vellozo) Verdcourt has been applied to this species since then. Although some plant material may have been available to Vellozo, there are no surviving herbarium specimens of *E. aquatic*, and we have only the original description and plate for the interpretation of this name. Although the plate was not published until later in 1831, it was cited in Vellozo’s protologue (1825 [1829]). The plate clearly represents original material (Art. 9.2 of the *International Code of Botanical Nomenclature* [McNeill et al., 2006]) and constitutes the only available element for lectotypification, and was so designated by Orchard (1979). In the *Flora of Tropical East Africa*, published in the same year as the new combination (Verdcourt, 1973), Bottique and Verdcourt (1973: 7) cited the type locality of *M. aquaticum* as “Brazil, junction of R. Taguauba and R. Amazon.” However, the actual locality is “... fluvium Taguauba confluentium sub aquis” (Vellozo, 1825 [1829]: 57), which is near Rio de Janeiro.

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We have examined and compared the plate and the original description of *Enydia aquatico*, and there are significant differences between the plant described (1825 [1829]) and the plant illustrated (1827 [1831]) by Vellozo, with respect to reproductive and vegetative characters. The description (Vellozo, 1825 [1829]: 57) of the genus *Enydia* and its single species *E. aquatico* mentioned the solitary axillary flowers, four stamens with acuminate anthers, and the absence of evident styles, as well as tuberous roots,
branched stems, and opposite leaves. In contrast, the species represented by the plate (1827 [1831])
designated as the lectotype has whorled axillary
flowers, eight stamens with linear-lanccolate anthers,
and four evident styles, with fasiculate roots, few-
branched stems, and (4)5(6) whorled leaves. Although
the reported style difference could be discounted,
since from his comment it is uncertain whether female
flowers were actually observed by Vellozo, characters
such as tuberous roots and opposite leaves are not
present in M. aquaticum, even under extreme
environmental conditions (e.g., sandy soils, desiccated
ponds).

The poor incongruence of the plate and description
suggest significant characters were wrongly portrayed
for the plant in question, Myriophyllum aquaticum.
Therefore, its lectotype is demonstrably ambiguous
and cannot be critically identified for purposes of the
precise application of the name. Therefore, we apply
Article 9.7 of the ICBN (McNeill et al., 2006), and our
selection of an epitype for Enydria aquatica serves to
fix the application of this name in accordance with its
current usage.

Myriophyllum aquaticum (Vellozo) Verdoncourt, Kew
57. 1825 [1829]. TYPE: Brazil. Rio de Janeiro: “Offendui rivulo quodam ad fluvium
Taguahy confluentium sub aquis,” Vellozo s.n. (lectotype, Fl. Flumin. Icon. 1, tab. 150, 1831.
Vellozo s.n., designated by Orchard, 1979: 249).
EPITYPE: Brazil. Rio de Janeiro: Petrópolis,
Caetitú, Dec. 1943, O. C. Gêes 863 (epitype,
designated here, RB), Figure 1.

Myriophyllum brasiliense Cambessédes, Fl. Bras. Merid. 2:
252. 1829 [1830]. TYPE: Brazil. “In paludibus prope
Jondiau haud longe ab urbe S. Pauli. Florecet
Octobri,” A. St. Hilaire 1682 (holotype, MUP [digital
image seen]; isotype, P not seen).

Myriophyllum proserpinacoides Gillies ex Hooker & Arnott,
Buenos Ayres,” s.d., Dr. Gillies s.n. (lectotype,
designated by Orchard, 1979: 250, K [digital image
seen]).

The lectotype of M. proserpinacoides was designated
by Mora in sched. in 1970, but this was not published.
Later, Orchard (1979) mentioned that the lectotype
was designated by Mora. Thus, we consider this 1979
publication as the effective designation of the
lectotype.

There were some materials cited by Gillies (1833)
in the original description. These materials were cited as
syntypes of M. proserpinacoides by Orchard (1979)
and previously cited as paratypes by Mora in sched. in
1970.

Specimens examined. ARGENTINA. Buenos Aires: “La
Plata, B. Ayres,” s.d., Tweedie s.n. (syntype, Myriophyllum
proserpinacoides, K [digital image seen]), CHILE. “Andes de
Chili,” s.d., Cuming 164 (syntype, M. proserpinacoides, K
[digital image seen]).

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Literature Cited
Reitz (editor), Flora Ilustrada Catamarine. Conselho
Nacional de Pesquisas-Instituto Brasileiro de Desenvolvi-
miento Florestal, Herbario Barbara Rodrigues, Itajaí.
in R. M. Polhill (editor), Flora of Tropical East Africa.
Whiterfiars Press Ltd., London and Tonbridge.
Cambessédes, J. 1830. XLVI. Hydrobiaceae. Pp. 250–252
in A. F. C. P. de Saint-Hilaire (editor), Flora Brasiliæ
Gillies, J. 1833. Myriophyllum proserpinacoides. P. 313 in W.
J. Hooker (editor), Botanical Miscellany, Vol. 3. John
Murray, London.
Myriophyllum L. (Haloragaceae) in Taiwan. Taiwania
McNeill, J. F., R. Barrie, H. M. Burdet, V. Demoulin, D. L.
2006. International Code of Botanical Nomenclature
(Vienna Code). Regnum Veg. 146.
Flora Maleisiana 7: 239–263.
Pp. 1–4 in A. Hanzíker (editor), Flora Fanerogámica
Argentina, Vol. 27. Programa Pro Flora (CONICET),
Córdoba.
Orchard, A. E. 1979. Myriophyllum (Haloragaceae) in
Australia As 1: New Zealand: A revision of the genus
——. 1981. A revision of South American Myriophyllum
(Haloragaceae), and its repercussions on some Australian
Typographia Nationali, Rio de Janeiro.
——. 1831. Myriophyllum aquaticum, tab. P. 150 in J. M.
da C. Vellozo (editor), Flora Fluminensis Icones.
Senefelder, Paris.
Vascularizes de la República Argentina II. Acanthaceae–
Euphorbiaceae (Dicotyledones). Monogr. Syst. Bot. Mis-
souri Bot. Gard. 74.
Nomenclatural Corrections in Onagraceae

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ABSTRACT. In this paper, we provide corrections to a recent synoptical revision of the family Onagraceae (Wagner et al., 2007). The first valid publication of subfamily Onagroideae was in 1834 by Eaton, and not in 2007 by Wagner et al. We correct the authorship and place of publication of Camissonia contorta (Douglas) P. H. Raven, Chylismia scapoida (Torrey & A. Gray) Nuttall ex Raimann, and Camissonia chamaenerioides (A. Gray) P. H. Raven. We correct the authorship and typification of Oenothera suffulta (Engelmann ex A. Gray) W. L. Wagner & Hoch, as well as the typification of Chylismia claviformis subsp. lancifolia (A. Heller) W. L. Wagner & Hoch. Our new genus Holmgrenia W. L. Wagner & Hoch is a later homonym of a name validly published by S. O. Lindberg in 1863. We propose the replacement name of Neoholmgrenia W. L. Wagner & Hoch to correct this problem, and make the two species-level combinations, N. andina (Nuttall) W. L. Wagner & Hoch, and N. hilgardii (Greene) W. L. Wagner & Hoch.

Key words: Camissonia, Chylismia, Neoholmgrenia, Oenothera, Onagraceae, Onagroideae.

Following the publication of our synoptical revision of the classification of Onagraceae (Wagner et al., 2007), we or others have noted several problems that we will correct here.

Subfamily Name

We published the name Onagraceae subfam. Onagroideae as new (Wagner et al., 2007: 41, 236) because we were not aware of any previous valid publication of this name. As we prepared our synopsis, we consulted Jim Reveal’s website (<http://www.plantsystematics.org/reveal/phio/fam/sindex.html>, Reveal, 2003) because it represents the only compilation of suprageneric names available. Reveal listed the earliest publication for this subfamily as: “subfam. Onagroideae Lindley in Beilschmied, Flora (Bieb.) 16(2): 58, 109. 14 Jun 1833 (Onagridae).” Our examination of copies of this publication in the libraries of MO and US revealed confusing discrepancies: the MO copy of Flora 16(2) does not include the Beilschmied article at all, whereas the US copy does, but with different pagination than that reported by Reveal (the relevant page in the US copy was p. 196, not 58). The MO library does, however, include another publication by Beilschmied from the same year, entitled John Lindley’s...Charakteres distinctiue oder Hauptkennzeichen der natürlichen Pflanzenfamilien (reported in TL2: 4644), which is a verbatim copy of the Flora article as it appears in the US copy, albeit with different pagination. After careful examination of these publications with their conflicting paginations, however, we disagreed with Reveal, and concluded that Beilschmied, who was translating and extracting Lindley’s (1830) An Introduction to the Natural System of Botany for a German-speaking audience, did not recognize subfamilies as such and did not substantively modify Lindley’s treatment, which explicitly accepted de Candolle’s (1828) tribal classification of Onagraceae. The only deviation from de Candolle adopted by Lindley was the recognition of Circaroeae as a separate family, a classification also followed by Beilschmied.

On his website, Reveal also reported two other possibly relevant subfamilial names: subfamily Oenotheroideae Kosteletzky (Kosteletzky, 1835, as Oenotherae), and subfamily Circaroeideae Kosteletzky (Kosteletzky, 1835, as Circaroeae). In this instance, we again disagree with Reveal’s interpretation. Kosteletzky, like Lindley and many other authors of that period, adopted de Candolle’s classification of Onagraceae with five tribes, using the same tribal Latin endings (McNeill et al., 2006), with only minor changes: Kosteletzky called his taxa Gruppen, and changed one from de Candolle’s Ongreae to Oenotherae. We find no direct evidence that Kosteletzky intended to change these Candollean tribes into subfamilies.

Discussion with Reveal (pers. comm. in 2007 after publication of our synopsis) revealed other valid publications of subfamily Onagroideae prior to our synopsis in 2007, the earliest of which appears to be:

**Onagraceae** subfam. **Onagroideae** Eaton, Bot. Dict., ed. 4: 44. 1836. **TYPE**: *Onagra* Miller [= *Oenothera* L.].

**Attribution of Species Names**

In his revision of *Camissonia* Link, Raven (1969) considered the new combination bringing *Oenothera contorta* Douglas into *Camissonia* to have been made by Kearney (in Britton & Kearney, 1894: 37), and we (Wagner et al., 2007: 122) repeated this information in citation. Our subsequent examination of Britton and Kearney's publication shows that Kearney did not validly make this combination, since he provided only an unranked trimomial *Chamissonia contorta pubens* based on *Oenothera contorta pubens*. Therefore, the next available and correct author and place of publication is Raven (1969), with the name appropriately attributed as *C. contorta* (Douglas) P. H. Raven.

Similarly, we listed Small (1896) as the author of the combination *Chylismia scapoides*, following Raven (1962, 1969); however, this combination was originally made three years earlier in Raimann (1893). The correct author and place of publication is Raimann (1893: 217). The name should be appropriately attributed as *C. scapoides* (Torrey & A. Gray) Nuttall ex Raimann in Wagner et al. (2007: 133, 136).

We inadvertently overlooked a correction in Raven (1982) relevant to the first valid publication of the combination *Camissonia chamaenerioides* (A. Gray) P. H. Raven. The correct place of publication is Raven (1982). The name is referred to *Eremothera chamaferioides* (A. Gray) W. L. Wagner & Hoch, in Wagner et al. (2007: 127, 209).

**Type Designations**

We incorrectly selected a lectotype for *Chylismia lancifolia*, when in fact the holotype still exists, as pointed out to us by A. G. Tichm (pers. comm.) after our synopsis appeared. Kerry Barringer kindly verified that the holotype is indeed extant in BKL. We also incorrectly typified *Oenothera suffulta* and misstated the authorship of this name, which was brought to our attention by Jim Zarucchi and Kanchi Gandhi. The corrections are as follows:


**New Generic Name**

When we published the new genus *Holmgrenia* W. L. Wagner & Hoch, we were unaware of an earlier name *Holmgrenia* Lindberg (Lindberg, 1862), published for a genus of bryophytes that is now known by the conserved name *Orthothecium* Schimper (in Bruch et al., 1851). We here propose a new name for the western North American genus in Onagraceae, and make the two necessary species-level combinations.


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Literature Cited


Validation of the Name *Chelonopsis chekiangensis* (Lamiaceae), a Species from Eastern China

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**Abstract.** *Chelonopsis chekiangensis* C. Y. Wu, var. *brevipes* C. Y. Wu & H. W. Li, a variety from the protologue (Wu, 1959). Consequently, *C. chekiangensis* is not a validly published name under Art. 43.1 of the International Code of Botanical Nomenclature (McNeill et al., 2006). Unfortunately, this oversight was not discovered in the taxonomic treatment for the English, updated edition of the *Flora of China* (Li & Hedge, 1994). To enable its formal use, the name is here validated, with one of these four originally cited specimens (Wu, 1959) designated as the holotype. Furthermore, because *C. chekiangensis* was not validly published, Wu and Li (Wu et al., 1965) did not validly publish the variety *C. chekiangensis* var. *brevipes* (Art. 43.1, McNeill et al., 2006), and this name is also validated herein.

Because the two names and their validating diagnoses are here ascribed to Wu (1959) and Wu and Li (Wu et al., 1965), respectively, under Art. 46.2 of the International Code of Botanical Nomenclature (McNeill et al., 2006), they remain the respective authors of these names.

*C. chekiangensis* C. Y. Wu, sp. nov.


The validating description and diagnosis were previously published by Wu (1959: 27).

This species is similar to *Chelonopsis moschata* Miguel, but the leaves are lanceolate, 3–15 × 1.5–4.5 cm, strigose along the veins, sparsely hirsute adaxially, inconspicuously glandular along veins abaxially (vs. blade oblong or narrowly oblong, 7–18 × 2–9 cm, sparsely pubescent on adaxial surface and on the nerves on abaxial surface); the leaf base is cuneate-attenuate, the margin irregularly callose-serrate (vs. base cuneate to truncate and frequently auriculate, margin acute serrate); and the cymes are 3- to 5-flowered (vs. 1- to 3-flowered).

**Distribution.** The species was described from Zhejiang Province in eastern China and it is distributed from Anhui to Guangdong provinces.


The validating description and diagnosis were previously done by Wu and Li (Wu et al., 1965: 154). This variety differs from the autonym *Chelonopsis chekiangensis* C. Y. Wu var. *chekiangensis* by having shorter peduncles, which range from 2 to 4 mm in length (vs. 10–20 mm in variety *chekiangensis*).

**Distribution.** This variety is only known from Guangdong and Jiangxi provinces, in moderately moist forest on mountains.

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Literature Cited
A Contribution to Astragalus sect. Campylanthus (Fabaceae) in Iran: Two New Species and a Diagnostic Key

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ABSTRACT. Astragalusghanbarianii Maassoumi, Podlech & Zarre and A. neriifolius Maassoumi, Podlech & Zarre, two new species of Astragalus sect. Campylanthus Bunge (Fabaceae) from Iran, are described and illustrated. Because of the considerable changes in the delimitation of this section, a new diagnostic key to its species is presented. Moreover, A. susianus Boissier subsp. sericeus Tietz is reduced to synonymy of A. chalaranthus Boissier & Haussknecht.

Key words: Astragalus, Fabaceae, Iran, IUCN Red List, section Campylanthus.

The Iranian highlands, with about 1000 species of Astragalus L. (Fabaceae), are one of the most significant diversification centers of the genus (Podlech, 1999). In addition to the numerous endemic species, several natural groups recognized as sections are distributed exclusively in Iran. In the thorny Astragalus (Zarre, 2000), the monotypic section Semnanenses Zarre & Podlech (Zarre & Podlech, 2001a), together with section Microphya Bunge and section Campylanthus Bunge (Bunge, 1868, 1869; Boissier, 1872; Tietz, 1988), are endemic to Iran. Species of both section Campylanthus and section Microphya are distributed mainly in the Zagros Mountains of western Iran. Extensive support has been offered for the close relationship between these sections (Tietz, 1988; Zarre, 2000; Podlech et al., 2001; Kazempour Osaloo et al., 2003, 2005), as well as for their possible close relation to section Anthylloidei DC. (Tietz & Zarre, 1994).

The Zagros Mountains is an important speciation center for several Irano-Turanian and Mesopotamian plant genera (Zohary, 1973). The southern part of this range is not well collected by botanists. Most species of Astragalus here are narrowly endemic (Tietz & Zarre, 1994; Podlech et al., 2001; Zarre & Podlech, 2001b).

The study of newly collected material in Iranian herbaria led to the discovery of the two new species described below for Astragalus sect. Campylanthus. Moreover, molecular studies using ITS sequences (Kazempour Osaloo et al., 2003, 2005) and this morphological study support the exclusion of A. magistratus Maassoumi, Ghahreman & Mozaffarian from section Campylanthus. Astragalus ahmad-parzae Maassoumi (Maassoumi, 1998) was overlooked in the Flora Iranica (Podlech et al., 2001), and the separation of A. chalaranthus Boissier & Haussknecht from A. susianus Boissier subsp. sericeus Tietz in that account is highly doubtful. All these findings support the necessity for providing a new key to the species of section Campylanthus.

KEY TO THE SPECIES OF ASTRAGALUS SECT. CAMPYLANTHUS IN IRAN

1a. Inflorescences globose, heads overtopping the leaves, 10- to 20-flowered.
2a. Calyx 16–23 mm long, teeth 11–17 mm long; heads 3–4.5 cm diam.; standard (13–)15–20 mm long, with elliptic to broadly elliptic limb .................... A. tricholobus DC. subsp. tricholobus
2b. Calyx (10–)15–28 mm long, teeth 6–10 mm long; heads 1.5–3 cm diam.; standard 11–14(–18) mm long, with orbicular to broadly elliptic limb. .................... A. tricholobus subsp. habenocheri (Boissier) Tietz
1b. Inflorescences ovate to cylindrical, if globose then shorter than the leaves, often more than 20-flowered.
3a. Fruiting calyx obviously inflated, 6-9 mm diam. .................... A. argyroterachys Boissier

3b. Fruiting calyx only slightly wider than flowering one, not inflated, 3–5 mm wide.
4a. Bracteoles always present; inflorescence ± loose ........................................ A. echatus Bunge
4b. Bracteoles absent or rarely present; inflorescences dense.
5a. Stipules membranous, hyaline; bracts membranous.
   6a. Median stipules ca. 8 mm long; median leaves with 8 to 10 pairs of leaflets, up to 11 × 1–2 mm; inflorescence globose to ovate, 2–3.5 cm diam. .... A. ghanbarianii Maassoumi, Podlech & Zarre
   6b. Median stipules 12–15 mm long; median leaves with 5 to 7 pairs of leaflets; median leaflets 12–18 × 3–6 mm; inflorescence cylindrical, longer.
   7a. Median wings 15–16 mm long, the limb 9–10 mm long. .... A. ahmad-parsae Maassoumi
   7b. Median wings 11–13 mm long, the limb 6–7.5 mm long ........................................ A. nereifolius Maassoumi, Podlech & Zarre
5b. Stipules chartaceous; bracts chartaceous (but membranous in A. sustius).
   8a. Inflorescences 1.5–3 cm long, shorter than leaves, peduncles 0.3–1.5 cm long; leaflets of median leaves in 7 to 12 pairs.
   9a. Stipules connate to each other at most up to the middle; rachis and leaflets spreading pubescent; bracts hyaline, median ones 6–11 mm long, often acuminate at tip, covered with short hairs only ........................................ A. sustius Boissier
   9b. Stipules connate to each other at least from the middle up to the apex; rachis and leaflets apressed sericeous; bracts chartaceous, median ones 5–7 mm long, shortly acuminate, covered with short and long hairs. .... A. chalaranthus Boissier & Hausknacht
   8b. Inflorescences 3–9 cm long, overtopping leaves, peduncles 2–15 cm long; leaflets of median leaves in 12 to 22 pairs.
   10a. Median leaves with 12 to 22 leaflet pairs; bracts villous, their hairs up to 2 mm long
   10b. Median leaves with 6 to 12 leaflet pairs; bracts with short appressed hairs up to 0.5 mm long or glabrous. .... A. erinifolius Pau

1. Astragalus ghanbarianii Maassoumi, Podlech & Zarre, sp. nov. TYPE: Iran. Fars; Jahrom, old rd. of Darab-Fasa, pass at 1200 m, 17 Apr. 2002, G. Ghanbarian 78 (holotype, TARI). Figure 1.

Affinis Astragaloo ahmad-parsae Maassoumi sed ab eo stipulas 4–10 mm (nec 12–15 mm) longis, foliis usque ad 10- (nec 5– ad 7-) jugis, 1–2 mm (nec 3–6 mm) latis, pedunculo usque ad 1 cm (nec 1–3 cm) longo, racemo 2–3.5 cm (nec 5–7 cm) diam. et laminis alarum 0–7.5 mm (nec ca. 10 mm) longis; ab A. sustius Boissier calyce 12–13 mm (nec usque ad 11 mm) longo, dentibus 8–10 mm (nec usque ad 7 mm) longis, vexillo usque ad 13 mm (nec usque ad 10.5 mm) longo et foliis usque ad 13 mm (nec usque ad 10 mm) longis differt.

Dwarf cushion, 20–50 cm tall, loosely branched at the base; indument exclusively white, on the calyx to 4 mm long, otherwise 0.1–2 mm; stems from a prostrate base ascending, 1–4 mm diam. In first year, growing 1–5 cm per year, below stipules densely appressed villous, gradually glabrescent; old stems covered by remainder of last year’s thorns and stipules; stipules membranous, hyaline at margins, yellowish white, 4–10 mm, with 3 to 5 parallel veins, ovate-triangular, acuminate, 2–6 mm adnate to the petiole, otherwise 1–4 mm connate, densely furnished with long adpressed straight hairs, gradually glabrescent, ciliate at margins. Leaves 0.8–4.5 cm; rachises ± remote, rigid, thick, densely covered by short spreading hairs, gradually glabrescent; petiole 0.4–1 cm (1/5–1/2 as long as the rachis); terminal spine 1–4 mm longer than uppermost leaflet pair; leaflets 3 to 10 pairs, grayish green, strongly complicate, 3–11 × 1–2 mm, linear to narrowly oblong or elliptic, acute at tip, with a macro < 0.3 mm long, both surfaces densely to sparsely appressed pubescent. Inflorescence densely globose to ovoid, 2–3.5 cm diam., 20–30-flowered; peduncle 0.5–1 cm, densely villous; bracts membranous, yellow, 5–8 mm, outer ones ovate to broadly ovate, inner ones narrowly ovate to oblong or elliptic, acuminate at tip, densely appressed short pubescent, ciliate at margins; bracteoles absent; calyx papery, yellowish white, campanulate-tubular, 12–15 mm, 3–4 mm diam., with 10 to 15 parallel nerves, densely appressed pubescent; teeth 8–10 mm, ca. 2× longer than the tube, filiform; petals pink to light purple (or brown when dried), claws of wings and the keel only basally adnate to stamen tube; standard 10–13 mm; limb orbicular, 6–9 mm diam., retuse at tip; wings 9–13 mm; limbs 6–7.5 × 2–2.5 mm, obovate, obtuse at tip; auricle 0.7–1.3 mm; claw as long as the limb; corolla keel 8–12 mm, slightly shorter than wings; limbs 5–6 × 2.5–3 mm, obvate-triangular, with ± rectangular lower edge and straight upper edge; claw 5.5–7 mm; stamens as long as the keel, the free part 2–2.5 mm; ovary densely shortly sericeous, sessile; style 8–10 mm, pubescent at the base or up to lower 1/3. Mature fruits and seeds not seen.

Distribution. Astragalus ghanbarianii shares a similar, but somewhat more western, distribution pattern with A. brevirhachis Tietz & Zarre on the southern Zagros Mountains (Tietz & Zarre, 1993). The southern part of the Zagros Mountains is not well collected botanically, and it seems that the area may be an important diversification center for Astragalus.
IUCN Red List category. Because of the paucity of collections, the species cannot be assessed for its conservation status and is considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Etymology. The species epithet recognizes G. Ghanbarian, a researcher at the Research Center of Forests and Rangelands, Shiraz (Iran) and the collector of the plant.

Species concept. Astragalus ghanbarianii is the second species of section Campylanthus with standards longer than 12 mm. This character connects it to A. ahmad-parsae (Maassoumi, 1998), from which it differs by having linear to narrowly oblong or rarely elliptic leaflets (vs. predominantly elliptic leaflets), racemes 2–3.5 mm long (vs. 5–7 cm), and smaller wing limbs (6–7.5 mm vs. ca. 10 mm long). The short and densely flowered inflorescences in A. ghanbarianii relate it to the core group of section Campylanthus, closest to A. susianus (see Tietz, 1988). The latter species has a shorter calyx (8–11 mm long) and petals (8–10.5 mm long) compared to A. ghanbarianii.

2. Astragalus nervifolius Maassoumi, Podlech & Zarre, sp. nov. TYPE: Iran. Khuzestan: Dehdez to Karun River, around Lirsiah, ca. 1000 m, 17 June 1995, V. Mozaffarian 74479 (holotype, TARI; isotype, M). Figure 2.
Valde affinis Astragalus ahmad-parsae Maassoumi sed ab eo alis brevibus usque ad 13 mm (nec 13–16 mm) longis et laminis earum 6–7.5 mm (nec 9–10 mm) longis; ab A. susiano Boissier stipulis membranaceis (nec chartaceis) 7–13 mm (nec usque ad 9 mm) longis, foliolis 3–ad 7–(nec 5–ad 14–) jugis, remotis (nec congestis) 4–15 × 2–5 mm (nec 0.5–10 × 0.5–2.5 mm), planis (nec complicatis), longae mucronatis (nec breviter mucronulatis), prominenter nervosis, inflorescentis cylindraceis 3–5 cm longis (nec globosis usque ovoideis et usque ad 3 cm longis) et bracteis usque ad 15 mm (nec usque ad 11 mm) longis; ab A. campylanthe Boissier stipulis membranaceis (nec chartaceis), foliolis 3–ad 7–(nec 8–ad 22–) jugis usque ad 15 mm (nec usque ad 10 mm) longis, remotis (nec congestis), planis (nec complicatis), longae mucronatis (nec breviter mucronulatis) et laminis carinæ obtusae (nec acuminatæ) differt.

Dwarf cushions, 20–50 cm tall, densely branched at base; hairs exclusively white, on the calyx up to 4 mm long, otherwise 0.1–2 mm; stem ascending, 1–
4 mm diam. in first year, growing 1–10 cm per year, below stipules densely appressed pubescent, gradually glabrescent; old stems covered by remainder of last year’s thorns and stipules; stipules membranous, hyaline, yellowish white, 7–13 mm, with 5 to 11 parallel nerves, widely ovate-triangular, acute or acuminate at tip, 1.5–5 mm adnate to the petiole, otherwise 1–3 mm connate, sparsely furnished with long adpressed straight hairs, soon glabrescent. Leaves 0.8–8 cm; rachises ± dense, rigid, thick, densely covered by tomentose hairs, gradually glabrescent; petiole 0.4–2.5 cm (1/4–1/2 as long as the rachis); terminal spine as long as the uppermost leaflet pair; leaflets 3 to 7 pairs, grayish green, flattened, 4–15 × 2–5 mm, ovate to elliptic, obtuse at tip, with a macro 1–2.5 mm long, both surfaces densely to sparsely tomentose. Inflorescence densely cylindrical to ovate, 3–5 cm, 2–2.5 mm diam., shorter than leaves, 40– to 100-flowered; peduncle 0.5–2.5 cm, densely villous; bracts membranous, yellow, 10–15 mm, outer ones ovate to elliptic, inner ones narrowly ovate to oblong or linear, acuminate at tip, sparsely pubescent to glabrous, ciliate at margins; bracteoles absent; calyx papery, yellowish white, campanulate-tubular, 12–15 mm, 3–4 mm diam., with 10 to 15 parallel veins, densely appressed pubescent; teeth 8–10 mm, ca. 2X longer than the tube, filiform; petals pink to light purple, claws of wings and the keel only basally adnate to stamens tube; corolla standard 12–13 mm; limb orbicular, 6–9 mm diam., retuse at apex; corolla wings 11–13 mm; limbs 6–7.5 × 2–2.5 mm, ovobate, obtuse at tip; auricle 0.7–1.3 mm; claw as long as the limb; corolla keel 10–12 mm, slightly shorter than wings; limb 5–6 mm, 2.5–3 mm deep, ovate-triangular, with ± rectangular lower edge and straight upper edge; claw 5.5–7 mm; stamens as long as keel, free part 2–2.5 mm; ovary densely shortly sericeous, sessile; style 8–10 mm, pubescent at base or up to lower 1/3. Mature fruits and seeds not seen.

Distribution. Astragalus nereifolius is distributed in the southern part of the Zagros Mountains along the border of Chahar-Mahal and Khuzeistan provinces.

IUCN Red List category. Because of the paucity of collections, the species cannot be assessed for its conservation status and is considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Species concept. Astragalus nereifolius possesses large petals similar to A. ghanbarianii and can therefore be compared with A. ahmad-parsae (see above). Ovate to elliptic leaves with prominent reticulate veneration for which the specific epithet is selected that are characteristic for this species separate it from A. ghanbarianii and relate it to A. ahmad-parsae. However, A. nereifolius differs principally from A. ahmad-parsae in the size of petals, which are 11–13 mm long (vs. 13–16 mm long in A. ahmad-parsae) with the wing limbs 6–7.5 mm (vs. 9–10 mm long). Astragalus nereifolius has cylindrical inflorescences that are shorter than the leaves, a character that it shares with A. susianus and A. chalaranthus (see Tietz, 1988). Astragalus nereifolius differs from both of these species, however, by its large bracts (10–15 mm vs. 9–12 mm long) and stipules (7–13 mm vs. 6–9 mm long).

Circumscription of Astragalus susianus

Tietz (1988) recognized two subspecies in Astragalus susianus: subspecies susianus was said to have leaflets with spreading hairs, whereas those of subspecies sericeus have appressed hairs. Moreover, the bracts are hyaline but large (6–11 mm long) in subspecies susianus, whereas they are chartaceous and smaller (5–7 mm long) in subspecies sericeus. Astragalus susianus differs from A. chalaranthus primarily by having the stipules connate up to the middle instead of up to the apex. Interestingly, the distribution of A. chalaranthus overlaps significantly with that of A. susianus subsp. sericeus. Furthermore, the presence of hyaline and short bracts in both taxa supports their union. Therefore, A. susianus subsp. sericeus is reduced herein to synonymy of A. chalaranthus.

Astragalus chalaranthus Boissier & Haussknecht


Acknowledgments. We are grateful to Ihsan Al-Shehbaz (MO) for his editing and critical review of the manuscript. We are indebted to M. Nobakht (TARI) for preparing the illustrations of the new species. The revision of Astragalus sect. Campylanthus was prepared as part of a project supported by the Research Council of Tehran University to Shahin Zarre; additional funding from Alexander von Humboldt Stiftung supported Shahin Zarre’s travel to study the type material in Munich.
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New Species of Alstroemeria (Alstroemeriaceae) from Brazil

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ABSTRACT. Two new species of Alstroemeria L. (Alstroemeriaceae) from Brazil are described: A. albescens M. C. Assis from Rio Grande do Sul and A. calliantha M. C. Assis from Minas Gerais. Descriptions, comments, and illustrations are provided.


Key words: Alstroemeria, Alstroemeriaceae, Brazil, IUCN Red List, Minas Gerais, Rio Grande do Sul.

The genus Alstroemeria L. (Alstroemeriaceae) comprises perennial herbs that are erect and rhizomatous with storage roots. The leaves are sessile, simple, entire, generally resupinate (twisted near the base or along the lamina), and either concentrated toward the stem apex, distributed along the stem, or as a rosette on a short stem. Blades can be membranous, chartaceous, or leathery; linear, lanceolate, elliptic, or oblong; and either glabrous on both faces or papillose on the adaxial face. The inflorescence is terminal as an umbel-like, simple or branched cyme of two to many flowers or rarely the flowers may be solitary, wrapped within the leaflike bracts. Flowers are zygomorphic and bisexual, with six tepals petaloid and free, in two whorls. The tepals may be similar or different, the inner often shorter, patterned, and basally narrowed into a canaliculate base with nectariferous ducts. The stamens are six, free, and in two whorls. The anthers are pseudobasifixed, with longitudinal intorse dehiscence. The ovary is inferior, syncarpous, 3-carpellate, and trilocular with axilar placentation; the style is apical, with three stigmas, and many anatropous ovules. The fruit is a dehiscent, loculicidal capsule, and the seeds are globose, without a sarcotesta.

Also known as the Lily of the Incas, Alstroemeria species and hybrid taxa have gained worldwide popularity as cut flowers due to their appearance and excellent keeping quality. They are also satisfactory for growing in pots and for use in gardens and landscaping.

The genus is restricted to South America and is found in a wide range of habitats including cloud forests, swamps, and desert areas, from the high Andes to marshy lands. Despite the lack of knowledge and studies regarding population dynamics, as well as the scarcity or absence of exsiccatae for Alstroemeria in most of Brazil, the restricted geographic distribution for most species suggests the vulnerability of its taxonomic populations, mainly from anthropomorphic actions.


1. Alstroemeria albescens M. C. Assis, sp. nov. TYPE: Brazil. Rio Grande do Sul: Porto Alegre,
doi: 10.3417/2007073

Figure 1. Alstroemeria albescens M. C. Assis. —A. Vegetative stem. —B. Reproductive stem. —C. Inflorescence. —D. Tepals, the inner ones spotted. Drawn from the holotype Setibal 204 (ICN).

Morro São Pedro, 30°11'24"S, 51°06'42"W, 130–160 m, 21 Jan. 2007 (fl.), R. B. Setibal 204 (holotype, ICN; isotypes, HB, K, MO). Figure 1.
Table 1. Morphological characters distinguishing Alstroemeria albenscens, A. sellowiana, A. amabilis, and A. malmeana.

<table>
<thead>
<tr>
<th>Character</th>
<th>A. albenscens</th>
<th>A. sellowiana</th>
<th>A. amabilis</th>
<th>A. malmeana</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower color</td>
<td>white-lilac</td>
<td>yellow-orange</td>
<td>orange-red</td>
<td>red</td>
</tr>
<tr>
<td>Inner tepal pattern</td>
<td>ruby-spotted</td>
<td>ruby-spotted</td>
<td>ruby-spotted</td>
<td>unpatterned</td>
</tr>
<tr>
<td>Flower length</td>
<td>2.2–3 cm</td>
<td>2.1–3.2 cm</td>
<td>2.5–3.5 cm</td>
<td>1.8–2.2 cm</td>
</tr>
<tr>
<td>Flower scent</td>
<td>absent</td>
<td>present</td>
<td>absent</td>
<td>absent</td>
</tr>
</tbody>
</table>

Perennial herb ca. 0.7 m tall; rhizome with storage roots; stems cylindrical, glabrous. Leaves of the vegetative stem evenly distributed along the stem, not resupinate, blade linear, 1.5–11.5 x 0.4–0.5 cm, coriaceous, apex acuminate, base cuneate, both faces glabrous; leaves of the reproductive stem distributed along the stem, not resupinate, blade linear or linear-lanceolate, 1.5–6 x 0.4–0.6 cm, coriaceous, apex acuminate, base truncate, both faces glabrous. Inflorescence an umbel-like, composite cyme of 3 to 10 flowers; pedicel glabrous, 2–2.5 cm; bracts leaflike, chartaceous, 0.8–0.9 cm; bracteoles membranous, 0.3–0.5 cm. Flowers patent, campanulate, white-lilac, 2.2–3 cm; tepals 6 in 2 whorls; the outer tepals unpatterned, all 3 very similar, spatulate; the upper one ca. 2 x 0.8 cm; the lower two ca. 1.9 x 0.7 cm; the inner tepals ruby spotted, all 3 very similar; the upper two ca. 1.9 x 0.5 cm; the lower one ca. 1.9 x 0.5 cm; stamens 6, included, filaments glabrous, ca. 1–2 cm; stigma included, style glabrous, ca. 1.5–1.6 cm. Capsules 1.3–1.5 x 0.7–1 cm.

Habitat and distribution. Alstroemeria albenscens is endemic to the Morro São Pedro in Porto Alegre, state of Rio Grande do Sul, and is found on rocky outcrops at 130 to 160 m elevation.

IUCN Red List category. The new species is Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001), and needs further investigation.

Phenology. Flowers were collected from January to March.

Etymology. The epithet is from the Latin “albenscens,” meaning “becoming white” or “whitish,” in reference to the color of the flowers.

Discussion. Alstroemeria albenscens is characterized by its whitish lilac flowers and ruby-spotted inner tepals. The vegetative stems of this species are very similar to A. amabilis M. C. Assis, A. malmeana Kraenzlin, and A. sollowiana Seubert ex Schenk, which occur in the South Region of Brazil, from Paraná to Rio Grande do Sul states. The new species can be differentiated from these related taxa by the floral characters indicated in Table 1.


2. Alstroemeria calliantha M. C. Assis, sp. nov.

TYPE: Brazil. Minas Gerais; Santa Maria do Salto, 40°03′22″S, 16°24′19″W, 21 Feb. 2005 (fl.), J. R. Stehmann, J. A. Lombardi & R. C. da Mota 4007 (holotype, HBIC). Figure 2.

Hace species praecipe quod characteres florales Alstroemeria foliosa Martius ex Schultz & Schultz f. similina, sed ab ea foliis membranaceis subitus epappillosus per caules floriferum sparse distributa eongesta distinguitur.

Perennial herb 0.7–1 m tall; rhizome with storage roots; stems cylindrical, glabrous. Leaves of the vegetative stems congested at stem apices, resupinate, blade oblong or elliptic, 9.5–18.5 x 2.2–3.4 cm, membranous, apex acute, base attenuate, both faces glabrous; leaves of the reproductive stem sparsely distributed along the stem, not resupinate, reduced, blade lanceolate or narrowly lanceolate, 2–3 x 0.2–0.3 cm, membranous, apex acuminate, base cuneate, both faces glabrous. Inflorescence an umbel-like, simple cyme of 2 to 5 flowers; pedicels glabrous, to 2.7 cm; bracts leaflike, membranous, 1–3.5 x 0.1–0.4 cm. Flowers patent, campanulate, reddish or yellow-red, 4.7–5 cm; the outer tepals unpatterned, these 3 similar, ovate, apex mucronate, base attenuate; the upper one 4.4–4.7 x ca. 1.5 cm; the lower two 3.9–4 x 1.4–1.5 cm; the inner tepals ruby striped, these 3 similar, elliptic, apex acuminate, base attenuate; the upper two 3.8–4 x 0.5–0.7 cm; the lower one ca. 3.4 x 0.4 cm; stamens included, filaments glabrous, ca. 3–3.5 cm; stigma included, style glabrous, ca. 2.8–3 cm. Capsules not seen.

Habitat and distribution. Alstroemeria calliantha is found rarely in transitional areas of caatinga and rainforest, in forest underbrush, in the state of Minas Gerais.

IUCN Red List category. The new species is Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001), and needs further investigation.

Phenology. Flowers were collected in February.

Etymology. The species epithet is derived from the Greek “calli-,” meaning “beautiful,” and “anthos,” meaning “flower.”
Figure 2. *Astroemeria calliantha* M. C. Assis. —A. Vegetative stem. —B. Reproductive stem. —C. Tepals, the inner ones striped. Drawn from the holotype Stehmann et al. 4007 (BHCB).

Discussion. *Astroemeria calliantha* may be recognized by its membranous and glabrous leaves that are congested at the apex of the vegetative stem and the few membranous, reduced leaves that are sparsely distributed along the reproductive stem, as well as by the unpatterned outer tepals and ruby-striped inner tepals. This species is very similar to *A. foliosa* Martius ex Schultz & Schultz f., mainly in the floral
characters. The two species differ by the coriaceous leaves that are papillate abaxially and congested along both the vegetative and reproductive stems in *A. foliosa* (Table 2).

**Paratype.** BRAZIL. Minas Gerais: Santa Maria do Salto, Fazenda Duas Barras, 16°23′54″S, 40°03′39″W, 750 m, fl., J. A. Lombardi et al. 5941 (BHC B).

**Acknowledgments.** I am very grateful to Robberston Setúbal, a young enthusiastic botanist, who was the first person to collect *Alstroemeria albecens* and who introduced the species to me; to the staff of the Herbarium of the University of Minas Gerais for supplying material for the description of *A. calliantha*; and to Alex Teixeira, who drew the new species illustrations.

**Literature Cited**


Notes on the Flora of the Yucatán Peninsula IX: A Reappraisal of the Genus *Wimmeria* (Celastraceae), Including the New Species *W. lundelliana*

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**Abstract.** *Wimmeria lundelliana* Carnevali, R. Duno, J. L. Tapia & I. Ramírez (Celastraceae) from the Yucatán Peninsula Biotic Province (YPBP) is proposed as a new species. The novelty is described, illustrated, and its affinities discussed. It appears related to *W. obtusifolia* Standley, also from the Yucatán Peninsula, which is glabrous or glabrescent overall, with proportionally broader and blunter leaves. In comparison, an amplified description and iconography of *W. obtusifolia* are offered. An epitype is designated for *W. obtusifolia* to document the fruit morphology. A taxonomic overview of *Wimmeria* Schlechtendal & Chamisso in the YPBP is presented. The objectives of this paper are (1) to present a synopsis of the genus *Wimmeria* for the YPBP, (2) to provide a key to species identification, and (3) to describe a new species. An additional objective of this contribution is to provide an amplified description and iconography of *W. obtusifolia*, particularly of the fruits, which were previously undescribed.

**Key words.** Celastraceae, epitype, IUCN Red List, Mexico, *Wimmeria*, Yucatán Peninsula Biotic Province.

*Wimmeria* Schlechtendal & Chamisso (Celastraceae) is a tree or shrub genus occurring from Mexico to Panama (Moreno, 2001). The genus is vegetatively nondescript, with simple, alternate, coriaceous leaves, often clustered at the apices of branches. Leaves are frequently produced on abbreviated branches or brachyblasts. Flowers are typically celastraceous with a well-defined, fleshy, annular disk and five stamens. The most distinctive feature of the genus is the trigonous ovary that develops into a conspicuous, 3-winged, samara-like fruit resembling a Chinese lantern.

Lundell (1939) published a treatment of the genus *Wimmeria* and recognized 15 species assigned to subgenus *Euwimmeria* Lundell, with fruits longer than wide, and subgenus *Wimmeriella* Lundell, with fruits broader than long. The monophyly of these sections needs to be tested in a cladistic framework because the fruit distinction is fuzzy at best and a few species are difficult to place and seem intermediate (e.g., *W. concolor* Schlechtendal & Chamisso, *W. montana* Lundell, and *W. obtusifolia* Standley). However, for the purposes of this paper we prefer to follow Lundell’s proposal since it is the only classification scheme available.

Lundell (1939) included two species for the Yucatán Peninsula Biotic Province (YPBP) area. *Wimmeria bartlettii* Lundell in subgenus *Euwimmeria* occurs from Veracruz, Oaxaca, and Chiapas to Panama (Chiriquí). Within the YPBP, it occurs in Petén Department in Guatemala, but has yet to be collected within Mexican territory (Lundell, 1939; Moreno, 2001). *Wimmeria obtusifolia* has been assigned to subgenus *Wimmeriella* because of its shrubby habit and pubescent leaves and twigs and is apparently endemic to the state of Yucatán (Lundell, 1939).
Recent fieldwork within the framework of the Flora Ilustrada de la Península de Yucatán project revealed two morphologically different populations of Wimmeria in the Mexican portion of the YPBP. One of them appears to be restricted to northwestern Yucatán and is a perfect match to the type material of Standley’s W. obtusifolia, a species that apparently was not collected since Lundell’s collections in the late 1930s. A second set of populations, occurring in more humid areas of the YPBP, which has been erroneously identified as W. obtusifolia by previous workers and does not match any previously described species in Wimmeria, is herein proposed as a new species, thus bringing the total number of species in YPBP to three.

**KEY FOR WIMMERIA SPECIES IN THE YUCATÁN PENINSULA BIOTIC PROVINCE, MEXICO**

1a. Leaves lanceolate, lanceolate-oblong, or elliptic, 6–13.5 × 1.8–5.5 cm; petiole 7–12 mm long; inflorescence forked 2 to 4x; fruits at least 1.5× longer than wide. ........................................ W. bartlettii

1b. Leaves obovate to obovate-elliptic, or elliptic-suborbicular, 3–7 × 0.9–2.8 cm; petiole 3–8 mm long; inflorescence 1–2-branched; fruits wider than long, as long as wide to less than 1.2× longer than wide. ........................................ 2

2a. Leaves elliptic, 2–4.5 cm long, puberulent on both surfaces, apex obtuse or slightly rounded; fruits pale dull yellow to green-yellow with irregular reddish spots and blotches, 1.1–1.2 × 1–1.7 cm. .................................. W. obtusifolia

2b. Leaves obovate, elliptic to elliptic-suborbicular, 3.5–7 cm long, glabrous on both surfaces, apex rounded, retuse, rarely narrowly obtuse; fruits concolorous, 1.2–1.4 × 1.2–2 cm. W.lundelliana


**Distribution and ecology.** This species is found in Mexico (Chiapas, Oaxaca, and Veracruz), Belize (El Cayo and Toledo), Guatemala (Petén), south into Panama. In Guatemala this plant grows in sapodilla and mahogany forests (Lundell, 1939). These forest types are also present in the southern portions of Campeche and Quintana Roo states, thus its occurrence in the Mexican portion of the YPBP is likely.

**Discussion.** Wimmeria bartlettii belongs in subgenus Wimneriella with fruits longer than wide.


**Figure 1.**

Species haec Wimmeriae obtusifoliae Standley similis, sed ab ea foliis glaberrimis (vs. puberulis) latioribus apice rotundato vel emarginato, petalis laxis pilosis (vs. puberulis) atque fructibus concoloriosis majoribus differt.

**Tree 10–20 m high; young branches minutely and sparsely pilose. Leaves borne mainly at the apex of short branches, alternate, simple, coriaceous, drying light brown on both surfaces, slightly paler abaxially; stipules minute, caducous. Petioles 4–8 mm, shallowly canaliculate, sparse and minutely pilose; leaves subcoriaceous, blades obovate to elliptic, elliptic, or elliptic-suborbicular, 3.5–7 × 0.9–2.8 mm, apex rounded, retuse, or rarely narrowly obtuse, base attenuate, glabrous on both surfaces, nervation pinninerved, central nerve prominent abaxially, inconspicuous axially, secondary nerves arising at 45°–60° to central nerve at first, then curving distally, not reaching the margins or the apex, margin crenate, subcrenate to almost entire. Inflorescences usually 7-flowered cymes, sometimes reduced to 1 flower, 1.5–2.5 cm, peduncle 9–12 mm, minutely pilose, first-order branches ca. 2 mm, second-order branches 1-flowered, ca. 2 mm, pedicle 4–5 mm, floral bracts ca. 1 mm, narrowly triangular, concave, sparsely and minutely pilose. Flowers perfect, actinomorphic, bisexual; calyx 5-lobed, lobes subequal, transversely oblong, apex broadly rounded, 0.3–0.5 × 1.5–2 mm, glabrous on both surfaces; corolla pentameric, imbricate, petals ovate, 3–3.5 × ca. 2 mm, apex obtuse, glabrous on both surfaces; stamen 5, inserted on margin of disk, ca. 2.5 mm, alternate to petals, filaments filiform, ca. 2 mm, glabrous, anthers basifixed, sagittate, 2-celled, longitudinally dehiscent, disk conspicuous, 5-lobate, surrounding the ovary, fleshy; ovary 2- to 3-keeled, 3-celled, base submerged in disc, ca. 1.5 mm high, style ca. 1 mm long, glabrous, stigma capitulate, sometimes 2-
to 3-fid. Fruits 3(rarely 2)-winged, depressed-orbicular, 1.2–1.4 × 1.2–2 cm, concolorous, notched at apex and base, crowned at apex by the persistent stigma and style, glabrous, indehiscent; wings membranous, with numerous fine, closely set, nearly parallel veins almost perpendicular to fruit axis.

Distribution and ecology. The new species is endemic to the Yucatán Peninsula in Mexico, only known from the south-central and eastern portions of Campeche and Quintana Roo states. It grows in subcaducifolious medium-statured forests with an annual precipitation of 1100–1400 mm (Carnevali et al., 2003).

IUCN Red List category. Wimmeria lundelliiana can be classified as Endangered (EN) according to IUCN Red List criteria B1ab (IUCN, 2001). It has only been collected in two localities, which are ca.
350 km distant from each other. One of these localities resides within the Calakmul Biosphere Reserve, where it is legally protected. The second known locality, however, is along the Cancún–Tulúm road, where touristic development is a major threat.

**Etymology.** The species epithet honors Cyrus Longworth Lundell (1907–1994), a prolific botanist who spent much of his career working in Central America, including the Yucatan Peninsula.

**Discussion.** *Wimmeria undulata* belongs to subgenus *Wimmeriella* because of its fruits that are wider than long. There are four species of *Wimmeria* in southeastern Mexico that form a natural alliance, referred to as section *Trichocarpae* Radlkofner in 1873 (cited by Lundell, 1939: 9): *W. microphylla* Radlkofner, *W. pubescens* Radlkofner, *W. obtusifolia*, and *W. cyclocarpa* Radlkofner. *Wimmeria undulata* seems to belong in this alliance, although it is unusual in featuring glabrous fruits and leaves. The new species resembles *W. obtusifolia* but differs in the leaves that are longer (3.5–7 mm vs. 2–4.5 mm), usually obovate with apex rounded to emarginate (vs. elliptic with apex obtuse), and glabrous (vs. puberulent on both surfaces), and in the fruits that are 1.2–1.4 x 1.2–2 cm (vs. 1.2 x 1.7 cm). The new species resembles *W. acapulcensis* Lundell (from another alliance, Leiocarpae Radlkofner, with four species from western Mexico), but the leaves of the western Mexican species have longer petioles (5–15 mm vs. 4–8 mm) and the leaves are narrower (narrowly ovate to ovate vs. generally obovate, elliptic, or elliptic-suborbicular).


**Trees** to 15 m high; young branches whitish, puberulent, older branches often lenticellate. **Leaves** small, slightly discolorous, chartaceous, brittle; petioles puberulent, 3–6 mm; blades elliptic, 2–4.5 x 1–2.5 cm, apex obtuse, sometimes slightly rounded, base acute, attenuate, margin subentire, inconspicuously crenate, sparsely puberulent on both surfaces, middle nerve distinct on adaxial surface, less distinct abaxially. **Inflorescences** cymose, to 2 cm, puberulent, lax, 3–7-flowered, 1.5–2 cm, peduncle 7–9 mm, minutely pilose, first-order branches ca. 0.5–1.5 mm, second-order branches 1-flowered, ca. 2 mm, pedicle 4–7 mm, floral bracts ca. 1 mm, triangular, concave, sparsely and minutely pilose. Flowers white, bracts and bracteoles inconspicuous; **calyx** 5-lobed, the lobes equal, rounded, 1–2.5 x 1–2.5 mm, apex obtuse, puberulent; **corolla** pentameres, infibricate, petals obovate to suborbicular, 3–4 x 2 mm; **stamens** 5, inserted on margin of disk, 3–4 mm, alternate to petals; filaments 2–3 mm, anthers ca. 1 mm, disc black-punctate. **Ovary** 3-keeled, 3-celled, base embedded in the disc, ca. 1.5 mm long, style ca. 1.5 mm, glabrous, stigma 3-fid. **Fruits** sparsely puberulent, 3-winged, 1–1.2 x 1–1.7 cm, pale dull yellow to green-yellow with irregular reddish spots and blotches.

**Distribution and ecology.** *Wimmeria obtusifolia* is endemic to the Yucatán Peninsula and is known only from northern Yucatán and Quintana Roo states in Mexico. The species grows in low deciduous forest with an annual precipitation of 500–600 mm, ranging eastward into subacuclimofolios medium-statured forests with an annual precipitation of 1100–1200 mm (Carnevali et al., 2003).

**IUCN Red List category.** *Wimmeria obtusifolia* can be classified as Endangered (EN) according to IUCN Red List criteria B2ab (IUCN, 2001). It has been collected in three localities on a narrow belt of ca. 300 km along the central zone of Yucatán and northern Quintana Roo states. These localities are affected by high anthropogenic impact due to touristic developments (Quintana Roo) and by land-use changes resulting from agriculture and cattle ranching.

**Discussion.** *Wimmeria obtusifolia* was described by Standley (1930) in his *Flora of Yucatán*, from a collection of G. F. Gaumer (24259, MO) made between 1917 and 1921 from northern Yucatán. *Wimmeria obtusifolia* was referred by Lundell (1939) to subgenus *Wimmeriella*, despite the fact that fruiting material was unavailable. Because classifications of *Wimmeria*, at both the sectional and subgeneric levels, are essentially based on fruit characteristics, we propose an epitype above. The shape of the fruits collected recently supports the referral of *W. obtusifolia* to subgenus *Wimmeriella*. Some relevant litera-
ture for the YPBP area treats the collections from Calakmul as *W. obtusifolia* (Durán et al., 2000; Martínez et al., 2001), but these collections are better referable to the new species, *W. lundelliana*.

Selected specimens examined. MEXICO. Quintana Roo: Mun. Solidaridad, 8 km S de Puerto Morelos, carr. Cancún–Chetumal, 20°47′50″N, 86°56′25″W, 0 m s.m., 22 ene. 1989 (fl.), I. Olmstead 290 (CICY). Yucatán: Mun. Tetiz, Nohuayún, a 800 m de la Escuela Secundaria de Nohuayún, 20°57′41″N, 89°56′09″W, 15 m, 20 oct. 2006 (fl., fr.), L. María Caneo s.n. (CICY, MEXU, MO); Mun. Chixcúbol, entre Chixcúbol Puerto y Chixcúbol Pueblo, 21°14′8.61″N, 89°31′58.13″W, 5–8 m, 13 nov. 2008, G. Carnevali, R. Duro, J. C. Trejo & D.
Acknowledgments. We thank Bruno Manara for the line drawings of *Wimmeria lundelliana* and *W. obtusifolia*. Luz María Calvo (CICY) prompted our interest in this genus after providing us with an excellent collection of *Wimmeria*, which proved to be the rediscovery of *W. obtusifolia*. Jorge Carlos Trejo Torres, of Ciudadanos del Karso, carefully read an earlier draft of the manuscript.

Literature Cited


Matelea quindecimlobata (Apocynaceae, Asclepiadoideae), a New Species from Amazonas, Brazil

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ABSTRACT. Matelea quindecimlobata Farinaccio & W. D. Stevens, a new species of Asclepiadoideae, Apocynaceae, from Amazonas, Brazil, is described and illustrated. The most diagnostic aspect of this new species of Matelea Aublet s. str. is the lobed, then fimbriate outer margin of the outer corona.

RESUMO. Matelea quindecimlobata Farinaccio & W. D. Stevens, uma nova espécie de Asclepiadoideae, Apocynaceae, do Amazonas, Brasil, é descrita e ilustrada. Apresenta a margem externa dos segmentos da corona lobado-fimbriada, característica diagnóstica, que a distingue das espécies relacionadas a Matelea Aublet s. str.

Key words: Amazonas, Apocynaceae, Asclepiadoideae, Brazil, IUCN Red List, Matelea.

Matelea Aublet (Asclepiadoideae, Apocynaceae) belongs to the New World subtribe Gonolebiinae of the tribe Asclepiadeae, which can be distinguished within the subfamily by having the pollinia partially sterile and excavated on one or both faces and oriented more or less horizontally along the margin of the style apex (Stevens, 1988). The genus in the broad sense comprises about 300 species (Morillo, 1997) and is abundant and diverse in the tropical areas of the mainland of North and South America (Spellman, 1978). The southern Mexico–Guatemala region appears to be the center of diversity of the genus, with a possible secondary center in southern South America (Spellman & Dwyer, 1973). During the preparation of the treatment for the flora of the Ducke Reserve, Central Amazon, Brazil, one new species of Matelea was recognized and is here described and illustrated.

Matelea quindecimlobata Farinaccio & W. D. Stevens, sp. nov. TYPE: Brazil. Amazonas: Presidente Figueiredo, AM 210, Km 20, Igarapé da Onça, Corredeira da Pantera, 17 July 2008 (fl.), M. A. Farinaccio, V. V. Seudeller & E. N. dos Santos-Silva 750 (holotype, SPF; isotypes, B, ESA, F, HRCB, HUEFS, INPA, K, MBM, MO, NY, RB, SP, SPF). Figure 1.

Hae species a Matelea stenopetala Sandwith et speciebus ei affinitibus lobis coronae exterioris liberis lobulatis-fimbriatis differt.

Vines, twining to the right, older stems woody and covered with thick, ridged, spongy, fissured, tan-colored cork, young stems with inconspicuous mixed indumentum, long trichomes sparse, translucent, in 2 lines, patent, 0.3–0.4 mm, short trichomes dense, translucent, ca. 0.05 mm, glandular trichomes dense, pale brown, ca. 0.05 mm, glabrescent, internodes 6–20 cm. Leaves opposite, blades elliptic, 8–15 × 7.5–9.3 cm, apex acute to acuminate, base obtuse to rounded, glabrous or with sparse short and glandular trichomes on midrib, lateral veins 4 to 8 pairs, diverging 55°–65° from midrib, collertes 1 to 6 at abaxial base; petiole 1.5–3 cm, with sparse mixed indumentum. Inflorescence congested-racemiform, peduncle 1–6 mm, with sparse mixed indumentum, becoming corky with age, axis 4–5 mm, covered with pedicel scars, pedicel 6.5–12 mm, with mixed indumentum or long trichomes absent, canaliculate when dry, bracts 0.7–1.1 × 0.4–0.7 mm, deltate to ovate, with dense short and glandular trichomes. Calyx divided to base, with 1 collerter per sinus, lobes elliptic, 1–1.9 × 0.8–1.1 mm, apex acute to rounded, green, sharply reflexed, with dense short and glandular trichomes outside, glabrous inside; corolla very briefly campanulate then rotate, white, drying with pale brown veins, adaxially glabrous, abaxially with inconspicuous short and glandular trichomes distally, tube 0.8–1.1 mm, lobes elliptic, 3–5 × 1.5–2.4 mm, apex rounded to acute, patent; gynostegium stipe 0.9–1.1 mm tall, corona of 2, 5-lobed, fleshy, glabrous skirts covering stipe of gynostegium, outer corona lobes 5, free, opposite anthers, dark colored when dry, base horizontal and overlapping the corolla.

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tube, each lobe trapezoidal in outline, outer margin deeply and irregularly 3- to 6-lobed-fimbriate with the lateral lobules broader than the central lobule(s), 0.4–0.5 × 0.9–1 mm, above the base a vertical lobule adnate to gynostegium stipe, this attenuate with tip touching anther base, 0.3–0.4 mm tall, inner corona lobes between erect outer corona lobules, elliptic, concave, 0.6–0.9 × 0.5–0.7 mm, terminal appendages appressed to margin of style apex, ca. 0.2 × 0.3–0.9 mm; corpusculum 0.14–0.19 × 0.08–0.09 mm, sagittate, pale brown, caudicles 0.05–0.1 × 0.06–0.08 mm, pollinia 0.33–0.46 × 0.22–0.25 mm, obovoid, sterile and deeply excavated on proximal half near center; style apex 1.8–1.9 mm wide, pentagonal, nearly circular, shallowly concave; ovaries smooth. Follicles and seeds unknown.

Distribution and habitat. Matelea quindecimlobata occurs in primary terra firme rainforest. The term terra firme is applied to all forests that are not seasonally flooded by the rivers. Different habitats can be recognized within what is called terra firme; forests of plateaus, slopes, white sands, and valley bottoms are defined mainly by the type of soil and this is associated with the variation in elevation and slope in the area (Ribeiro et al., 1999). The new species has been collected along streams in clearings (igarapé) in valley-bottom forest (baixio) that is characterized mainly by sandy soil, a waterlogged state during the wet season, and the accumulation of sediments.

IUCN Red List category. The new species occurs in Reserva Ducke, an area of protected primary forest, 25 km northeast of Manaus. Matelea quindecimlobata could be considered as Vulnerable (VU) under IUCN Red List criteria (IUCN, 2001), not only because the population is small, but also because it has a restricted distribution and has been found in places near Manaus that are prone to the effects of human activities, e.g., tourism (Cachoeira Baixa do Tarumã and Corredeira da Pantera).

Phenology. Matelea quindecimlobata is known to flower in April, July, August, October, and December.
Etymology. The specific epithet is an allusion to its corona, which is divided (radially) into five distinct lobes, and each of these lobes is more or less divided into three lobules.

Relationships. *Matelea quindecimlobata* belongs to a small group of species including the type of *Matelea*, *M. palustris* Aublet, and *M. stenopetala*, which are mostly restricted to riverine habitats in the Amazon Basin. These are shrubs or vines with prominent corky bark, a mixed indumentum, small flowers in indeterminate congested-racemiform inflorescences with closely spiraled scars, and a corona with the outer lobes horizontal at the base of the gynostegium stipe and the inner corona lobes adnate to the stipe. The other species of this group have the outer corona discoid, without free lobes, with the outer margin entire or at most pentagonal, while the new species has five free lobes that are then lobed again. *Matelea quindecimlobata* is probably most closely related to *M. stenopetala*.


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Literature Cited


Three New Species of *Indigofera* (Leguminosae) from China

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**Key words:** China, *Indigofera*, IUCN Red List, Leguminosae.

*Indigofera* L. is the third largest genus in Leguminosae with ca. 750 species, and 81 species were documented in the Chinese-language *Flora of China* (Fang & Zheng, 1994). In preparing the treatment of *Indigofera* for the English-language *Flora of China* (Gao & Schrire, 2009), several new species have come to light. Two new species were previously described by Gao (2007), and three new species are described here.

1. *Indigofera shipingensis* X. F. Gao, sp. nov.

**TYPE:** China. Yunnan: Shiping Co., 21 Apr. 1961, s. coll. 106 (holotype, KUN). Figure 1.

Hae specie sa *Indigofera caloneura* Kurz foliolis utrinque trichomatis adpressis brunneis mediflexis vestitis, vexillo dorsi-alter trichomatis patulis lenticbus albo-pubescentae atque staminum vagina 6–7 mm longa differt.

**Discussion.** *Indigofera shipingensis* is similar to *I. caloneura*, but its leaflets are pubescent on both surfaces (vs. adaxial surface glabrous in *I. caloneura*), the standard is white pubescent dorsally (vs. strigose

with stiff brown biramous hairs), and the staminal sheath is 6–7 mm long (vs. 8–10 mm).

2. *Indigofera megaphylla* X. F. Gao, sp. nov.

TYPE: China. Yunnan: Yuanjiang Co., Wadi, 23°31′55″N, 102°16′44″E, 1575 m, 19 Apr. 2008, Xin-Fen Gao & Bo Xu 10057 (holotype, CDBI; isotypes, CDBI, K, MO). Figure 2.

Hace species ab *Indigofera dichroa* Craib et L. boldeniana Craib foliolis majoribus utrinque sicut ramis petiolis pedunculisque dense patule-pubescentibus, foliolorum venatione manifesta supra impressa infra prominente, racemis 5–13 cm longis atque pedunculis 3–5 mm longis differunt.

Shrub 1–2 m tall; stems with dense spreading equally biramous brownish hairs. Leaves 12–15 cm, (1)3- to 5(7)-foliolate; petiole 30–50 mm, petiole and rachis terete, both with sparse brownish hairs; stipules narrowly triangular, 5–6 mm; leaflets oblong or ovate to obovate-oblong, 3–8 × 4–6 cm, abaxially with long white biramous hairs, adaxially with short spreading brownish biramous hairs, base rounded to cuneate, apex obtuse or emarginate, primary to tertiary venation markedly impressed adaxially and prominent abaxially, lateral veins in 9 to 14 pairs; petiolules 3–4 mm; stipels 2–3 mm. Racemes 5–13 cm, including a peduncle of 3–5 mm, peduncle and rachis with very
Figure 2. *Indigofera megaphylla* X. F. Gao. —A. Flowering branch. —B. Fruit. Drawn by Jian Gu from the holotype *Gao & Xu 10057* (CDBI) for A and G. D. Tao 38875 (HITBC) for B.

dense spreading brown hairs; bracts ovate, ca. 2.5 × 1.2 mm, with adpressed hairs; pedicels 0.5–1 mm. Calyx 2.5–3 mm, the lobes narrowly triangular, ca. twice the length of the tube, densely spreading hairy; corolla purple, 7–9 mm, standard ovate-oblong, 4–4.5 mm wide, dorsal surface with densely spreading soft white hairs; wings narrowly oblong, 1.6–1.8 mm wide, ciliate at the margin, keels densely spreading white pubescent distally and along lower margin, spur to 1 mm; staminal sheath 5.5–6 mm, anthers glabrous; ovary densely pubescent with white and brown hairs. Pod (3–)4–5 cm, with densely spreading gray or pale
brown hairs, endocarp not blotched; seeds 9 to 12, dark brown.

Ecology and distribution. The new species occurs in Yunnan, China, growing in thickets and along roadsides between 1200 and 1600 m in elevation.

IUCN Red List category. Indigofera megaphylla is known only from a small area in two adjacent counties in southern Yunnan and grows commonly in thickets. The population size was estimated to number between 250 and 1000 mature individuals, and this species is best assessed as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

Etymology. The specific epithet is from the Greek "megas," meaning "large," and "phyllon," meaning "leaf."

Discussion. Indigofera megaphylla is similar to I. dichroa and I. balfouriana, but these latter species have much smaller leaflets (1–4 cm vs. 5–8 cm long in I. megaphylla) and the secondary and tertiary venation is not impressed adaxially as in I. mega-
phylla. Both species have longer peduncles (5–15 mm vs. 3–5 mm long in *I. megaphylla*) and shorter racemes (2–6 cm vs. 5–13 cm long).

*Paratypes.* CHINA. Yunnan: Yuanjiang Co., Wadi, 1400 m, 7 June 1984, Gao-Da Tao 38875 (HTBC); 1200 m, 7 June 1984, Gao-Da Tao 38883 (HTBC); Shiping Co., Niuje, 1380 m, 9 Dec. 1988, Ya Tang 88-34 (KUN).

3. *Indigofera pseudoheterantha* X. F. Gao & Schrire, sp. nov. TYPE: China. Sichuan: Daocheng Co., Riwa, Kanggu Village, 2800 m, 11 Aug. 1982, Vegetation Exp. 29174 (holotype, CDBI), Figure 3.

Hace species *Indigofera heterantha* Wallich ex Brandis affinis, sed ab ea stipula triangularibus ca. 1 mm longis, foliis (5)-7- to 11(13)-foliatis, stipulis absentes, calycis ca. 2 mm longo atque staminum vagina 11–12 mm longa differt.

Shrub 0.2–3 m tall; stems ribbed, strigose with equally biseriate adpressed minute white and scattered brown hairs. Leaves 1.5–3 cm, (5)-7- to 11(13)-foliata; petioles 4–7 mm, petiole and rachis with adpressed white hairs; stipules triangular, ca. 1 mm; leaflets elliptic to oblong, 4–9 × 2–4 mm, both surfaces with adpressed equally biseriate white hairs but sometimes sparser adaxially, base cuneate or rounded, apex rounded to obtuse, lateral veins not visible; stipels absent. Racemes 1–4 cm, including a peduncle of ca. 10 mm, laxly 1- to 25-flowered; bracts 1.5 mm, subulate; pedicels 2–4 mm. Flowers 12–13 mm; calyx ca. 2 mm, lobes lanceolate to triangular, equalizing or up to twice the length of the tube; corolla greenish and rose to purple; standard dorsal surface strigose with adpressed white hairs; wings ciliate at margin, keels with adpressed hairs at apex; staminal sheath 11–12 mm, anthers ovoid, mucronate, glabrous; style 4–5 mm. Young pods 2.5–3 cm, with minute adpressed hairs.

Ecology and distribution. This species is found in southwestern Sichuan and northwestern Yunnan, China, in sunny and dry bushland, grassland, open rocky areas, and near roadsides, from 1260 to 2900 m.

*IUCN Red List category.* During a 2007 field expedition, the first author observed the number of mature individuals to be fewer than 50 and noted that the species is extremely vulnerable to habitat change. Also taking into consideration extent of occurrence and habitat preference, *Indigofera pseudoheterantha* can be assessed as Critically Endangered (CR) according to IUCN Red List criteria (IUCN, 2001).

Etymology. This species epithet refers to its resemblance to *Indigofera heterantha*.

Discussion. *Indigofera pseudoheterantha* differs from *I. heterantha* in having triangular stipules ca. 1 mm long (vs. stipules linear-attenuate and 2–6 mm in *I. heterantha*), stipels absent (vs. present), leaves (5)-7- to 11(13)-foliate (vs. 13- to 25-foliate), calyx ca. 2 mm long (vs. 2.5–4 mm), and staminal sheath 11–12 mm long (vs. 8–10.5 mm).


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Literature Cited
Eleocharis tenarum (Cyperaceae), a New Species from Durango and Zacatecas, Mexico

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ABSTRACT. *Eleocharis tenarum* S. González & M. González (Cyperaceae), an endemic to dry temperate forests in Mexico, is described from Zacatecas and Durango. It belongs to *Eleocharis* R. Brown sect. *Eleocharis* subser. *Truncatae* Svenson s.l. and can be recognized by its basally burgundy to rose-purple upper sheaths with oblique, not truncate or cuspidate apex, and its dark brown achenes that are finely reticulate with longitudinally elongated cells.

RESUMEN. Se describe *Eleocharis tenarum* S. González & M. González (Cyperaceae), nueva especie endémica de bosques de clima templado seco de los estados de Durango y Zacatecas, México. Forma parte de *Eleocharis* R. Brown sect. *Eleocharis* subser. *Truncatae* Svenson s.l. y se reconoce por sus vainas superiores husamente de color rojo-vino a rosa-púrpura, con ápice oblicuo, no truncado ni cuspidado, y por su aquenio de color café oscuro finamente reticulado con celdillas longitudinalmente alargadas.

Key words: Durango, Eleocharis, IUCN Red List, Mexico, Zacatecas.

*Eleocharis* R. Brown (Cyperaceae) includes a wide diversity of groups (González & Peterson, 1997; González & Tena, 2000). No recent comprehensive worldwide taxonomic treatment of *Eleocharis* is available (Smith et al., 2002), and many species remain undescribed in Latin America. The subseries *Truncatae* Svenson (Svenson, 1932) includes species with the apex of the upper sheath truncate and usually cuspidate as well as other plants similar to the typical *Truncatae* in most aspects, but having the apex of the upper sheath oblique and not cuspidate. The species here described belongs to subseries *Truncatae* in this broad sense.

Eleocharis tenarum S. González & M. González, sp. nov. TYPE: Mexico. Zacatecas: Mpio. Sombrerete, Parque Nac. Sierra de Órganos, por vereda hacia la casadita, en sitio arenoso cerca de arroyo, en bosque de Pinus cembroides y Quercus, 23°46’23”N, 103°47’38”W, 2350 m, 9 Aug. 2003, S. González 6808 con Georgina Tena (holotype, CIIDIR; isotypes, ENCB, IEB, MEXU, MO). Figure 1.

Perennial, loosely caespitose, from ascendant to nearly vertical rootstocks from a horizontal rhizome; culms erect, somewhat stiff, 8-24(-31) cm × 0.6-9 mm, quadrangular and deeply sulcate or several-ridged, usually compressed, 0.3-0.4 mm thick, pale green, shiny. Basal sheaths loose, scariosus, stramineous to pale purple-tinged, subtruncate to slightly oblique and rounded at the apex, easily disintegrating and often absent in herbarium specimens; upper sheath tight, cylindric, 1.2-4 cm, proximally deep burgundy to rose-purple or purple-rotiolate, distally pale green or stramineous, the apex of the upper sheath oblique and acute or slightly oblique and rounded at the apex, the mouth truncate to concave, the margin membranous, stramineous and minutely red-dotted or ± firm and callous, reddish or purple, lacking a cusp but sometimes the dorsal vein prolonged into a mucro not reaching the margin of the sheath or surpassing it by only 0.1-0.2 mm. Spikelets lanceoloid to ovoid-lanceoloid or narrowly fusiform, often somewhat compressed, 4.1-9.5 × 1.8-


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2.3 mm, acute to subaeminate, rachilla 0.3–0.4 mm wide, ca. 13- to 26-flowered; floral scales polystichous, loosely arranged, appressed or subappressed, (2.2–)2.3–2.7 mm, 0.5–0.8 mm wide in lateral view, narrowly ovate, obtuse to acute, the midvein stramineous or reddish, the flanks membranous, burgundy to red-purple, the margins and apex scarious, colorless, hyaline, cellulose-reticulate, 0.1–0.3 mm long; lowermost scale empty, amplexicaul in immature spikelets, later subamplexicaul, ovate, 1.8–2.4 mm, 1/5–1/3 the length of the spikelet, the apex translucent, to 0.8 mm, rounded to broadly acute; subprox-
imal scale empty or with flower. Perianth present, of ca. 5 to 7 erect bristles appressed to achene, quite variable in length, 0.1–1 mm, shorter than achene or equaling the achene body, colorless or slightly reddish brown, translucent, retrorsely securiform with colorless irregular spines; style trifid; stamens 3, filaments 1.9–2.2 mm, not or barely exerted, colorless to pale reddish brown, anthers 1.1–1.3(–1.5) mm, yellow, the connective shortly prolonged. Achene 1.2–(1.3) mm including base and tubercle, the body (0.8–)0.9–1 × (0.65–)0.7 mm, trigonous with blunt slightly costulate angles and convex sides, obovoid to obpyriform in outline, chocolate to reddish or dark brown, finely striate-reticulate with many rows of longitudinally elongated cells, appearing nearly smooth to somewhat irregular, glossy, when immature yellow or lemon-green, reticulate and dark striolate; stylolase pyramidal to deltoid, slightly spongy, whitish, sometimes reddish brown, acute or minutely denticulate at the summit, contrasting with the color of the body of achene, 0.2–0.3 × 0.2–0.3 mm at the base.

Distribution and habitat. *Eleocharis tenarum* is known from the southern Durango and Zacatecas, Mexico, on low mountains and on the eastern side of the Sierra Madre Occidental. It grows in patches in open, sandy or gravelly sites on igneous rocks between 2300 and 2700 m.s.m., in areas that may temporarily flood but that are dry most of the year. It is found in dry forests (*Pinus cembroides* Zuccarini and *Quercus* L.) or in semi-humid *Quercus–Pinus* L. forests, often associated with annual herbs, mainly *Tagetes micrantha* Cavallines and *Muhlenbergia* Schreber.

IUCN Red List category. *Eleocharis tenarum* should be considered Near Threatened (NT) according to IUCN Red List criteria (IUCN, 2001) given its restricted, patchy distribution, habitat degradation by overgrazing practices, and the rapid changes that are occurring in the temperate forests of the region.

Etymology. It is a pleasure to dedicate this species to Georgina A. Tena-González and Sandra M. Tena-González, daughters of two of the authors (MSGE and JATF). They have enthusiastically participated in many botanical surveys of the CIDHIR herbarium, including the collection of the type of this species.

Discussion. *Eleocharis tenarum* belongs in *Eleocharis* subg. *Eleocharis* sect. *Eleocharis*. In its general aspect, it is morphologically similar to Mexican representatives of subseries *Truncatae*, especially *E. dombeyanus* and *E. parshii*, from which *E. tenarum* differs in the oblique, nontruncate and noncuspitate apex of the upper sheath, the burgundy to rose color of the upper sheath, the achene that is finely reticulate with longitudinally elongated cells, and the conic, not nucrinitate or lanceolate stylolase. From *E. monteviedensis* Kunth and *E. ignota* S. González & Reznick, it differs in the apex of the upper sheath, the shape and color of the spikelet and floral scales, and the more finely reticulate achene. *Eleocharis tenarum* appears to be related to the complex of *E. albibracteata* in the similar apex of the upper sheath, but it differs mainly in its longer culms, longer and narrower spikelets with more flowers, longer proximal floral scale, and the more finely reticulate, humpy achene. A comparison of these species is presented in a key.

**Key to *Eleocharis tenarum* and Morphologically Related Species**

1a. Apex of the upper sheath oblique and acute or slightly oblique and rounded at the apex, membranous to slightly callous, without a cusp, sometimes a macro 0.1–0.2 mm present .................................................. 2

2a. Culms deeply sulcate; lase of the upper sheath deep burgundy to rose-purple or purple-striolate; spikelets lanceoloid to ovoid-lanceoloid or narrowly fusiform, 13–26-flowered; floral scales burgundy to red-purple; achene (0.65–)0.7 mm wide, finely striate-reticulate with longitudinally elongated cells (30×). *E. tenarum* 2b. Culms slightly sulcate; lase of the upper sheath purple or brown; spikelets ellipsoid to subfusiform, 2–8-flowered, floral scales reddish brown to almost black, colorless when immature; achene 0.7–0.9 mm wide, reticulate (30×) .................................................. *E. albibracteata*

1b. Apex of the upper sheath truncate to very slightly oblique, callous, with a cusp (0.1–)0.5–2 mm long .............................................. 3

3a. Rhizomes thick, ligneous, not creeping; cusp on apex of the upper sheath (0.5–)0.8–2 mm long, 0.1–0.2 mm wide at the base .................................................. *E. ignota* 3b. Rhizomes slender, creeping; cusp on apex of the upper sheath 0.1–1.2 mm long, 0.2–0.3 mm wide at the base .................................................. 4

4a. Spikelets ovoid, ellipsoid, or subcylindrical; apex of floral scales broadly rounded, usually horizontally wrinkled; achene surface coarsely reticulate, appearing subcancellate (30×); stylolase pyramidal to deltoid, 0.1–0.3 mm long .................................................. *E. monteviedensis* 4b. Spikelets ovoid, narrowly lanceoloid, or cylindrical, acute to subacute; apex of floral scales rounded to acute, not wrinkled; achene surface almost smooth to reticulate (30×); stylolase mucroniform to lanceoloid, 0.2–0.5 mm long .................................................. 5

5a. Floral scales dark purple to almost black; achene broadly obovoid to obpyriform, 0.7–1 mm wide, nearly smooth (30×) .......................... *E. dombeyanus* 5b. Floral scales brown to purple; achene ellipsoid or obovoid to narrowly obpyriform, 0.5–0.7 mm wide, reticulate (30×) .................................................. *E. parshii*

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Literature Cited


A New Species of Elymus (Gramineae, Triticeae) from Eastern Australia

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Abstract. A new species, *Elymus* *fertilis* Song Wang ex S. W. L. Jacobs & Barkworth (Gramineae, Triticeae), is described from New South Wales and Queensland, Australia, with a New South Wales specimen being designated as its holotype. *Elymus fertilis* is similar to *E. multiflorus* (Banks & Solander ex Hooker f.) A. Löve & Connor, but differs in having longer awns on the lowest lemma of the spikelet and in growing mostly on basic soils of volcanic origin, whereas *E. multiflorus* is more common on alluvial soils. A key is supplied for the Australian species of Elymus.

Key words: Elymus, Gramineae, IUCN Red List, Poaceae, Triticeae.

For a long time, only one species of what is now treated as *Elymus* L. was recognized in Australia, *E. scaber* (R. Brown) A. Löve or, as it used to be called, *Agropyron scabrum* (R. Brown) P. Beauvosis. This species was, however, known to be diverse (see, e.g., Rees, 1972) and was frequently referred to as a complex. With further study, additional taxa have been recognized. Thus, in 1989 Stanley and Ross recognized three taxa in southeastern Queensland: two species, *E. scaber* and *E. multiflorus* (Banks & Solander ex Hooker f.) A. Löve & Connor, and two subspecies, *E. scaber* var. *scaber* and *E. scaber* var. *plurineris* (Vickery) B. K. Simon. Subsequently, Wang and Henwood (1999) recognized one additional species, *E. rectisetus* (Nees in Lehmann) A. Löve & Connor, as growing in Australia. In her doctoral thesis, however, Wang (1999) recognized variety *plurineris* at the species level and documented the existence of a hitherto unrecognized species for which she suggested the epithet “fertilis.” Two of the specimens that she cited as belonging to this new species, Wang 95140 and 95158, are cited as *E. multifloris* in Wang and Henwood (1999).

Wheeler et al. (2002) and Wang and Jacobs (2002) followed the recommendations Wang (1999) made in her thesis, recognizing the two species as species A and B, with species A corresponding to *Elymus scaber* var. *plurineris* and species B to the new taxon. More recently, Connor (2005) raised *E. scaber* var. *plurineris* to specific rank, naming it *E. plurineris* (Vickery) Connor, a decision that is well supported by morphological information (Murphy & Jones, 1999). This paper concerns species B, the previously unrecognized taxon. We are convinced that it merits recognition as a distinct species on the basis of its morphological, ecological, and molecular distinction from other species in the *E. scabrus* complex (Wang, 1999; Wang & Jacobs, 2002). To reduce the confusion resulting from its lack of a name and to provide a name for the next edition of Wheeler et al. (2002), we describe it here, using the epithet *fertilis* as suggested by Wang (1999), and provide a key to all the Australian species of *Elymus* to aid others in identifying them.

*Elymus fertilis* S. Wang ex S. W. L. Jacobs & Barkworth, sp. nov. TYPE: Australia. [New South Wales]: urban area, Moree, 29°28’S, 149°51’E, 13 Oct. 1988, N. Lloyd 759 (holotype, NSW 220373). Figure 1.

*Elymo multifloro* (Banks & Solander ex Hooker f.) A. Löve & Connor similis sed ab eo speculce lemmae infimo plerunque arista longiore et lemmatis superne arista longiore quam corpore mutatis differit.

Caespitose perennial to ca. 55 cm tall; culms erect or drooping, 0.7–1.7 mm diam., glaucous, 3- to 6-noded. Basal leaf sheaths glabrous or hairy, smooth; margins hyaline or membranous; auricles 0–1.9 mm, glabrous; ligules 0.4–0.5 mm, membranous, truncate; collar glabrous or hairy; blade flat, to ca. 20 cm × 1.8–4.7 mm, adaxially glabrous or scabrous or hairy, abaxially glabrous or scabrous. Inflorescence axis 21–70 cm; peduncles glabrous or scabrous; internodes 20–38 mm, glabrous or scabrous. Spikelets 5 to 10 on the rachis, solitary at each node, the flat side against the axis, 26–39 mm, with 4 to 9 florets, the spikelets...
equal to the internode length; glumes subequal; lower glume 4.8–6.1 × 0.8–1.2 mm, glabrous or scabrous, 4- to 5-nerved, with a terminal awn 1–1.8 mm and membranous margin 0.3–0.6 mm wide; upper glume 5.6–7 × 0.7–1.2 mm, glabrous or scabrous, 4- to 6-nerved, with a terminal awn 1–1.5 mm, and margins hyaline or membranous, 0.3–0.5 mm wide; rachilla segments 1.8–2.5 mm, with
short hairs; apical scar ovate, ebovate to circular; callus 0.6–0.9 mm, broadly triangular, dorsal surface flat or sunken, glabrous or glabrescent, tip not thickened, adaxial margin thickening, extending approximately to the midpoint; lemmas 8.5–10 mm, dorsally glabrous or scabrous, not pruinose, 5-nerved; margins hyaline or membranous, 0.1–0.3 mm wide; apex acuminate, flat, entire or bifid, awned; awn on lowest lemma in each spikelet 2–7.7 mm, those on other lemmas 4.4–15 mm, all awns remaining straight, when dry, scabrous, 3-nerved at base; palea 8.9–1.1 × 1.4 mm, 2-keeled; keels ciliate with hairs 0.1–0.18 mm; intercostal region scabrous or hairy; apex narrower to wider than lemma apex, truncate or obtuse, entire or retuse, side panels 0.027 mm shorter than the keel tips; lodicules 0.9–1.4 mm, margin lobed or entire; stamens 3; anthers 1.6–2.6 mm, yellow or purple. Caryopsis narrowly elliptical or narrowly oblong, 5.2–6.7 × 1.3–1.1 mm, longitudinally grooved or deeply furrowed.

**Distribution and habitat.** *Elymus fertilis* grows in southeastern Queensland and northern New South Wales. It usually grows on dark brown basaltic soils of volcanic origin, but is sometimes found on fertile alluvial soils. It grows in mixed populations with *E. plurinervis* in New South Wales, but not in Queensland. *Elymus multiflorus* usually grows on poorer soils in more coastal and riperine areas and is much more common farther south, extending through New South Wales, Victoria, and Tasmania.

**IUCN Red List category.** The new species is now almost completely confined to road sides. Most of its natural distribution is on high-fertility soils that originally supported grasslands or grassy woodlands. It is estimated that well over 50% of such land has been lost to cultivation. While the cause of the loss is clear, it has not ceased, and most of the known populations are vulnerable. The data best fit the IUCN (2001) classification for Endangered (EN).

**Etymology.** The epithet *fertilis* was suggested by Wang (1999) because of the high seed set the species exhibits.

**Reproductive biology.** The high seed set, which is retained in cultivation (pers. obs.), strongly suggests that *Elymus fertilis* reproduces sexually (Connor, 1954; Murphy & Jones, 1999). In this, it resembles both *E. multiflorus* and *E. plurinervis* but differs from *E. scaber* s. str. and *E. rectiscus*.

**Cytology and genomic constitution.** *Elymus fertilis* is probably a hexaploid with 2n = 42 and a genomic constitution of StYW. (Genome designations follow the recommendations of the International Triticeae Con-

**Molecular analysis.** Random amplified polymorphic DNA analysis (Wang & Jacobs, 2002) revealed 11 markers unique to *Elymus fertilis*, only slightly fewer than the 13 markers unique to *E. plurinervis*.


**Key to Elymus in Australia**


1a. Plants with long, pale yellow vigorous rhizomes; lemmas acute but awnless (in Australia). ... *E. repens*

1b. Plants caespitose; at least some lemmas usually awned.

2a. Rachilla hairs usually 0.2–1 mm long; callus usually triangular to narrowly triangular, usually distinctly hairy.

3a. Rachilla hairs < 0.2 mm; callus broadly triangular, glabrous to glabrescent.

3b. Rachilla hairs not covering calyx base; dorsal surface of calyx flat to sunken; callus usually hairy on margins and surface sometimes glabrous to glabrescent; calyx tip usually thickened. ... *E. scaber*

4a. Glumes ≥ 7.7 mm; lemma awn usually curved when dry, 1-awned at base; mature caryopsis < 55% palea length. ... *E. plurinervis*

4b. Glumes < 7.7 mm; lemma awn usually straight when dry, 3-awned at base; mature caryopsis > 60% palea length.

5a. Awn of lowest lemma 2–7.7 mm; other lemma awns 4.4–15 mm; ratio of awn to lemma length 0.7–1.3:1. ... *E. fertilis*
5b. Awn of lowest lemma 0–3 mm; other lemma awns 0–11 mm long; ratio of awn to lemma length 0.2–0.8:1 ................. E. multiflorus

Literature Cited


Begonia caparaoensis (Begoniaceae), a New Endemic Species from the Atlantic Forest in the State of Minas Gerais, Brazil

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ABSTRACT. A new narrow endemic species of Begonia L. (Begoniaceae) from the Atlantic Forest of Brazil is described and illustrated. Begonia caparaoensis E. L. Jacques & L. Kollmann occurs in a small area of Cacheoeira Bonita, along the coast of the José Pedro River (20°24'29"S, 41°50'29"W), at the Parque Nacional do Caparão, Minas Gerais, Brazil, growing on rocky outcrops. Diagnostic characters, description, detailed illustration, and taxonomic comments are given. Begonia caparaoensis resembles B. jureiensis S. J. Gomes da Silva & Mamede, which shares its peltate leaf blades, bilamellate placentae, and obovate anthers, but is easily distinguished by its leaves with serrulate margins (vs. dentate) and its smaller stipules (ca. 7 × 9 mm vs. ca. 3 × 1.5 cm). Begonia caparaoensis is identified as Critically Endangered (CR B2a) according to IUCN Red List criteria.

RESUMO. Uma nova espécie de Begonia L. (Begoniaceae) endêmica da Mata Atlântica do Brasil é descrita e ilustrada. Begonia caparaoensis E. L. Jacques & L. Kollmann ocorre num pequeno trecho da Cacheoeira Bonita, às margens do Rio José Pedro (20°24'29"S, 41°50'29"W), no Parque Nacional do Caparão, Minas Gerais, Brasil, crescendo em formações rochosas. Caracteres diagnósticos, descrição, ilustração detalhada e comentários taxonômicos são apresentados. Begonia caparaoensis assemelha-se a B. jureiensis S. J. Gomes da Silva & Mamede, com a qual compartilha a lâmina foliar peltada, a placenta bilamellada e as anteras obovadas, mas é facilmente distinta pelas folhas com margem serrulada (vs. dentada) e pelas estípulas menores (ca. 7 × 9 mm vs. ca. 3 × 1.5 cm). Begonia caparaoensis é incluída na categoria Criticamente em Perigo (CR B2a) de acordo com os critérios da IUCN.

Key words: Atlantic Forest, Begonia, Begoniaceae, Brazil, IUCN Red List.

The genus Begonia L. (Begoniaceae) has approximately 1400 named species distributed primarily in the tropical and subtropical areas of the world, and within this area is absent only from Australia (Forrest & Hollingsworth, 2003; Clement et al., 2004; Forrest et al., 2005). It is well represented in Brazil, with approximately 200 species, and is found in almost all ecosystems except mangroves. In Brazil, one of the centers of distribution of the genus is the Atlantic Forest (Jacques, 1996; Gomes Silva & Mamede, 2000; Jacques & Mamede, 2004, Souza & Lorenzi, 2005). This genus is morphologically variable (Jacques & Mamede, 2005) but can be characterized by its often asymmetric leaf shape, four staminate tepals and five pistillate tepals, an inferior ovary with axilar placentaion, dry 3-winged fruit, and seeds with a lid and collar cells.

Research in the GFJP herbarium and fieldwork in the Parque Nacional do Caparão in the state of Minas Gerais revealed the existence of a previously undescribed species, which is described here.

Begonia caparaoensis E. L. Jacques & L. Kollmann, sp. nov. TYPE: Brazil. Minas Gerais: Alto Caparão, Parque Nac., Vale Encantado e Cacheoeira Bonita, 1890 m, 26 Feb. 2004, L. S. Leoni 5625 & A. Chautems (holotype, GFJP; isotype, MO). Figure 1.

Haece species quoad laminam foliarem peltatam, antheras obovatas etiam placentas bilamellatas Begoniae jureiensis S. J. Gomes da Silva & Mamede similia, sed ab ea folis serrulatis (nec dentatis), stipulas majoribus atque stylos complanatis bimanosis facile distinguitur.

Herbs rupicolous, puberulent, with an indumentum of simple and glandular trichomes, 15–40 cm tall; subterranean stems consisting of a tubercle-like structure, with very numerous adventitious roots; stems erect, internodes (2–)4–5 cm. Petioles terete, 9–11 cm, light pink to purplish red; stipules white or reddish, ca. 7 × 9 mm, deciduous, ciliate at margin; lamina (5-)9–21 × (5-)8.5–20 cm, ovate, peltate, in


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vivo with a small central depression, shiny green, minutely pubescent on both surfaces, with an indumentum of simple and glandular trichomes, apex acute, margin lobate, serrulate, 8 primary veins, palmatinerved. Cymes (13–)17–30 cm, 3 to 5 flowers, 3- to 4-branched, peduncles reddish green; bracts persistent, 1–1.4 × 0.7–1.2 cm, ovate, margins with glandular trichomes, outer surface reddish green,
inner surface pink. Staminate flowers ca. 4 cm, pedicels 1.7–3.4 cm, purplish red, tepals white, tinged pale pink, the outer pair (1.5–)2–3 × (1.6–)2–3 cm, orbiculate, the inner pair 1.2–2.4 × 1.5–2.4 cm, obovate, stamens (49)80 to 100, 5–9 mm, yellow, filaments free, 4–6 mm, anthers obovate, 1–2 mm, recurved, extrorse, yellow, the connective scarcely projecting. Pistillate flowers 3.5–4 mm, pedicels 2.5–3 cm to 5.2 cm in mature fruits, tepals 5, unequall, 1.5–2.6 × 1.3–2.6 cm, white, tinged pale pink, oblong to obovate, apex obtuse to orbiculate, with glandular microscopic trichomes, prophylls 1(2) or absent, elliptic, margins fimbriate, 4–5 × 2–3 mm, white to lightly pink, styles 3, spirally twisted, 2-branched, stigma with a flabelliform base, yellow, with stigmatic papillae along margins. Ovary triloculate, reddish, 10–12 mm, placenta axillary, placenta bilamellate with the ovules on both sides of lamellae. Immature capsules triate, 1.2–5 × 1.1–2.2 cm (including wings), glossy red, with glandular trichomes, peduncles (2–)2.5–5 cm, wings unequal, the largest wing (5–)10–15 mm tall, the smallest wing 1–2 mm tall; seeds ca. 0.5 × 0.25 mm, oblong, cylindrical.

Discussion. Among eight Brazilian species of Begonia with peltate blades and bilamellate placenta (Begonia egregia N. E. Brown, B. espiritosanensis E. L. Jacques & Mamede, B. ibitiocensis E. L. Jacques & Mamede, B. jungeiis S. J. Gomes da Silva & Mamede, B. lealii Brade, B. luhensii E. Morren, B. paulensis A. DC., and B. santosilmae Brade; Jacques, 2002), B. caparaoensis is morphologically similar to B. jungeiis, which is endemic to Serra da Jurélia, a well-preserved area of the Atlantic Forest in the southern coast of São Paulo State, Brazil. However, B. jungeiis is characterized by leaves with dentate margins, larger stipules (ca. 3 × 1.5 cm), and a flattened, branched style that is almost kidney-shaped.

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Literature Cited


A New Species of Cyanus (Centaurea p.p.) sect. Napuliferi (Asteraceae) from Turkey

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ABSTRACT. A new species of Cyanus Miller (Centaurea L. p.p.) (Asteraceae), C. eflanensis Kaya & Bancheva, is described and illustrated from Karabük Province, Turkey. It belongs to Cyanus sect. Napuliferi (Stefanoff & T. Georgiev) Banceva & Raimondo, and taxonomically its closest relative is C. thricei (Schultz Bipontinus) Holub. The habitat and conservation status of the new species are presented, and the morphological characters distinguishing C. eflanensis and C. thricei are analyzed and illustrated.

Key words: Asteraceae, Cardueae, Centaurea, Cyanus, IUCN Red List, Karabük, Turkey.

Centaurea L. s.l. is one of the largest genera in Asteraceae. Depending on the classification used, the genus comprises between 200 and 700 species (Bremer, 1994; Hellwig, 2004; Bancheva & Greilhuber, 2006). Turkey is one of the main centers of diversity for this group (Wagenitz, 1986). Because Centaurea s.l. is considered a taxonomically unnatural grouping, recent approaches have split this taxon into several, more natural genera: Centaurea s. str., Cyanus Miller, Psephenus Cassini, and Rhaponticoides Vaillant (Greuter, 2003; Hellwig, 2004).

According to Hellwig (2004), the genus Cyanus comprises ca. 25 species. In the Flora of Turkey, 15 species of Cyanus (as Centaurea sect. Cyanus) were included by Wagenitz (1975). In this paper, we describe a new species, which increases the total number of Cyanus known from Turkey to 16 species. There are nine endemic species of Cyanus in Turkey; therefore, approximately 56% of this group known from Turkey are endemic taxa.

In Turkey, these Cyanus species are found on rocky and grassy slopes, stony calcareous slopes (seres), montane and shrub steppe, alpine and subalpine meadows and pastures, open pine and oak forests and shrub, dry meadows, fields, and roadsides, and range between 500 and 3500 m in altitude.

The taxonomic complexity of Centaurea s.l., especially in the Near East, has stimulated much recent research (Wagenitz, 1983; Kaya, 1986, 1987; Hellwig, 1994; Wagenitz & Hellwig, 1997; Kaya & Vural, 2007).

The new species was collected in 2006 and again in 2007, near the town of Eflani, in Karabük Province in the western Black Sea region of Turkey. These field investigations were part of a joint research project between the Scientific and Technological Research Council of Turkey (TUBITAK) and the Bulgarian Academy of Sciences. Herbarium specimens of the new species and allied taxa are deposited in ISTE and SOM.

Cyanus eflanensis Kaya & Bancheva, sp. nov. TYPE: Turkey. Karabük (A4): 10 km W of Eflani town, on dry grassy places in open pine forest, 1020–1031 m, 41°20'25.7"N, 32°42'1.9"E, 6 June 2007, Z. Kara & S. Bancheva 84U27 (holotype, ISTE; isotype, SOM). Figure 1.


Hace species Cyanus thricei (Schultz Bipontinus) Holub affinis, sed ab eo radice palari simplici (sine radibus lateralisibus) cylindrico-incrassata (1.5-1.5 cm vs. 0.5-1 cm diam.) usque ad 10 cm (vs. 4 cm) longa, ciliis appendicium phyllariorum 0.9-1.1 mm (ne 2-3 mm longis margini scorioso 0.2-0.3 mm (ne 1-2 mm lato insidentibus atque flosculus violacei-purpureis (ne albidis) differt.

Perennial plants, lacking stolons, with single thickened taproot to 10 cm, ca. 1-1.5 cm diam., abruptly narrowed above into a short, ± horizontal neck; stem single, ascending, 10.5–23 cm tall. Leaves loosely villous, ± glabrescent; lower leaves pinnatifid to pinnatipartite with 2 to 4 pairs of lanceolate segments or entire, usually not forming basal rosette at flowering; median and upper leaves entire to pinnatipartite, sessile. Capitulum single, 1.5–2 cm wide; involucre 11–15 × 8–11 mm: phyllaries elongate-triangular, glabrate; appendages with decurrent, light to dark brown, 0.2–0.3 mm wide scariosus margin, with cilia 0.9–1.1 mm. Florets violet-purple; marginal florets radiating, divided into 4 to 6 narrowly

**IUCN Red List category.** The new species is endemic to the western Black Sea region of Turkey. The specimens were collected in Karabük Province (A4), where the species is apparently very rare and local. *Cyanus eflanensis* is known only from one population in the type locality occupying an area of 1000 m². The population was not in good condition at the time of our fieldwork, numbering approximately 150 to 200 plants. According to IUCN Red List criteria (IUCN, 2001), it should be assigned to the Critically Endangered (CR) category because of its local distribution and small population size.

**Phenology.** The new species was collected in flower June–July and in fruit in July.

**Etymology.** The species epithet recognizes the town of Eflanı, the type locality of the new species.

**Relationships.** *Cyanus eflanensis* belongs to section *Napaljery* (Stefanoff & T. Georgiev) Bancheva & Raimondo. The group is well characterized by its thickened, spindle-shaped or turnip-shaped roots, and relatively small leaves, often with a deeply cut blade and white woolly indumentum (Bancheva & Raimondo, 2003). Based on morphology, the closest ally of *C. eflanensis* is *C. thirkei* (Schultz Bipontinus) Holub, which has a broader distribution, occurring in

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**Table 1.** Morphological comparison of selected characters used to distinguish *Cyanus eflanensis* and *C. thirkei.*

<table>
<thead>
<tr>
<th>Character</th>
<th><em>C. eflanensis</em></th>
<th><em>C. thirkei</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Root type and size</td>
<td>single thickened taproot, to 10 × 1.5 cm</td>
<td>taproot with (1 to)2 to (4 to 5) thickened, nifiform or fusiform lateral roots, to 2-4 × 0.5-1 cm</td>
</tr>
<tr>
<td>Stem height (cm)</td>
<td>10.5-23</td>
<td>5-10 (15)</td>
</tr>
<tr>
<td>Involucrum size (mm)</td>
<td>11-15 × 8-11</td>
<td>16-20 × 10-15</td>
</tr>
<tr>
<td>Phyllary appendages: length</td>
<td>0.9-1.1</td>
<td>2-3</td>
</tr>
<tr>
<td>of marginal cilia (mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phyllary appendages: width of</td>
<td>0.2-0.3</td>
<td>1-2</td>
</tr>
<tr>
<td>scarious margin without cilia (mm)</td>
<td>4-4.5</td>
<td>3-4 (-4.5)</td>
</tr>
<tr>
<td>Achene length (mm)</td>
<td>1.1-2.2</td>
<td>1-1.2</td>
</tr>
<tr>
<td>Pappus length (mm)</td>
<td>violet-purple</td>
<td>whitish</td>
</tr>
<tr>
<td>Color of florets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td><em>Pinus nigra</em> forest</td>
<td>dry grassy and rocky places</td>
</tr>
<tr>
<td>Flowering</td>
<td>June-July</td>
<td>March-June</td>
</tr>
</tbody>
</table>
Bulgaria, Moldavia, and Turkey. The distribution of C. thirkei in Turkey is confined to the Mediterranean-climate area of western Turkey (A1, B1, B2, B3, C2 and C3) (Wagenitz, 1975), so the two mentioned taxa are allopatric.

The authors studied pertinent specimens and published descriptions (Wagenitz, 1975; Dostal, 1976; Bancheva & Raimondo, 2003) and determined that Cyanus eflanensis and C. thirkei differ morphologically (Fig. 2, Table 1). The diagnostic characters are contrasted in the following key couplet.

**KEY TO TWO CYANUS SPECIES IN TURKEY**

1a. Plant with (1 to) 2 to 4 (to 5) thickened adventitious roots, to 4 × 1 cm; florets usually whitish ... C. thirkei
1b. Plant with a single thickened taproot, to 10 × 1–1.5 cm; florets violet-purple . . . . . . . . . . . . . . . . . . . . . . . . C. eflanensis

**Paratypes.** TURKEY. Karabük (A4): 10 km W of Eflanı town, on dry grassy places in open pine forest, 1020–1031 m, 41°20′25.7″N, 32°42′1.9″E, 8 July 2007, Z. Kaya & S. Bancheva 86016 (ISTE, SOM).

**Acknowledgments.** The financial support of TUBITAK, the Bulgarian Academy of Sciences, and the European Community’s program “Structuring the European Research Area” under SYNTHESYS through grant 4499 from the Austrian Taxonomic Facility (AT-TAF, comprising the Natural History Museum, Vienna [W] and Vienna University [WUP] is gratefully acknowledged. We are also indebted to the two referees, Gerhard Wagenitz and Werner Greuter, for providing critical comments and helpful suggestions on the manuscript.

**Literature Cited**


Solanum anomalostemon (Solanaceae), an Endangered New Species from Southern Peru with Unusual Anther Morphology

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Abstract. Solanum anomalostemon S. Knapp & M. Nee is described from Cusco in southern Peru. The species is endemic to the Río Apurímac basin and is known from very few collections. The new species has unique anther morphology within Solanum L.; this is compared to other anther variants in the genus. Potential relationships of this unusual and enigmatic species are discussed, the new species is illustrated, and a preliminary conservation assessment of Endangered (EN) is proposed.

Resumen. Solanum anomalostemon S. Knapp & M. Nee se describe de Cusco para el sur de Perú. La especie es endémica de la cuenca del Río Apurímac y conocida por muy pocas colecciones. La especie nueva tiene anteras con una morfología única en Solanum L., que son comparadas con otras variaciones de anteras en el género. Las relaciones potenciales de S. anomalostemon están detalladas; se ilustra la especie y se le atribuye un estado de conservación preliminar de En Peligro (EN).

Key words: Anther morphology, IUCN Red List, Peru, Solanaceae, Solanum.

Solanum L., with ca. 1500 species, is the largest genus in the Solanaceae and one of the 10 most species-rich genera of flowering plants (Frodin, 2004). The highest species diversity in the genus occurs in South America and is concentrated in the Andes (Knapp, 2002a). As part of the collaborative project “PBI Solanum: A world-wide treatment” (see Knapp et al., 2004; <http://www.nhm.ac.uk/solanaceaesource>), descriptions of all species of Solanum are being provided online. This intensity of work in the genus by a large number of collaborators, along with the massive increase in specimens available from the Andean regions of South America and intensive work in the undetermined collections of herbaria worldwide, has meant that many new taxa are being discovered (Knapp, 2005, 2007; Granados-Tochoy & Orozco, 2006; Nee et al., 2006; Granados-Tochoy et al., 2007). In addition, the intensive global monographic project, in conjunction with a commitment by the botanical community to achieving Targets 1 (a global plant species checklist) and 2 (preliminary conservation assessments for all known plant species) of the Global Strategy for Plant Conservation (GSPC; Secretariat of the CBD, 2002), means that recognition and description of endemic taxa or those facing a significant conservation threat is particularly timely.

Our recent work in many herbaria has uncovered an unusual endemic species from southern Peru. Until recently, this species has only been known from sheets collected in the late 1930s, so we feared it might be extinct. However, recent material received at NY from the intensive collecting program being undertaken jointly in southern Peru by personnel of CUZ and MO proved to be this unusual species. Peru forms one of the most species-rich and endemic-rich areas in South America (Knapp, 2002a); the country previously had 102 endemic species (Knapp et al., 2006), and this new species boosts that number to 103.


Species nova Solanum chamaesarchidio Bitter similia, sed ab eo habitu suffruticosi nani, foliis profunde ternatis vel pinnatifidis, antheris ad basim cordatis et ad apicem prolongatis, stylis et filamentis glabris atque seminibus etuberculatis differt.

Dwarf shrubs or herbs 30–50 cm, perennial from a woody taproot, branching from near the base; stems robust, ± erect, densely glandular-pubescent


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with a mixture of glandular and eglandular simple, uniseriate trichomes, 0.3–1 mm; sympodial units not geminate, usually difoliate, but sometimes 3- to 4- foliate. Leaves ternate to pinnatifid, (1–)1.5–3.5 × (1–) 1.5–2.5 cm, ± triangular to ovate in outline, thick and succulent, pubescent both adaxially and abaxially with a mixture of glandular and eglandular simple uniseriate 1- to 5-celled trichomes, 0.5–1 mm, the basal cell usually larger and broader, the gland 1-celled; leaflets 3(to 5), usually not discrete but with a wing of connecting leaf tissue; lateral leaflets 1–2 × 0.5–0.8 cm, if leaflets 5 then the basal one much smaller, 0.2– 0.5 × ca. 0.2 cm, the base decurrent on the rachis and usually oblique and basiscopically extended, the margins entire to irregularly erose, the apex truncate; terminal leaflet 1.2–2 × 0.7–1.1 cm, always larger than the lateral leaflets, the base attenuate onto the rachis, the margins irregularly erose, the apex truncate; rachis sulcate, densely glandular-pubescent with simple uniseriate trichomes like those of the stems; petiole 1–2 cm, densely pubescent. Inflorescence 1–2 cm, internodal, 2-flowered, densely pubescent with a mixture of glandular and eglandular, uniseriate, simple trichomes, 0.3–0.6 mm; peduncle 1–2 cm, the flowers at the tip of the inflorescence; pedicels 0.5–0.7 cm, stout, ca. 1 mm diam., densely pubescent like the inflorescence, articulated at the base. Buds globose to slightly depressed-globose, the corolla enclosed in the foliose calyx lobes; flowers all perfect, white; calyx with the tube < 0.5 mm, an open cup, the lobes 2–3 × 1–1.5 mm, elliptic to somewhat spatulate, densely pubescent on both surfaces with eglandular simple uniseriate trichomes, ca. 0.3 mm; corolla 1.5–1.7 cm diam., stellate, lobed 1/3–1/2 way to the base, the lobes 0.3– 0.5 cm, 0.3–0.4 cm wide at the base, delate, somewhat campanulate at anthesis, with 3 main veins in the center of each lobe, these drying darker, pubescent abaxially with simple uniseriate trichomes, these denser on the lobe midveins, papillate at the tip; stamens 5, equal, the filament tube ca. 0.5 mm, the free portion of the filaments 1–1.1 mm, glabrous, the anthers 2.5–3 × 2–2.1 mm, cordate, abaxially thickened and densely papillate, the basal lobes ca. 0.5 mm, the apex prolonged with a small beak ca. 1 mm long, dehiscing by longitudinal slits from apical pores initially; ovary conical, densely papillate; style 4.5–5 × ca. 1 mm, glabrous, strongly curved at anthesis; stigma ca. 1 mm diam., capitate, densely papillate. Fruit a globose berry, 1–1.4 cm diam., the pericarp shiny and brittle when dry, black (Galiano et al. 5109),
orangish brown when dry; fruiting pedicels 1.2–1.5 × 0.1–0.15 cm, curving and deflexed; seeds 10 to 20 per berry, 3–3.1 × 1.9–2.1 mm, somewhat ovoid, reniform in outline, the margins slightly thicken, the testa with sinate cells, not tuberculate, appearing shallowly pitted and covered with what appears to be remains of fruit pulp.

**Distribution.** The new species occurs in southern Peru on rocky and clayey arid slopes at ca. 2800 m (ca. 13°30’S, 72°40’W) on either side of the Río Apurímac west of Cusco on the road to Abancay.

**IUCN Red List category.** *Solanum anomalostemon* is known from only four collections, all collected within 20 km of each other in the Río Apurímac drainage. The species had not been collected for more than a half century until its recent rediscovery in Cusco Department, on the other side of the Apurímac. The dry forests in which it occurs are not widely protected in Peru, and *S. anomalostemon* does not occur in or near any of the Peruvian network of protected areas (see <http://www.inrena.gob.pe>). *Solanum anomalostemon* can be added to the list of endemic Peruvian solanums, and using the IUCN Red List criteria (IUCN, 2001) we suggest it be given a preliminary conservation status of Endangered (EN B1[a][ii], B2a) based on its restricted distribution (extent of occurrence < 5000 km², area of occupancy < 100 km²), low number of populations (2), and threatened and unprotected habitat. A more thorough assessment is of interest, not only to discover if it still occurs in Apurímac Department on the other side of the Río Apurímac, but also to assess its population size where it does occur.

**Phenology.** All specimens have both flowers and fruits, so the species appears to flower and fruit throughout the year. It may do so in response to rainfall, as do many species of tomatoes (Peralta et al., 2008).

**Etymology.** The species epithet is taken from the Greek “anomalos” (meaning “not agreeing” or “inconsistent”; e.g., anomalous) and “stemon” (meaning “stamen”), in reference to the unique stamens, which are anomalous in the genus *Solanum*.

**Discussion.** *Solanum anomalostemon* appears to be unique in *Solanum* in its corolla, sharply pointed anthers with a prolonged beak-like apex, which dehisce by longitudinal slits that are only poricidal very briefly at the beginning of anthesis. Otherwise, *Solanum* is remarkably uniform in basic anther morphology in the ca. 1500 species. Approximately 95% of the species are divided between two groups: (1) those with oblong anthers with relatively large terminal pores and lateral longitudinal dehiscence to a greater or lesser extent (the nonspiny solanums), and (2) species with attenuate anthers with very small terminal anthers that do not later enlarge (the Leptostemonum and Wendlandii clades [sensu Bohns, 2005; Weese & Bohns, 2007]). In other nonspiny solanums (excluding the Wendlandii clade [sensu Bohns, 2005; Weese & Bohns, 2007]), the anthers split longitudinally with age, but the pores are distinct at the beginning of anthesis (Knapp, 2002b). Throughout *Solanum* many different types of anther modifications occur in almost all of the monophyletic clades in the genus (Levin et al., 2006; Anderson et al., 2006). Heterandry can be present, either by the unequal growth of a single filament (e.g., *S. uncinnellum* Lindley of the Dulcamaroid clade [sensu Bohns, 2005; Weese & Bohns, 2007]), or *S. turneroides* Chodat of the Brevantherum clade [sensu Bohns, 2005; Weese & Bohns, 2007]), or by various unequal anthers (e.g., *S. rostratum* Dumal and all but one of the other species of section *Antrocoeus* (Nutall) Marzell of the Leptostemonum clade). Members of the Pachyphylla clade (sensu Bohns, 2005; Weese & Bohns, 2007, formerly *Cyphomandra* Martius ex Sendtner) have unusually thickened connectives, and in the tomatoes the anthers are tightly connate and have a sterile tip that functions as a single pore (Glover et al., 2004; Peralta et al., 2008). The Argentine species *S. deliciosus* C. V. Morton, of the Geminata clade, has ellipsoid anthers that are narrowed and apparently sterile in the lower third.

The anthers of *Solanum anomalostemon* are most like those of the small section *Chamaeasarachidiwm* Bitter (*S. chamaeasariachidiwm*, *S. gilioides* Rusby, and *S. annuum* C. V. Morton; considered part of the Morelloid clade on morphological grounds pending molecular investigation [G. Barboza, pers. comm.]). These tiny, often annual, plants of the high Andes have basally appended anthers, somewhat reminiscent of the corolla anther base of *S. anomalostemon*. In habit and leaf morphology *S. anomalostemon* also resembles the species of section *Chamaesarachidiwm*; the plants are shrublets or small perennial herbs and the leaves are variously pinnatifid (Barboza, 2005). *Solanum chamaeasarachidiwm* has glandular pubescence like that of *S. anomalostemon*, but has a marked basal connectival extension and is a much smaller, apparently annual plant (Barboza, 2005). The flowers of members of section *Chamaeasarachidiwm* are usually somewhat campamulate at anthesis, as apparently are the flowers of *S. anomalostemon*. The seeds of *S. anomalostemon* are not tuberculate, as are those of all known species of section *Chamaeasarachidiwm*. There are herbaceous species in the Andes of section *Parasolanum* A. Child (*S. triripartiti* Dumal and relatives) with somewhat similar leaves, but these lack the glandular hairs, and anthers are more typical of the nonspiny solanums. Although the relationships of
S. anomalostemon remain obscure at present, we suggest it belongs to the Morelloid clade based on its overall morphology; sequence data, however, suggest it is anomalous in the genus and of uncertain affinities (L. Bohs, pers. comm.).

Paratypes. PERU. Apurimac: hillside above Cura-
huasi, Cuzco region, 9000 ft., 15 Jan. 1938 (fl., fr.), H. L. Blood & L. Tremelling 209 (NY); Trancapata, Curahuasi, Abancay, Jan. 1938 (fl., fr.), C. Vargas 756 (F, GH); Trancapata, Curahuasi, 2800 m, 10 Nov. 1938 (fl., fr.), C. Vargas C. 2000 (K); Prov. Abancay, Dist. Trancapata, Curahuasi, slopes of Carhonzopata, environs of Coto-mayo, 2800 m, 9 Nov. 1938 (fl., fr.), C. Vargas 9611 (F, GH, K).

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(CUZ) for searching the herbarium in Cuzco to find the holotype sheet; Bobbi Angell for the illustration; the curators of the herbaria cited in the text for permission to examine their material; and Gloria Barboza (CORD) for valuable advice on Andean solanums. Financial support for this work came from the National Science Foundation Planetary Biodiversity Inventory (award DEB-0316614 “PBI Solanum—A worldwide treatment”).

Literature Cited


Barboza, G. 2005. Revision of Solanum sect. Chamaesar-


Draba calcifuga (Brassicaceae), a New Species from the Rocky Mountains of North America

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Abstract. Draba calcifuga Lesica (Brassicaceae) is an alpine species of the Rocky Mountains of Montana, Idaho, and Wyoming, U.S.A., restricted to non-calcareous soils. It has been confused with the sympatric D. oligosperma Hooker because both species are similar in habit, leaf size and shape, fruit size and shape, style length, and in the presence of doubly pectinate trichomes on the leaves. However, D. calcifuga has cilia and pectinate trichomes with crisscross branches that do not occur in D. oligosperma. Draba calcifuga demonstrates low pollen stainability throughout its range, suggesting it is agamospermy. Although D. oligosperma is agamospermy over most of its range, it is sexual in its area of sympatry with D. calcifuga, suggesting that the latter may be derived from the former. Draba calcifuga is described and compared to four other species with doubly pectinate trichomes from the Rocky Mountain region.

Key words: Agamospermy, Brassicaceae, Draba, Idaho, IUCN Red List, Montana, Wyoming.

Draba L. is the largest genus in the Brassicaceae with ca. 350 species occurring primarily in temperate to arctic regions (Rollins, 1993). New species continue to be described, even in relatively well-known floras (Mulligan, 1970; Dorn, 1978; Price, 1980; Al-Shehbaz & Windham, 2007). Delineation of species can be difficult due to frequent polyploidy and agamospermy. Perennial species frequently have remarkably similar growth forms and are often distinguished by trichome shape (Hitchcock, 1941; Mulligan, 1976). Four described species of Draba in the Rocky Mountains have doubly pectinate trichomes: D. oligosperma Hooker, D. pectininula Rollins, D. juniperina Dorn, and D. incerta Payson (Mulligan, 1976; Dorn, 1978; Rollins, 1993). Here I describe a fifth species, D. calcifuga Lesica, with doubly pectinate trichomes. Draba calcifuga has commonly been mistaken for D. oligosperma because it is similar in size and has doubly pectinate trichomes on leaf surfaces. I compare it to D. oligosperma and other similar species occurring in the Rocky Mountains and use evidence from pollen stainability studies to propose a possible scenario for the origin of this species. Although D. calcifuga is likely primarily asexual, it displays morphological, ecological, and geographical integrity, prompting me to describe it as a new species.

Methods
I examined 17 morphological characters considered important for separating perennial species of Draba in western North America (Hitchcock, 1941; Mulligan, 1976) from 28 herbarium sheets of D. calcifuga from southwest Montana and adjacent Wyoming. Measurements were taken from leaves, scapes, flowers, and mature fruits of representative plants on each sheet.

I used pollen stainability as a metric of agamospermy for Draba oligosperma and D. calcifuga (Radford et al., 1974; Price, 1980). I collected one anther from each of five flowers on three to five flowering specimens on herbarium sheets representing 17 populations of D. oligosperma and 12 populations of D. calcifuga. Anthers were macerated in a drop of aniline blue dye in lactophenol on a microscope slide (Radford et al., 1974). For each slide I scored 100 pollen grains from randomly chosen 100× microscope fields as either full or empty (see Mulligan & Findlay, 1970: figs. 3, 4).

Species of Draba

Draba calcifuga Lesica, sp. nov. TYPE: U.S.A. Montana: Ravalli Co., Bitterroot Range, common in gravelly soil derived from metamorphic parent material in a fellfield on the summit of St. Mary’s Peak with Ivesia gordonii, Phlox diffusa, and Eririchium nanum, 2850 m, T9N R21W S28, 15 July 2007, P. Lesica 9819 with P. Kittelson (holotype, MONTU; isotypes, MO, MONT, NY, RM). Figure 1.

Hae species inter congeneros scaposos Montium Saxosorum trichomatibus bis pectinatis vestitos quasi scopum glabrum etiam pedicello brevem ad Drabam oligospernam maxime accedit, sed ad ea folis ad marginem ciliatis et ad paginan abaxialen trichomatibus pectinatis pro parte stipitatis pubescentibus distinguat.

Caespitose, scapose, perennial herbs from a taproot surmounted by a caudex, forming cushions 1–3 cm tall; caudex branches covered with old leaf bases and terminating in rosettes. Leaves oblanceolate, entire, 1.5–5.5 × 0.5–1.1 mm, tapering to a petiole-like base; abaxial surface with sessile or stalked, pectinately branched trichomes sometimes mixed with stalked, stellate trichomes; adaxial surface glabrous or with sparse simple or branched trichomes; margins ciliate with twisted simple or few-branched trichomes; scapes erect, 4–25 mm, typically glabrous or rarely with stalked-stellate trichomes. Racemes 2- to 8-flowered, ebracteate; fruiting pedicels ascending, the lowest 1.2–5 mm; sepals ovate, 1.6–3 × 0.7–1.4 mm, glabrous or with sparse twisted, simple or forked trichomes; petals yellow, obvate, 2.3–4 × 1.2–2.1 mm, the claw 0.5–1 mm; filaments ca. 1.5 mm; anthers ca. 0.6 mm; silicles ovoate, 2.5–5.3 × 1.9–3.5 mm with short, usually recurved, simple or forked trichomes 0.1–0.2 mm; fruiting style 0.2–0.6 mm; seeds 2 to 5 per silicle, 0.8–1.7 mm.

Distribution and habitat. *Draba calcifuga* occurs at or above treeline in non-calcareous mountain ranges in Beaverhead, Deer Lodge, Gallatin, Granite, Madison, Park, Powell, Ravalli, and Silver Bow counties in southwest Montana, Blaine and Lemhi counties in Idaho, and Park and Sublette counties in Wyoming. *Draba calcifuga* appears to be a strict calcifuge, occurring only on substrates derived from
granitic, metamorphic, and volcanic parent materials, although calcareous parent materials are common at both low and high elevations in southwest Montana and adjacent Idaho. It is most common in the granitic-batholith Bitterroot, Pioneer, Anaconda, and Tobacco Root mountain ranges in Montana. Draba oligosperma is also common in this part of Montana, but only at lower elevations and primarily in calcareous soils, although it has a wider ecological amplitude elsewhere (Hitchcock, 1941; Mulligan, 1972; Lesica, 2002).

**IUCN Red List category.** Draba calcisuga is estimated to be Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001). The species occurs above timberline in habitats that are generally not impacted by human disturbance. Several known occurrences are from areas protected as designated wilderness where mechanized impacts are not allowed. Collections voucher at least 25 populations, extent of occurrence is at least 50,000 km², and there is no reason to believe that there has been any reduction in population size.

**Phenology.** Plants flower June through July, depending on aspect and elevation. Mature fruit is present July through September.

**Etymology.** The specific epithet refers to the fact that the plant has never been collected on soils derived from calcareous parent material although such soils are common within the range of the species.

**Discussion.** Draba calcisuga shows little morphological variation throughout most of its range. However, one population from the Gravelly Range in Madison County, Montana (Lesica & Cooper 4929, MONTU), has nearly glabrous siliques. Several specimens from the Absaroka–Beartooth region along the Montana–Wyoming border (Beyer 6, Lockschewitz 9782, MONTU; Jennison 313, MONT; Lichvar 1895, RM) have stalked-stellate trichomes on the scape, but otherwise conform to the description of *D. calcisuga*. These collections may represent local variants on the edge of the species’ range or may indicate that *D. calcisuga* has had more than one independent origin. Such polytypy has been demonstrated for several arctic-alpine, agamosperous, perennial species of *Draba* (Brochmann et al., 1992). Understanding the relationships of *D. calcisuga* to other species will require further cytological and molecular genetics studies.

**Affinities.** Vestiture of leaves, scapes, and siliques are important in delimiting *Draba calcisuga* from the other scapose species with doubly pectinate trichomes in the Rocky Mountains (Dorn, 1978; Lichvar, 1983). *Draba pectinipila* and *D. juniperina* have sessile pectinate trichomes on the scape and siliques but lack cilia or stalked-stellate trichomes on the leaves as in *D. calcisuga*. *Draba oligosperma* has glabrous scapes and similar silique vestiture as *D. calcisuga* but lacks cilia and stalked trichomes on the leaves. *Draba incerta* has stalked-pectinate trichomes and ciliate margins but has larger fruits than any of these other species (Table 1). These species have usually been considered closely related because of the trichome similarities (Hitchcock, 1941; Lichvar, 1983; Rollins, 1993). However, *D. oligosperma* and *D. juniperina* have different chromosome base numbers (x = 8 vs. x = 11, respectively; Windham, 2000). A recent molecular phylogeny based on ITS sequences suggests that *D. oligosperma* and *D. juniperina* may not be members of the same clade (Belstein & Windham, 2003) and that doubly pectinate trichomes may have arisen independently at least twice.

*Draba calcisuga* is presumed to be agamosperous because all populations had less than 30% pollen stainability, and nine of 12 measured populations had less than 2% stainability. Pollen stainability of *D. oligosperma* populations was himodal; 12 populations

<table>
<thead>
<tr>
<th></th>
<th><em>D. calcisuga</em></th>
<th><em>D. incerta</em></th>
<th><em>D. juniperina</em></th>
<th><em>D. oligosperma</em></th>
<th><em>D. pectinipila</em></th>
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<tr>
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<td>pectinate</td>
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<td>pectinate</td>
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<td>(5–)–7–15</td>
<td>1–4(–9)</td>
<td>(4–5)–9(–11)</td>
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<td>0.6–1.8</td>
<td>0.5–1</td>
<td>0.1–0.5</td>
<td>0.5–1.2</td>
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<tr>
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<td>0.7–1.5</td>
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<tr>
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<td>alpine</td>
<td>montane</td>
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<td>alpine</td>
</tr>
</tbody>
</table>
Lesica

Draba calcifuga (Brassicaceae)

KEY TO THE ROCKY MOUNTAIN SPECIES OF DRABA WITH PECTINATE TRICHOMES

1a. Leaf margins with simple or forked cilia .................................. 2
1b. Leaves not ciliate ........................................................................ 3

2a. Siliques 2.5–3.3 mm; scarps usually glabrous, < 3 cm .................. D. calcifuga
2b. Siliques > 6 mm; scarps often > 3 cm with branched trichomes ............ D. inereta

3a. Scape glabrous; siliques with many simple trichomes .................. D. oligosperma
3b. Scape with pectinate trichomes; siliques with mainly branched trichomes .................................................................................. 4

4a. Style 0.3–0.7 mm; petals white, mostly 3–4 mm ........................ D. pectinipila
4b. Style 0.7–1.5 mm; petals yellow, mostly 4–5 mm ......................... D. juniperina

Acknowledgments. This paper is dedicated to the memory of Kathleen M. Peterson, in whose lab it first began. Reed Rollins and Ihsan Al-Sheshbazi encouraged me to pursue this research. Walt Fertig helped to locate relevant specimens. I am grateful to the curators of GH, ID, MONT, RM, and US for loans of specimens. Jennifer Whipple alerted me to Draba collections from Wyoming. Ihsan Al-Sheshbazi, Matt Lavin, William Weber, Victoria C. Hollowell, and an anonymous reviewer provided helpful comments on the manuscript. Roy Gereau and Joni Peterson provided Latin translations. Nancy Seiler prepared the illustration of Draba calcifuga. Research was partially supported by the National Science Foundation (grant DBI 0447391).

Literature Cited


A New Species of *Hetaeria* (Orchidaceae) from Hainan, China

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**Abstract.** *Hetaeria shiuyingiana* L. Li & F. W. Xing, a new species of Orchidaceae (Orchidoideae, Cranichideae, Goodyerinae) (Pridgeon et al., 2003). It comprises about 30 species, distributed in tropical Africa, the Himalayan region, through Southeast Asia to New Guinea, Australia, New Caledonia, and Fiji (Su, 2000; Pridgeon et al., 2003). The generally accepted characters of the genus are the inflorescences with several to many flowers that have the lip in a non-resupinate position, one to many papillae or glands on each side of the sac-shaped hypochile, and the bifid rostellum that rises vertically with the lateral stigmas at the base (Seidenfaden, 1978). In China, there are six species, with four reported from Hainan Province (Lang, 1999; Yeh et al., 2005; Song et al., 2007).

During a botanical expedition to Baoting County in Hainan Province in 2005, an unusual *Hetaeria* was collected by Xin-Sheng Qin. Morphological study shows that it closely corresponds to a plant that has been previously identified as *H. nitida* Ridley by Hu (1977: 49). In China, the name was based on a single specimen, *Hu 13233* (K), collected in Hong Kong, but the identification was later disputed by Seidenfaden and Wood (1992), as *H. nitida* has smaller flowers and spatulate petals. In fact, more than a decade earlier Seidenfaden had suggested that plants from Khao Sabab in Thailand that had been identified as *H. nitida*, which have considerably broader petals than the type specimen of *H. nitida* (Curtis s.n., SING), as well as the other specimens cited in their treatment (Seidenfaden & Smitinand, 1965), ought to be considered a separate species (Seidenfaden, 1978). Because the 2005 collection provided insufficient material for identification, we temporarily regarded this new collection as an imperfectly known species.

In 2006, more material of this species was collected by the authors in Ledong, Baoting, and Wuzhishan counties from Hainan Province, and we now have quite a few living plants in the greenhouse of the South China Botanical Garden, Chinese Academy of Sciences, where they have flowered every year in March since 2005. Detailed literature study (Hooker, 1890, 1894; Ridley, 1896; Holttum, 1957; Seidenfaden & Smitinand, 1959, 1965; Backer & Bakhuizen van den Brink, 1968; Seidenfaden, 1978, 1992; Bose & Bhattacharjee, 1980; Yeh et al., 2005; Song et al., 2007) and comparison with orchid specimens in K, KUN, IBSC, and PE revealed that this species is indeed similar to *H. nitida*, but is remarkably different in its column wings. In fact, the characters associated with these structures are quite distinctive in the genus and are critical in determining its taxonomy (Fig. 1). This species is further distinguished from *H. nitida* in its larger flowers, broader, obovate petals, and lip hypochile with finger-like tripartite papillae. A detailed study of our fresh collections clearly establishes that the Hainan plants represent a new species. A key to the *Hetaeria* species from China, based on these essential details of the flowers, is provided below. It is noteworthy that, based on the present material, there is no true *H. nitida* in China. Some specimens previously considered to be *H. nitida* (Barrett & Young, 1980; Su & Chau, 1999) could very well be identical with this new species.

**Hetaeria shiuyingiana** L. Li & F. W. Xing, sp. nov.  

**Type:** China. Hainan: Ledong County, eastern Jianfeng Mtn., Weidong Forestry Center, fl. in cult. at South China Botanical Garden, 8 Apr. 2007, Li Lin 014 (holotype, IBSC). Figure 1.

Species *Hetaeriae nitidae* Ridley affinis, sed ab ea floribus manifeste majoribus, petalis latoobursis oblique obovatis, hypochilo labelli saccato basi utrinque papillis tripartitis 2-seriatis et plenunque papilla solitaria simplici gacelli ornato.
atque columnae alis 2 plenumque minute papillosis aliquanto sigmoides sursum extensus rostelli lobis aequilongis vel eis longioribus differt.

Erect terrestrial herb, up to 20 cm tall; rhizome terete, creeping, several-noded, fleshy, 5–20 cm, 2–3 mm thick; internodes 2–3 cm; roots arising from rhizome nodes, elongate, pubescent; stem erect, ascending from rhizome, glabrous, succulent, dark purple, 8–15 cm, 4–5 mm diam., 2- to 5-leaved. Leaves ovate, 5–8 × 2–4 cm, apex shortly acuminate, base obliquely obtuse or round, deep green and lustrous adaxially, pale abaxially, distinctly 3-veined; petioles 2.5–3 cm, sheathed at base. Inflorescence slender; peduncle 20–22 cm, pubescent; sterile bracts 4, lanceolate, 1–2 cm, pinkish brown; rachis 7–9 cm, loosely spaced typically with 14 to 18 flowers; floral bracts lanceolate, 7–9 mm, puberulent outside, shorter than ovary. Flowers not resupinate, not opening widely; ovary densely glandular-pubescent, cylindrical, 8–10 mm; sepals subequal, obliquely ovate, obtuse at apex, densely glandular-pubescent, 6–7 × 3–4 mm, olive-green, pink along the margin and at apex; dorsal sepal slightly recurved at apex; lateral sepals embracing the base of the lip, slightly smaller;

petals connivent with dorsal sepal and forming an inverted hood, glabrous, lateral, obliquely ovate, apex obtuse, 6 mm long, 3-3.5 mm wide across the middle,
glistening pinkish white, slightly curved outward; lip
adnate to margins of the column, honey yellow in
color, fleshy, lageniform, 5.6 mm long, 2.2 mm thick
at base, with a short mesochile and 3-partite;
hypochile concave, saccate, ca. 2.5-3 mm, containing
2 groups of tripartite papillae at base on each side,
arranged along the lateral veins, usually with 1
separate basal slender papillae near the groups;
mesochile with involute margins, folding inward
with an orange-colored patch; column short and stout, ca.
1 mm high at the back, 2 mm wide across the middle,
extending upward into 2 fleshy ± sigmoid wings,
usually with a minutely papillose surface, pointing
upward on each side ventrally, with upcurved lower
edges laterally; epichile entire, attenuate, margins
involute, 1-1.2 mm, white; anther ovoid, 2-locular;
pollinia 4 in 2 pairs, sectile, clavate, basally attenuate
into slender cadicles, attached to an oblong viscidium;
rostellum erect, bifid, with 2 broad arms, linear-oblong,
ca. 1 mm, gradually narrowing toward apex; stigmas
2, lateral. Capsule erect, fusiform.

Distribution and habitat. This terrestrial orchid
grows in wet and shady areas at elevations of 600 to
800 m, in Hainan and Hong Kong, on the windward
side of evergreen broad-leaved forests, in the low
understory.

IUCN Red List category. Hetaeria shiuyingiana
is known only from small populations in Ledong,
Baoting, and Wuzhishan counties from Hainan
Province, and only a single specimen (collected in
1971) has been collected from Hong Kong. We
estimate its population to total fewer than 250 mature
individuals. In addition, Ridley (1896) reported that
the leaves of H. obliqua Blume are used as medicine
in peninsular Malaysia, and it is possible that H.
shiuyingiana might also be collected for use as
medicine. For these reasons, H. shiuyingiana can be
considered at high risk of extinction in the wild, and
should be classified as Endangered (EN) according to
criterion D (restricted population size) of the IUCN
Red List criteria (IUCN, 2001).

Phenology. Hetaeria shiuyingiana flowers in
March and April.

Etymology. The species epithet honors the well-
known Chinese botanist, Hu Shiuy Ying (1908-), of the
Chinese University of Hong Kong, who has shared her
rich knowledge of this orchid with us.

Relationships. Hetaeria shiuyingiana is similar to
H. nitida from Penang, Malaysia, but differs in its
conspicuously larger flowers (sepal 6-7 × 3-4 mm),
its petals that are broader (3-3.5 mm wide) and
obliquely ovate, the lip hypochile with a pair of
tripartite papillae and usually a single basal slender
and finger-shaped papilla at the base on each side,
and the two thick, more or less sigmoid wing-like
appendages on the ventral side of the column, usually
with a minutely papillose surface and pointing upward
as long as or slightly longer than the rostellum arms.
Hetaeria nitida, on the other hand, has much smaller
flowers (sepal ca. 4 × 2 mm), spatulate petals (0.8-
1.6 mm wide) that are not noticeably oblique, the
lip hypochile with a pair of close papillae with
irregular terete fleshy branching, and rostellum
arms that extend above the column wings, which are
rather large, broad, oblong flaps that are curved and
folded.

Paratypes. CHINA: Hainan: Baoting County, Ganhaola,
800 m, 20 July 2006, Li Lin 017 (IBSC); Wuzhi Mtn., in
cult., at South China Botanical Garden, 16 Apr. 2007, Li Lin
108 (PE).

KEY TO THE SPECIES OF HETAERIA FROM CHINA
1a. Lip with conspicuously enlarged epichile, bilobulate, with large orbicular lobules ............... H. anomala Lindley
1b. Lip with an acuminate or slightly enlarged epichile, entire or 3-lobed.
2a. Epichile slightly enlarged.
   3a. Epichile 3-lobed; sac of the hypochile with 2 hornlike papillae; disc with one group of irregular minute
       warts or with 2 short keels .............................................. H. cristata Blume
   3b. Epichile entire, most often heart-shaped; sac of the hypochile with 2 oblong, 2- to 4-lobed papillae in each
       half; disc without warts or keels ............................................ H. affinis Lindley
2b. Epichile acuminate.
   4a. Sac of the hypochile with about 5 rather slender papillae in each half, most often spread along the 4 lateral
       veins.
      5a. Petals linear to lancolate, ca. 1 mm broad, usually less; the strongly sigmoid wings on front of
       column usually with vertical triangular acute tips at their upper part .................................................. H. oblongifolia Blume
      5b. Petals rhombic to obolate, > 2 mm broad; the broad obtuse upper part of the column wings usually
       bent inward and overlapping ............................................. H. finlaysonianiana Seidenfaden
   4b. Sac of the hypochile with ca. 1 pair of usually lobed or split thick papillae in each half, most often close
       beside each other.
      6a. Petals spatulate, not very oblique; sac of the hypochile with 2 or 3 papillae close beside each other in
c       each half, shaped like flat scales with an irregularly lobed or dentate apex ........................................ H. obliqua Blume
6b. Petala obliquely ovate; sac of the hypochile with 2 close series of tripartite papillae and 1 single slender finger-shaped papilla near the series in each half. . . . . . . H. shiyingsiana L. Li & F. W. Xing

Acknowledgments. The authors thank the reviewers, Victoria C. Hollowell and Hubert Kurzweil, for providing useful remarks and suggestions that improved the manuscript; Yang Qin-Er for critical Latin corrections; Deng Yun-Fei (IBSC) for valuable discussions and constructive remarks on the nomenclature of this new species; Zeng Song-Jun (IBSC) for checking and providing images of specimens in K; and Liu Yun-Xiao (IBSC) for preparing the illustration. Financial support was provided by the National Natural Science Foundation of China (grant 30470137).

Literature Cited

—— & ———. 1965. Pp. 735–735, Fig. 547 in The Orchids of Thailand. A Preliminary List. Part IV(2). The Siam Society, Bangkok.
A New Species of *Pseudostellaria* (Caryophyllaceae) from Gansu, China

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**Abstract.** A new species, *Pseudostellaria polymorpha* Y. S. Lian (Caryophyllaceae), is described from Gansu Province, China. The species is remarkable for the regular variation in its floral morphology from stem apex to base. The terminal chasmogamous flower is largest, having five oval-lanceolate sepals, five oblanceolate petals noticeably longer than the sepals, 10 stamens, and an ovary with two long filamentous styles. The flowers along the upper portions of the stems have four sepals, only two or three petals equal or slightly shorter than the sepals, six to eight stamens including one or two sterile ones, and an ovary with two filamentous, shorter styles. The cleistogamous flowers are solitary in the axils of the basal portion of the stem, with four densely pilose sepals, three petals obviously shorter than the sepals or reduced, two sterile stamens, and an ovary with two styles obviously shorter than the ovary itself. This floral transition is rare in *Pseudostellaria* Pax, and is therefore a feature by which the new species is easily distinguishable from other members of the genus.

**Key words:** Caryophyllaceae, China, Gansu Province, *Pseudostellaria*.

*Pseudostellaria* Pax is a small genus in the Caryophyllaceae with about 18 species known from Central Asia and Afghanistan to Japan, as well as Europe and North America (Dequan & Rabeler, 2001), with nine species distributed in China. While studying specimens of *Pseudostellaria* from Gansu Province in China in 2002, the author found two remarkable specimens of this genus. These represent a new species distinguished by its regular, basipetalous variation in floral morphology. This rare feature is not otherwise known in *Pseudostellaria* or in Caryophyllaceae, and it easily distinguishes the new species from other members of the genus.

*Pseudostellaria polymorpha* Y. S. Lian, sp. nov.

**Type:** China. Gansu: Tianzhu Xian, Shimen ravine, under forest on shady slope, 2800 m, 20 June 1989, Wang Qingrui & Yan Minsheng 12092 (holotype, NWTC). Figure 1.

Species haec ab omnibus congeneribus florum structura ab apice ad inum caulim variationem ordinate praebeunte (petalorum et staminum longitudine manifeste abbreviata atque numerum citio reductis, stylorum longitudine manifeste abbreviata, sepalorum numero e 5 ad 4 reducto) distinguitur; quoad foliolum formam etiam scaleas prostratos *Pseudostellaria himalaica* (Franchet) Pax similis, sed abs caulis folio ovatis usque late ovatis utrinque glabris vel interdum sparsim puberulis atque seminibus minutae tuberculatis bene differt.

Perennial herbs with fusiform tubers; stems erect, 10–20 cm, with biseriate hairs, with creeping branches at lower nodes. Leaves opposite, ovate or widely ovate, 10–20 × 7–12 mm, membranous, glabrous or sparsely pubescent, apex acute, usually with mucro ca. 1 mm, base nearly rounded or widely cuneate, margins basally ciliate; petioles 1–4 mm. Flowers terminal or solitary in branch axils; pedicels 1.2–2.2 cm, with biseriate hairs. The chasmogamous flower terminal and largest, with 5 sepals oval-lanceolate, 3.2–3.6 × 0.9–1 mm, with a few scattered pilose hairs only along abaxial midrib; petals 5, oblanceolate, 4.7–5.1 × 1.1–1.4 mm, bilobed at apex, exceeding the sepals; stamens 10, to 4.5 mm, anthers purple; ovary coniform, 1–1.2 mm diam., with 2 filamentous styles to 4 mm, 2–3× longer than the ovary. Flowers along the upper half of stems, with 4 sepals oval-lanceolate, 2.5–3 × 0.6–0.8 mm; petals 2 or 3, subequal to sepals; stamens 6 to 8, ca. 1.5 mm, including 1 or 2 sterile ones ca. 0.8 mm; ovary coniform, 0.8–1.2 mm diam., with 2 filamentous styles to 1.3 mm, 1.2–1.6× longer than the ovary. Cleistogamous flowers solitary in axils of the lower stems; with 4 sepals linear-lanceolate, 2.5–3 × 0.4–0.6 mm, densely pilose; petals 3, 1–1.5 × 0.3–0.5 mm, obviously shorter than the sepals or reduced; stamens 2, sterile, ca. 1 mm; ovary coniform, 2–2.5 mm diam., with 2 styles to 1 mm, much shorter than the ovary. Fruit a coniform capsule, with numerous seeds; seeds subglobose, ca. 1 mm diam., minutely tuberculare.

**Distribution and habitat.** *Pseudostellaria polymorpha* is known only from the type collected from Shimen ravine in Tianzhu County of Gansu Province, China. It was observed at elevations of 2750–2800 m, on shady slopes in forests.

The type locality in Tianzhu is located at the transitional zone from the Qinghai–Tibet plateau to Nei Mongol–Xinjiang plateau. The ecological conditions in the region are variable and quite harsh for the plants. It was difficult to assess the distributional

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extent of the new species, but it can be provisionally considered endemic to Tianzhu.

Phenology. *Pseudostellaria polymorpha* has been collected in flower in June and in fruit from June to July.

Discussion. The new species has an affinity with *Pseudostellaria himalaica*, with several characters in common, including the basic leaf shape and the prostrate stems. The two taxa differ in that the leaves of *P. polymorpha* are ovate to widely ovate and glabrous or sparsely pubescent, while those of *P. himalaica* are no more than ovate and are densely pubescent; the seeds of *P. polymorpha* are minutely tuberulate, while those of *Pseudostellaria himalaica* lack tuberules. Furthermore, *P. polymorpha* differs in its hasipetalous variation in floral morphology. This feature is not previously known in *Pseudostellaria* and easily distinguishes the new taxon.

Capsules with seeds have been seen only from cleistogamous flowers on the basal stem. The cleistogamous flowers have larger ovaries and two styles that are shorter than the ovary, whereas flowers that are chasmogamous or located on the upper half of the stem have smaller ovaries and two styles that are longer than the ovary. Further study is needed to determine whether style length affects pollen tube development and fertilization.


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Literature Cited
Clematis liuzhouensis (Ranunculaceae), a New Species from China

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ABSTRACT. A new species of Clematis L. (Ranunculaceae), C. liuzhouensis Y. G. Wei & C. R. Lin, is described and illustrated. The new species is related to C. wissmanniana Handel-Mazzetti, but differs in its leaflets that always have entire margins and are abaxially silvery-pannose and in its smaller sepals that are up to 1.5 × 0.6 cm.

Key words: China, Clematis, IUCN Red List, Ranunculaceae.

There are more than 300 species of Clematis L. (Ranunculaceae) in the world, and more than 100 species are found in China (Chang et al., 1980). During a field trip to Liuzhou shi, Guangxi Province, China, in 1989, we collected an unusual Clematis specimen with fruits only; however, we could not identify it without flowers. In 2006, we returned to Liuzhou shi to collect the flowers, and now establish it as a new species.

Clematis liuzhouensis Y. G. Wei & C. R. Lin, sp. nov. TYPE: China. Guangxi: Longtan Park, Liuzhou shi, 17 June 2006 (fl.), Y. G. Wei 06220 (holotype, IBK; isotype, PE). Figure 1.

Species nova affinis Clematis wissmanniana Handel-Mazzetti, a qua foliis margine integris subitus argenteopannose atque sepalis minoribus 1.1–1.5 cm longis et 0.4–0.6 cm latis differt.

Woody vines, 2–4 m long, branches angular, appressed puberulous. Leaves 2-pinnate or 2- to 3-ternate; leaflets papery, ovate-lanceolate, long-ovate, or ovate, 2.5–6 × 1.3–2.5 cm, apex acuminate, base rounded, margin always entire, adaxially appressed puberulous, abaxially densely silvery pannose. Cymes axillary, 4- to 7-flowered; peduncles 4–6.5 cm, puberulous; bracts lanceolate, ca. 6 × 2 mm. Flowers 2.8–3.2 cm diam., pedicels 1.5–3.5 cm, puberulous; sepals 4, spreading, white, oblong, 1.1–1.5 × 0.4–0.6 cm, densely puberulous externally, glabrous internally; stamens 50 to 87, glabrous, ca. 1.5 cm, filaments linear, anthers oblong, ca. 2 mm, apex obtuse. Achenes bilaterally compressed, ovate, ca. 5 × 2.5 mm, puberulous, persistent style ca. 3 cm, plumose.

Distribution. Clematis liuzhouensis is known only from the type locality in Liuzhou shi, in Guangxi Province, China. It grows in association with Bauhinia championii (Bentham) Benth, Diospyros sasatilis S. K. Lee, Mallotus microcarpus Pax & K. Hoffmann, and M. philippinensis (Lamarck) Müller Argoviensis.

IUCN Red List category. Clematis liuzhouensis should be considered Critically Endangered (CR A2c) according to IUCN Red List criteria (IUCN, 2001). Only 10 individuals were found on the limestone hills in an area of ca. 10 × 10 m², at an elevation of 150 m. Although no path exists to the site, the area is accessible to tourists, and tourism presents the principal threat of disturbance to the new species.

Phenology. The new species was collected in flower in June and in fruit in August.

Discussion. Based on floral structure, Clematis liuzhouensis belongs to section Clematis subsection. Clematis, characterized by its habit of woody vines or herbs; leaves that are 2-pinnate, 2-pinnate deep split, or 2- to 3-ternate; inflorescences in cymes or panicles; glabrous stamens, and lack of staminae. The new species is characterized by its leaflets, which are covered abaxially with a beautiful and unusual silvery pannose indumentum, and this feature distinguishes C. liuzhouensis from its close ally, C. wissmanniana Handel-Mazzetti, as well as other species of that subsection. Clematis wissmanniana is found only in the adjacent Yunnan Province to the west of Guangxi, and is not sympatric with C. liuzhouensis.


KEY TO CLEMATIS LIUZHOENSIS AND C. WISSMANNIANA IN SOUTH CENTRAL CHINA

1a. Leaflets always with entire margins, abaxially silvery pannose; sepals to 1.5 × 0.6 cm

.......................... C. liuzhouensis

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Figure 1. *Clematis liuzhouensis* Y. G. Wei & C. R. Lin. —A. Fertile habit showing the flowering cymes. —B. Older stem. —C. Sepal, abaxial surface. —D. Stamen. —E. Infructescence. —F. Achene. A–D drawn by S. Q. He from the holotype, Y. G. Wei 06220 (IBK); E, F, from the paratype, Longtan-Dule Exp. 06744 (IBK).
1b. Leaflets sometimes with entire margins or serrate, appressed pubescent on both surfaces; sepals to 2 × 1 cm. ---------------C. wissmanniana

Acknowledgments. We are grateful to Wang Wentsai (CAS) for correcting the description and to He Sunqing for the illustration of the new species. This study was supported by the Knowledge Innovation Program of CAS.

Literature Cited
Hechtia caulescens (Bromeliaceae), a New Species from Central Mexico

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ABSTRACT. Hechtia caulescens López-Ferrari, Espejo & Martínez-Correa (Bromeliaceae), known from the states of Morelos, Puebla, and Oaxaca in Mexico, is described and illustrated. The new species is compared with H. stenopetala Klotsch, from which it differs by its larger flowers and floral bracts, and by its twice-branched inflorescences.

RESUMEN. Se describe e ilustra Hechtia caulescens López-Ferrari, Espejo & Martínez-Correa (Bromeliaceae), conocida de los estados de Morelos, Puebla y Oaxaca, México. La nueva especie se compara con H. stenopetala Klotsch, de la cual difiere por sus flores y brácteas florales más grandes y por sus inflorescencias más ramificadas.

Key words: Bromeliaceae, Hechtia, IUCN Red List, Mexico, Puebla.

Of the 18 genera of Bromeliaceae present in Mexico, Hechtia Klotsch is particularly interesting due to its significant specific representation and its high level of endemism. With ca. 55 accepted species (Burt-Utley & Utley, 1987; Espejo et al., 2004, 2007a, 2008; Luther, 2006) and at least eight more species to be described (Espejo et al., 2007b), Hechtia is an almost entirely Mexican genus, with 50 species (90.9%) endemic to the country.

As part of our ongoing fieldwork for a monograph on Mexican Bromeliaceae, we collected plant material of an undescribed taxon of Hechtia and propose it here as new.

Hechtia caulescens López-Ferrari, Espejo & Martínez-Correa, sp. nov. TYPE: Mexico. Puebla: Mun. Izúcar de Matamoros, 2 km adelante de El Tepenece, carr. Izúcar–Acatlán, 18°28’42”N, 98°23’20”W, 1235 m, selva baja caducifolia, 20 jul. 2006 (♀), N. Martínez C., A. Espejo, A. R. López-Ferrari & J. García-Cruz 58 (holotype, UAMIZ; isotypes, IEB, MEXU). Figure 1.

Hace species quad flores albos parvos ac habitum caulescentem Hechtiae stenopetalae Klotsch similis, sed ab ea floribus et bracteis floralibus majoribus atque inflorescencia bis ramosa distinguitur.

Herbs dioecious, terrestrial or saxicolous, caespitose, rosette-forming and long caulescent, forming large colonies, flowering 0.86–1.87 m high, the rosettes extended, actinomorphic, ca. 40 cm diam.; stems cylindrical, prostrate or decumbent at the apex, 22–30 × 3–3.7 cm diam. Leaves numerous, fleshy; sheaths amplexicaulose, light brown, lustrous, depressed-ovate, 3.2–4.7 × 4.9–6 cm, basally lustrous on both surfaces, apically white lepidote on both surfaces; blades erect to slightly curved at the apex, green to dark green, linear, 29–40 × 1.8–3 cm, densely white lepidote on both surfaces, long acuminate and apiculate, the margin loosely spiny with brown curved ascendant spines, 1.9–4 mm long, 1.5–1.9 cm apart. Inflorescence terminal, erect, paniculate, with numerous, densely packed flowers. Staminate inflorescence 0.86–1.6 m high, twice branched, scape cylindric, 30–56 cm × 4–12 mm diam., green, glabrous; scape bracts light brown, foliaceous, glabrous, entire; sheaths ovate to triangular, 1.1–1.4 × 1.1–1.2 cm; reduced blades linear, 4.2–7 cm × 3–4 mm, acuminate and apiculate, shorter than the internodes, reducing their length gradually to the apex; primary branches 1 per node, ascendant to erect, with the basal sterile portion flattened, 10–22 cm, each with 3 to 15 secondary branches; primary bracts light brown, ovate to triangular, 4.7–11 × 5–7 mm, slightly erose, acuminate; secondary branches 1 per node, ascendant, cylindric, 4.5–7 cm × 5–7 mm diam.; floral bracts light brown, triangular, acuminate, 2.2–2.5 × 1.3–1.7 mm, entire; staminate flowers ascendant to divaricate, sessile to subsessile; sepal light brown to brown basally, ovate-triangular, 2.1–2.2 × 1.6–1.8 mm, obtuse, entire; petals white, elliptic, 3.5–4 × 2.2–2.5 mm, rounded; stamens subequal, longer than the petals, filaments white, laminar, 2.8–3 mm, anthers white to whitish yellow, oblong, ca. 1 mm; ovary vestigial. Pistillate inflorescence to 37 cm high, twice branched, scape cylindric to 1 m × 0.15 cm diam., green, glabrous; scape bracts light brown, foliaceous, glabrous, entire; sheaths ovate to triangular, 1.1–1.4 × 1.1–1.2 cm; reduced blades linear, 4.2–7 cm × 3–4 mm, acuminate and apiculate at the apex, shorter than the internodes, reducing their

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length gradually to the apex; **primary branches** 1 per node, ascendant, with the basal sterile portion flattened, (2–)6–24 cm long, each with (2)6 to 18 secondary branches; **primary bracts** light brown, triangular to widely triangular, 12–15 × 4.5–6 mm, entire, glabrous, narrowly acuminate; **secondary branches** 1 per node, ascendant, cylindric, 2.5–9 cm × 5–7 mm diam.; **floral bracts** light brown, triangular,
Table 1. Morphological differences between *Hechita caulescens* and the affinned *H. stenopetala*. The *H. stenopetala* data were based on the revision of 34 specimens examined by the authors from CICY, ENCB, MEXU, MO, and XAL.

<table>
<thead>
<tr>
<th></th>
<th><em>H. caulescens</em></th>
<th><em>H. stenopetala</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflorescence</td>
<td>twice branched, with 3 to 15 (♂) or 6 to 18 (♀) well-developed secondary branches</td>
<td>once branched or basally twice branched, with 2 barely developed secondary branches</td>
</tr>
<tr>
<td>Pistillate flowers</td>
<td>sepals triangular, 2.7–3.7 × 1.3–1.7 mm; petals 3.4–3.8 × 1.1–1.4 mm; ovary ovoid to long-ovoid, 3.3–3.9 × 1.2–1.5 mm</td>
<td>sepals elliptic to widely triangular, 1.8–2.1 × 1.2–1.7 mm; petals widely elliptic to widely oblong, 2.5–3 × 1.9–2 mm, rounded; stamens 2.3–3 mm; anthers green, 1.1–1.3 mm oblong to triangular, 0.9–1.1 mm, rounded</td>
</tr>
<tr>
<td>Stamine flowers</td>
<td>sepals ovate-triangular, 2.1–2.2 × 1.6–1.8 mm; petals elliptic, 3.5–4 × 2–2.5 mm, rounded; stamens 2.3–3 mm; anthers white to whitish yellow, ca. 1 mm</td>
<td>sepals elliptic to widely triangular, 1.8–2.1 × 1.2–1.7 mm; petals widely elliptic to widely oblong, 2.5–3 × 1.9–2 mm, rounded; stamens 2–3 mm; anthers green, 1.1–1.3 mm oblong to triangular, 0.9–1.1 mm, rounded</td>
</tr>
<tr>
<td>Pistillate floral bracts</td>
<td>triangular, ca. 2 mm, acuminate</td>
<td>oblong to elliptic, 0.7–1.2 mm, acute</td>
</tr>
<tr>
<td>Stamine floral bracts</td>
<td>triangular, 2.2–2.5 mm, acuminate</td>
<td>ovate to widely oblong or oblong, 3.5–6 × 4–2 cm</td>
</tr>
<tr>
<td>Leaf sheaths</td>
<td>depressed-ovate, 3.2–4.7 × 4.9–6 cm</td>
<td>Veracruz</td>
</tr>
<tr>
<td>Distribution</td>
<td>Morelos, Puebla, and Oaxaca</td>
<td></td>
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acuminate, ca. 2 × 1.8 mm, slightly erose; *pistillate flowers* ascendant to adpressed, slightly pendicellate, pedicels 1.3–1.7 mm; *sepals* greenish brown, triangular, acute, 2.7–3.7 × 1.3–1.7 mm, entire; *petals* white, narrowly triangular, acute, 3.4–3.8 × 1.1–1.4 mm, entire; *ovary* green, ovoid to long-ovoid, 3.3–3.9 × 1.2–1.5 mm diam., glabrous, stigma branches 1–1.5 mm; staminodes 6, laminar, 1.6–1.8 mm, white, lacking anthers. *Capsule* narrowly ovoid to narrowly conical, pale brown, 3.5–10 × 3.2–4.3 mm diam.; *seeds* ellipsoid to oblong, 2.3–4 × ca. 1 mm diam., winged around seed circumference, the wing more conspicuous distally.

Distribution and habitat. *Hechita caulescens* is known from the states of Morelos, Puebla, and Oaxaca, where it grows in arid scrub and tropical deciduous forest on rocky talus, slopes, and valleys, at altitudes of about 1200–1600 m.s.m., forming extensive colonies.

IUCN Red List category. The known populations of the *Hechita caulescens* are widespread and usually form extensive colonies. Apparently, the plants are not used by the inhabitants of the region, thus we believe that the populations of *H. caulescens* are not subject to anthropogenic pressure. However, because of the absence of detailed information about the species distribution and precise population data we suggest the new species be considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. *Hechita caulescens* has been collected in flower during July and August, and the fruits have been found in August.

Etymology. The specific epithet refers to the conspicuous, long, and prostrate to decumbent stems that characterize the new species.

Discussion. By its small white flowers and caulescent habit, *Hechita caulescens* is phenetically similar to *H. stenopetala* Klotsch, from which it differs by its larger flowers and floral bracts, its twice-branched inflorescence, and its distribution and habitat (Table 1). *Hechita stenopetala* is endemic to the state of Veracruz, where it grows in oak forests and tropical (semi-)deciduous forests between 100 and 850 m.s.m. (Espejo et al., 2005).


Acknowledgments. We are very grateful to Thorsten Krömer for the critical revision of the manuscript and to Javier García Cruz for his assistance in the fieldwork. We also thank the curators of B, CHAP, CICY, ENCB, MEXU, MO, UAMIZ, and XAL for
providing the facilities to consult specimens and data. The line illustration of the new species was drawn by Rolando Jiménez Machorro.

Literature Cited


Persea pallescens, a New Combination for Phoebe pallescens (Lauraceae, Perseeae), a Mistaken Taxon of Mexico and Guatemala

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ABSTRACT. Critical review of the morphology of Phoebe pallescens Mez shows that the species must be placed in Persea Miller subgen. Persea (Lauraceae, Perseeae) because of the pinnerved leaves, absence of domatia, stipitate staminal glands, well-developed staminodia, the pubescent gynoecium, flat hypanthium not developed into a cupule, and perianth lobes entirely deciduous in fruit. The new combination Persea pallescens (Mez) Lorea-Hernández, which is distinguished by its straight, appressed pubescence on leaves, is not a rare, local endemic as previously considered, but occurs along the eastern Sierra Madre in Mexico and in central Guatemala. The name Persea pallescens is lectotypified, and a key to separate the Mesoamerican species of Persea with a pubescent pistil is provided.

RESUMEN. Con base en una revisión crítica de la morfología de Phoebe pallescens Mez se concluye que la especie debe ser considerada en Persea Miller subgen. Persea (Lauraceae, Perseeae), debido a sus hojas pinnervadas, la ausencia de domatios, glándulas estaminales estipitadas, estaminodios bien desarrollados, el gineceo pubescente, hipooplasto plano que no se desarrolla como una cúpula y lóbulos del perianto deciduos en el fruto. La nueva combinación Persea pallescens (Mez) Lorea-Hernández, que se distingue por su pubescencia recta y adpreso sobre las hojas, no es un endemita local y raro, como anteriormente se le consideraba, sino que se distribuye a lo largo de la Sierra Madre Oriental en México y en el centro de Guatemala. Además se designa el lectotipo del nombre Persea pallescens y se presenta una clave para separar las especies de Persea con pílstilo pubescente en Mesoamérica.

Key words: Guatemala, Lauraceae, Mexico, Persea, Phoebe.

In his review of the American Lauraceae, Mez (1889) described Phoebe pallescens Mez based on a single collection (F. Müller 90), which was gathered in the vicinity of Orizaba, Mexico. According to Mez, the species was unique among the 45 species of Phoebe Nees recognized by him in having a pubescent pistil. In subsequent reviews of the Mexican Lauraceae (Standley, 1922; Allen, 1945), the species was considered an endemic of very narrow distribution and known only from the type.

Later, Kostermans (1961) subsumed all the American species of Phoebe (including P. pallescens) under Cinnamomum Schaeffer, creating the name C. pallescens (Mez) Kostermans. However, a detailed study of the type material during a review of the Mexican species of Cinnamomum (Lorea-Hernández, 1997) showed that F. Müller 90 belongs instead in Persea Miller. The pinnerved leaves, the absence of domatia in the axes of the secondary veins, the stipitate staminal glands, the well-developed staminodia, and the flat hypanthium not developed into a cupule firmly supported this generic affiliation. The flowers with tepals of similar form and size, the pubescent gynoecium, and the perianth lobes entirely deciduous in fruit place the species in Persea subgen. Persea.


The original material of Persea pallescens does not have mature open flowers, but only buds in different developmental stages, and the collected fruits were diseased. Therefore, part of the problem was to associate further collections of the species with open flowers and normal fruits with that of the type. Unfortunately, in the diagnosis and original description, Mez (1889) introduced an error when he described the species as having leaves and flowers

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glabrous. Examination of the type material showed that old leaves can sometimes be glabrous, but younger leaves are consistently sparsely appressed pubescent abaxially, as is the abaxial side of the tepals, particularly those of the inner whorl. The sparse, closely appressed pubescence of the abaxial leaf surface is, in fact, the principal character state that distinguishes this taxon.

The misleading presentation of the species by Mez has since contributed to an incorrect application of the name, and conspecific material subsequently collected around the type locality or from other areas has been overlooked. Most material of the species is filed in herbaria as *Persea americana* Miller, but this species has loose extended hairs forming the sparse to dense pubescence on its leaves. The same type of pubescence occurs in *P. schiedeana* Nees, the only other species of the subgenus *Persea* recognized by Kopp (1966) in America that has not been considered synonymous with *P. americana* (van der Werff, 2002). In searching for a possible previous name or synonyms of *P. pallescens* in *Persea*, careful examination of the types for synonyms of *P. americana* was undertaken, including *P. drymifolia* Schlechtendal & Chamisso, *P. floccosa* Mez, *P. gigantea* L. O. Williams, *P. gratissima* C. F. Gaertner var. oblonga Meisner, *P. nubigena* L. O. Williams, *P. paucitriplinervia* Lundell, and *P. steyermarkii* C. K. Allen. Except for the type of *P. steyermarkii*, all these types share rather erect, simous trichomes on the abaxial leaf surfaces, sometimes sparse, sometimes dense. Leaves of the type of *P. steyermarkii* are entirely glabrous, but its inflorescence axes and flowers have extended, simous trichomes. In addition, the inflorescence structure in *P. steyermarkii* is botryoid, whereas in *P. pallescens* it is thyrsoid. Thus, none of the binomials mentioned above correspond to the taxonomic concept of *P. pallescens*.

A review of other type material in *Persea* from Mexico and the Mesoamerican region resulted in the recognition of *Persea perglauca* Lundell and *P. parvifolia* as additional, novel synonyms of *P. pallescens*. *Persea perglauca* was differentiated (Lundell, 1975) by the combination of glaucous abaxial leaf surfaces, short inflorescences (up to 2 cm), and small flowers (ca. 2 mm long), all of which are characters that correspond to *P. pallescens*. The glaucous bark of the twigs, considered typical of *P. perglauca* by van der Werff (2002), is not such; although it is not seen frequently, the feature is certainly present in some specimens (mainly from Oaxaca) of *P. pallescens*. Other than that, there are not additional characters to distinguish *P. perglauca* from *P. pallescens*. The two species are similar in leaf shape (elliptic with apex acute to short acuminate and base cuneate) and size (7-12 × 2.5-4 cm), in inflorescence and flowers (discussed above), in the abaxial surfaces of young leaves and tepals that are characteristically appressed pubescent, and in the pubescent pistil.

In the case of *Persea parvifolia*, Williams (1977) pointed out the glabrous condition of the leaves and ovary as two of the distinctive features of the species. However, a careful inspection of the type material showed that he overlooked the sparse appressed pubescence of the abaxial leaf surface and the long scattered hairs of the pistil. The size and shape of the leaves as well as inflorescence and flower morphology also correspond to *P. pallescens*. It is worth mentioning that Tetla, the place where the type of *P. parvifolia* was collected, is just 13 km north of Oztlan, the approximate source area of *P. pallescens* type material.

During the survey of type material involved in this work, it was noticed that no holotype was designated for *Persea pallescens*. Mez (1889: 218) cited two specimens of the collection F. Miller 90, one from the herbarium of the Vienna Natural History Museum (W), the other from the herbarium of the Russian Academy of Sciences (LE). The syntype at W was destroyed during World War II, and I therefore designate the extant specimen at LE as the lectotype.

According to data recovered from herbarium specimens, *Persea pallescens* is a small tree (mainly 4-8[18] m) found frequently in mixed montane forests of the eastern Sierra Madre in Mexico (San Luis Potosí, Hidalgo, Querétaro, Puebla, Veracruz, and Oaxaca), growing mostly between 1600 and 1900 m on limestone-derived soils. The species is disjunct in central Guatemala, growing in the eastern mountains of Baja Verapaz. Flowering occurs from March to April, and mature fruits are found in the autumn and winter. The fruit is 3-3.5 cm in diam. and round or slightly pyriform in shape.

Specimens examined. GUATEMALA. Baja Verapaz: Unión Barrios, E of Km 154, C. L. Lundell & E. Contreras 19217 (F, MO). MEXICO. Hidalgo: 3.5 km al N de Ixtlahuacan, S. Montes 51 (XAL). Oaxaca: 16 km al W de Totontepec, E. Ramírez 549 (MEXU, MO, NY); 7 km al E de Totontepec, E. Ramírez 357 (MEXU, MO); 11 km al N de Totontepec, R. Torres 10429 (MEXU, MO); Totontepec, J. Rivera 189 (MEXU, MO); Cerro Horqueta, San Pedro Ocotepec, J. Rivera, S. Sales & L. Schibli 357 (XAL); 3 km al S de Valle Nacional, J. Reedschini 34025 (ENCB, XAL); 2.5 km al E de Tanustas, R. Aguilera 878 (OAX, XAL); entre La Laguna y brecha límite de Talea, S. Acosta 2774 (OAX, XAL); 3 km al SW de La Esperanza, A. Rincón 524 (MEXU, XAL); 9.5 km E of the Midia–Choapam rd. on rd. to Zacatepec, D. Breedlove 64755 (CAS); a 200 m de Plan de Guadalupe, por la terracería a San Martín Zoquipap, X. Munn 2018 (XAL). Puebla: Tetelilla, Barranca del Río Tozán, E. Meza 314 (XAL); 4 km al N de Tetetilla, Huayapan, J. L. Contreras 4488 (XAL). Querétaro: 1.5 km al SE de El Pemoche, Landa de Matamoros, H.
Rubio 2245 (IEB, MO, XAL); same locality, H. Rubio 2326 (IEB, XAL). San Luis Potosí: 5 km al NE de Ahuacatlán, J. Rzedowski 10070 (ENCB, XAL). Veracruz: Alseseca, F. Ventura 18363 (MO, XAL); Cerro La Cima, entre Plan de Las Hayas y Tierra Blanca, G. Castillo & H. Narase 2168 (XAL); Cerro San Cristóbal, 5 km al SW de Orizaba, J. Rzedowski 12183 (ENCB, XAL); cerca de Apanga, Zongolica, A. Rincón 1354 (XAL); La Cima, Plan de Las Hayas, R. Hernández 1588 (MEXU).

KEY TO MESOAMERICAN SPECIES OF PERSEA WITH A PUBESCENT PISTIL

1a. Pubescence of abaxial leaf surface made of minute, straight appressed hairs, scattered (better seen on young leaves) .................. P. pallescens

1b. Pubescence of abaxial leaf surface made of rather erect sinuous hairs, mostly noticeable by the naked eye (particularly on young leaves), scattered to dense .... 2

2a. Bracts at the base of the inflorescences lanceolate to ovate; staminode apex trullate to ovate in outline. .................. P. americana

2b. Bracts at the base of the inflorescences widely ovate to depressed ovate; staminode apex elliptic to lanceolate in outline .................. P. schiedeana

Acknowledgments. I thank the curators of BR, CAS, ENCB, F, K, LE, MEXU, MO, and NY herbaria for making available the type material and other specimens involved in this study. I am particularly thankful to I. Tatanov (LE) for his help in finding the type material of Phoebe pallescens. Fernando Chiang, Henk van der Werff, and Ramón Cuevas critically reviewed the paper and made useful comments. The editorial work of Victoria C. Hollowell improved the presentation of the paper.

Literature Cited


**Parkia nana** (Leguminosae, Mimosoideae), a New Species from the Sub-Andean Sandstone Cordilleras of Peru

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**Abstract.** *Parkia nana* D. A. Neill (Leguminosae, Mimosoideae) from sandstone areas near the Río Marañón area in northeastern Peru is described and illustrated. Photographic evidence also indicates presence of this species on sandstone substrate in the Cordillera Azul in east-central Peru. Compared to other species of *Parkia* R. Brown, which commonly attain 30–40 m in height, *P. nana* has a dwarf growth form, found as a pachyaecal treelet attaining reproductive maturity at 3–4 m in height. The new species is placed in the pantropical section *Parkia* R. Brown and is similar to *P. nitida* Miquel and *P. balstevii* H. C. Hopkins, with which it shares the opposite to subopposite leaves, the biglobose capitula, and indehiscent strap-shaped pods, but differs from both in its short stature, erect compound inflorescence, and erect, velutinous fruits.

**Resumen.** Se describe y se ilustra *Parkia nana* D. A. Neill (Leguminosae, Mimosoideae) procedente de mesetas de areniscas cerca al Río Marañón en el noroeste del Perú. Evidencia fotográfica además indica la presencia de esta especie en substrato de areniscas en la Cordillera Azul en el centro-oriental del Perú. A diferencia con otras especies de *Parkia* R. Brown, que frecuentemente alcanzan 30–40 m de alto, *P. nana* tiene una forma de crecimiento esbelta, es un arbusto poco ramificado que llega a la madurez reproductiva a la estatura de 3–4 m. La especie nueva se ubica en la sección *Parkia* R. Brown, que tiene una distribución pantropical, y es similar a *P. nitida* Miquel y *P. balstevii* H. C. Hopkins, especies con las cuales comparte las hojas opuestas a subopuestas, las cabezuelas biglobosas, y las vainas indehiscentes y planas, pero con las cuales difiere en su estatura baja, su inflorescencia compuesta erecta, y sus frutos erectos y vellosos.

**Key words:** IUCN Red List, Leguminosae, Mimosoideae, Parkia, Peru, sandstone.

The genus *Parkia* R. Brown, comprising some 35 species of trees, has a broad pantropical distribution with three disjunct centers of diversity including the Neotropics (centered in lowland Amazonia), Africa—Madagascar, and tropical Asia–Oceania (Lewis et al., 2005). Of the three sections of *Parkia*, only the largest, section *Parkia* R. Brown, is pantropical, including all of the 16 Paleotropical species and more than half of the 19 or more Neotropical species; sections *Sphaeroparkia* Duke and *Platytoparkia* Duke are exclusively Neotropical and restricted to the Amazon region (Hopkins, 1986, 2000a, b, 2001).

In *Parkia* the individual flowers are tightly massed into globose, pyriform, or biglobose heads, known as capitula, and these partial inflorescences are grouped into branched compound inflorescences. In section *Parkia* there are three types of flower in each capitulum: (1) fertile flowers at the globose, swollen apex of the receptacle, (2) nectar-secreting flowers in the middle, in a ring below the fertile ones, and (3) staminodial flowers at the base. The compound inflorescences are generally borne outside of the leaf-crown, either above the crown and erect or below the crown and pendent. Species of *Parkia* are pollinated by bats in the Neotropics and Paleotropics (Baker & Harris, 1957; Baker, 1973; Hopkins, 1984), and the floral and inflorescence structures are considered to be adaptations to chiroptrophy (but the three Amazonian species of section *Sphaeroparkia* are partially or entirely entomophilous; Hopkins, 1986).

Most species of *Parkia* throughout the pantropical range of the genus are large trees that attain 30 m or more in height in the canopy, or even taller emergents above the canopy, in lowland tropical forests. A few species that grow in reduced-stature vegetation types on nutrient-poor soils are much smaller trees. *Parkia cachimboensis* H. C. Hopkins is a small tree or shrub that attains just 5 m in height and grows exclusively in nutrient-deficient, highly acidic sand or sandstone, in low scrubby vegetation known as white-sand campina or Amazon caatinga (Anderson, 1981) in the Tapajos region of Pará, Brazil (Hopkins, 1986). Similarly, *P. lutea* H. C. Hopkins (2000a) is a small tree 5–10 m tall, occurring on lowland white-sand campina in central Amazonia (Amazonas, Brazil, near the mouth of the Río Madeira). A third species of *Parkia* that grows as a small tree is *P. barnesiana* H.
C. Hopkins (Hopkins, 2000b, 2001) from the upper Río Negro region of the Venezuelan Guayana. The label information indicates that *P. barneyana* attains just 7–9 m in height, and like *P. cuchimboensis* and *P. luậta,* it may be endemic to lowland white-sand scrub, but the soil type is not indicated on the specimen labels of the two known collections.

Recent collections from the sub-Andean sandstone plateaus in the Río Marañón region of Amazonas Department, Peru, have revealed a fourth dwarf species of *Parkia,* in section Parkia, that is evidently restricted to the nutrient-poor sandstone substrate and has a limited distribution in this habitat type in westernmost Amazonia.

**Parkia nana** D. A. Neill, sp. nov. TYPE: Peru. Amazonas: Bagua District, Imaza, Tayu Mujaji, Comunidad Nativa de Wawas, bosque primario, vegetación de 2 m de alto promedio (Uwejush), 1100 m, 05°15’S, 78°02’W, 7 Feb. 1999 (fl., immature fr.), R. Vásquez, C. Vargas, J. Yactayu & E. Palominó 26063 (holotype, USM 181801; isotypes, MO 5593805, MO 5593806). Figure 1.

Hae species Parkiae nitidae Miquel et P. baldeoii H. C. Hopkins foliis oppositis vel suboppositis, inflorescentia biglobosa et legumina lignalo indiscernibilis similis, sed ab eis habitu humiliori (arboris parvae 3–4 m altae), inflorescentia erecta et floribus velutinosis recedit.

Small tree or shrub, sparsely branched, with erect or ascending branches, 3–4 m tall; branchlets, petiole, and Rachises with brownish furriginous pubescence of short simple hairs. Leaves bipinnate, opposite or subopposite, (9)–11–15 cm, with swollen basal pulvinus; petiole 2.5–3.5 cm; rachis 5–9 cm; petiole bearing a single shallow, inconspicuous ellipitical gland, ca. 3 × 1.5 mm, on abaxial side, ca. halfway from the base to the first pair of pinnae; pinnae 8 to 10 in pairs, opposite to subopposite; leaflets 16 to 28 pairs per pinna, oblong, 2–6 × ca. 1 mm, the length of the leaflets gradually diminishing at the distal end of the pinna to a minimum of 2 mm long at the distal end versus ca. 6 mm in the central and basal portions of the pinna; apex of leaflet rounded, the base auriculate on the proximal side; main nerve of leaflet central and straight at apex. Compound inflorescence axis erect, projecting above foliage, ca. 10–12 cm long; peduncles in 3 or 4 pairs, opposite and decussate along erect compound inflorescence axis, ascending at an angle, ca. 4–6 cm long; capitula yellow, ca. 3–4–(5) cm, biglobose, the basal fringe of staminal flowers ca. 3.5–4 cm diam., the apical portion ellipsoid, ca. 2.2–2.5 cm diam. Hermaphrodite (apical) flowers: calyx ca. 4 mm, the 5 lobes ca. 0.5 mm long, minutely pubescent; corolla ca. 5–5.5 mm, the 5 lobes ca. 0.5 mm long, minutely pubescent; the 10 stamens exerted ca. 10 mm beyond corolla. Nectar-secreting (midportion) flowers similar in size to hermaphrodite flowers. Staminodial (basal) flowers: calyx ca. 6 mm, with rounded lobes ca. 1 mm long, minutely pubescent; corolla ca. 9–10 mm, lobes ca. 1–1.5 mm long, filaments exerted to ca. 18–20 mm beyond corolla. Immature pods strap-shaped, with dense furriginous to brownish velutinous pubescence; mature pods (seen only in photographs; no specimens available) borne erect or ascending on erect compound inflorescence, above foliage, indiscernible, estimated to be ca. 12–20 × 3–4 cm, with furriginous to brownish velutinous pubescence evident in photographs. Seeds elliptic, glossy black, seen only in photographs.

**Distribution and habitat.** Herbarium specimens of *Parkia nana* have been obtained only from a small area in the Bagua District, Amazonas Province, Peru, in territory owned by indigenous Aguaruna communities in the vicinity of the settlement of Imaza. This area is a few kilometers east of the Río Marañón where the river flows through a region of sandstone outcrops above the river valley, near the union of the Marañón and one of its right bank tributaries, the Río Imaza (or Río Chirriaco), at about 05°15’S, 78°22’W. Both of the known collections were made from low shrubby vegetation atop sandstone plateaus or ridges, at 900–1100 m in elevation.

Photographic evidence and site records, however, suggest that *Parkia nana* also occurs on sub-Andean sandstone mountains about 350 km farther to the south of the type locality, in east-central Peru. Biologists, including botanists from the herbaria of the Field Museum of Chicago (F) and the Universidad Nacional Mayor de San Marcos in Lima (USM), conducted a “Rapid Biological Inventory” of the Cordillera Azul National Park along the boundary between San Martin and Loreto departments, between the Ucayali and Huallaga rivers (Alverson et al., 2001). On the high sandstone ridges of the Cordillera Azul, at 1400 m elevation, about 07°34’S, 75°31’W, Robin Foster photographed a small *Parkia* about 3 m tall with opposite leaves and erect, evidently velutinous brown fruits and black seeds. Taking note of those features, he wrote in the expedition report (Alverson et al., 2001) that the dwarf *Parkia* was a new species distinguished by its small stature and erect fruits. Herbarium specimens were not collected on the FUSM Cordillera Azul expedition, but the photographs were posted on the Internet site of the Field Museum, <www.fmnh.org/plantguides>. I believe the images of the dwarf *Parkia* from the Cordillera Azul almost certainly represent another population of *P. nana.* There are a number of
Figure 1. *Parkia nana* D. A. Neill. —A. Branchlet with a terminal, compound inflorescence and young fruits. —B. Fertile flower from the apical portion of the capitulum. —C. Staminodial flower from the basal portion of the capitulum. Scale bar for B also applies to C. —D. Nearly mature fruit. —E. Distal end of pinna with leaflets. (Detail from part A.) —F. Leaflet. A–C and E–F drawn from the type and paratype, *R. Vásquez et al.* 26063 and *R. Vásquez* 27397 (MO); D from photographs taken by Robin Foster of a tree in the Cordillera Azul, Loreto Department, Peru, and posted on the Internet at <www.fmnh.org/plantguides>. 
sandstone outcrops in eastern Peru, most of which have not been explored at all botanically, where this species is also likely to occur; in addition, it is likely to occur on the lower elevation sandstone ridges of the Cordillera del Cóndor in southeastern Ecuador (Neill, 2005), where *P. nana* has not been found as yet.

Ecologically, *Parkia nana* appears to be restricted to the low scrub vegetation or dwarf forest that occurs exclusively on sandstone outcrops in sub-Andean cordilleras below 1500 m elevation, at the extreme western edge of the Amazon Basin in Peru. These sandstone outcrops form an “archipelago” of isolated, edaphically distinct habitat islands that vary from a few hectares in size to tens of thousands of hectares. The floras of very few of these sandstone cordilleras have been inventoried as yet, and none have been explored thoroughly, but ongoing studies in Ecuador and Peru have revealed that many trees and shrubs in the sandstone dwarf forests are restricted to that habitat; some are local endemics (Neill, 2005) and some are more widespread in the lowland white-sand campinas or “Amazon caatingas” that are scattered throughout the Amazon Basin (Anderson, 1981).

**IUCN Red List category.** *Parkia nana* is known with certainty from a single locality that is not formally protected, and the presumed record of a protected population in Cordillera Azul National Park is based only on photographic evidence. This species is believed to be ecologically restricted to sandstone substrates, which are scattered as isolated habitat islands in the sub-Andean cordilleras of eastern Peru. The population size, extent of occurrence, and area of occupancy of *P. nana*, criteria used in the IUCN Red List categories for threatened species (IUCN, 2001), are not known to any degree of precision. In general, the natural vegetation on these isolated sandstone outcrops in Peru and Ecuador is not highly threatened at present because these sites are relatively difficult to access, are not suitable for agriculture, and are usually not subject to deforestation by rural inhabitants in this region. However, because the total population of this species is expected to be relatively small, fragmented, and ecologically restricted, migration to other areas under future conditions of climate change may not be possible, and increased alteration of forest habitats in eastern Peru by agriculture, mining, or other human activities may take place in the future, the IUCN Red List category of Near Threatened (NT) is assigned to this species. *Parkia nana* is clearly not, by any measure, widespread and abundant, which are criteria for the IUCN category of Least Concern (LC).

**Etymology.** The specific epithet, Latin meaning “dwarf,” refers to the unusually small stature of *Parkia nana*, in comparison with most other species of *Parkia*, which are tall canopy emergent trees.

**Discussion.** Within section *Parkia*, *P. nana* is most similar to the widespread *P. nitida* and *P. baldei*, known only from Amazonian Ecuador. Both of the latter species share several features with *P. nana*, including the opposite to subopposite leaves, biglobose capitula, and strap-shaped indehiscent pods. *Parkia nitida* and *P. baldei*, however, are large canopy emergent trees attaining 30–40 m in height, and the compound inflorescences in both species are pendent, hanging below the leafy crown of the tree, with the capitula pendent from long peduncles. The capitula of *P. nana* are yellow like those of *P. nitida*, whereas those of *P. baldei* are pinkish red. The strap-shaped indehiscent pods of all three species are similar, but those of *P. nitida* and *P. baldei* are glabrous, whereas those of *P. nana* bear a velutinous pubescence similar to the pods of the more distantly related *P. velutina* Benoist, in section *Sphaeroparkia*, which is widespread in lowland Amazonia.


Both the type and the paratype were originally determined by the author as *Parkia nitida* Miquel, and duplicates under that name may have been distributed from MO to other herbaria.

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**Literature Cited**


A Tiny New Brazilian Species of *Diandrolyra* (Poaceae, Bambusoideae, Olyreae), with Notes on the Systematics of the Genus

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ABSTRACT. A new species of *Diandrolyra* Stapf (Poaceae, Bambusoideae, Olyreae), *D. pygmaea* Soderstrom & Zuloaga ex R. P. Oliveira & L. G. Clark, from Bahia, Brazil, is described and illustrated. This species is known only from southern Bahia, growing in the Atlantic Forest region. It is compared and contrasted with its congeners, *D. bicolor* Stapf and *D. taitiana* Soderstrom & Zuloaga, and the Bahian distribution of the three species is mapped. Distinguishing features of *D. pygmaea* include its small stature and two (or three) pairs of spikelets per racemose inflorescence.

RESUMO. Uma nova espécie de *Diandrolyra* Stapf (Poaceae, Bambusoideae, Olyreae), *D. pygmaea* Soderstrom & Zuloaga ex R. P. Oliveira & L. G. Clark, para a Bahia, Brazil, está sendo descrita e ilustrada. Esta espécie é conhecida apenas para o sudeste da Bahia, crescendo em áreas de Mata Atlântica higrófila. Está sendo comparada com as outras espécies congeneres, *D. bicolor* Stapf e *D. taitiana* Soderstrom & Zuloaga, e a distribuição das três espécies na Bahia é mapeada. Características distintivas de *D. pygmaea* incluem sua pequena estatura e dois (ou três) pares de espiguetas por inflorescência racemosa.

Key words: Atlantic rainforest, Bahia, Bambusoideae, Brazil, *Diandrolyra*, IUCN Red List, Olyreae, Poaceae.

*Diandrolyra* is a rare grass genus, described by Stapf (1906). The generic name refers to the reduced stamen number, from three (as occurs in other genera of Olyreae, e.g., *Olyra* L., *Cryptochloa* Swallen, and *Raddia* Bertoloni) to two. This genus is also distinguished from other herbaceous bamboos by flowering culms typically bearing only one fully developed and specialized leaf blade, which is appressed to and overtops the single contracted inflorescence (Juszczewiecz et al., 1999). This inflorescence is inconspicuous and completely hidden under the abaxial surface of the leaf blade when the plant is viewed from above, which makes *Diandrolyra* species appear to always be sterile (Fig. 1D).

Based on the presence of often raceme-like inflorescences borne on specialized culms (Fig. 1B, C, E), Clayton and Renvoise (1986) considered *Diandrolyra* to belong to a group including *Piresia* Swallen, which is disjunct between the Amazon Basin and the Atlantic Forest region, as well as *Mniochloa* Chase and *Ekmanochloa* Hitchcock, endemics to Cuba, and *Buergerioschloa* Pilger, endemic to New Guinea. Among these genera, *Piresia* was consistently indicated as most related to *Diandrolyra* (Soderstrom & Calderón, 1974; Clayton & Renvoise, 1986), principally due to the presence of polygamous spikelets with incomplete sexual separation (female spikelets with staminodes and male spikelets with a sterile ovary bearing three stigmas).

Preliminary molecular studies in the tribe Olyreae (Oliveira, 2006), however, do not support a relationship between *Diandrolyra* and *Piresia*. ITS sequence data provide weak support for a sister relationship between *Diandrolyra* and *Cryptochloa capillata* (Trimis) Soderstrom, which has conspicuously dimorphic male and female spikelets. However, plastid *trnD-trnT* sequence data used in the same work (Oliveira, 2006) strongly support *Diandrolyra* as sister to a clade containing *Paradiodrya* Soderstrom & Zuloaga and *Raddiella* Swallen.

*Diandrolyra* is endemic to the Atlantic Forest of Brazil, from Bahia to São Paulo (Soderstrom et al., 1988; Clark, 1990), occurring in lowlands below 400 m, often in very shaded areas, sometimes near running water. Only two species are presently formally

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described, *D. bicolor* Stapf (Fig. 1C), occurring in Bahia, Espírito Santo, and Rio de Janeiro states, and *D. tatianae* Soderstrom & Zuloaga (Fig. 1D, E), which has a wider distribution, known from São Paulo, Rio de Janeiro, Espírito Santo, Minas Gerais, and Bahia states (Oliveira, 2001). Estimates have given possibly as many as five (Soderstrom & Zuloaga, 1985) or six species (Clayton & Renvoize, 1986) for this taxonomically difficult genus, as each of the two described species are not well defined morphologically and more
than one taxon may be included in their current circumscriptions (Oliveira et al., 2006).

Thomas Soderstrom and colleagues first became interested in Olyreae, including *Diandrolra*, in the 1960s (Calderon & Soderstrom, 1967). They initiated a systematic revision of this genus in the 1970s as part of their studies on Neotropical Bambusoideae. Several new species among olyroid genera were proposed by these authors, but they were not published before Soderstrom's untimely death (1936–1987). Soderstrom (1984) showed a photograph of and formally mentioned a third, tiny and small-leaved new species of *Diandrolra* from Bahia, which was also commented on in Soderstrom and Zulaoga (1985).

During a floristic survey of Olyreae from the state of Bahia (Oliveira, 2001), several herbarium specimens were found annotated as *Diandrolra pygmaea* by Soderstrom and Zulaoga, and a recent collection was made from the only population of this species still known to exist. We herein validate this taxon and discuss its conservation status. Information on the occurrence of other *Diandrolra* species in Bahia is based on Oliveira (2001).

**KEY TO THE SPECIES OF *DIANDROLRA***

1a. Vegetative culms 8.5–19 cm tall; leaf blades of vegetative culms 1.8–3(–4) × 0.2–0.8 cm; leaf blades of flowering culms 1.7–2.9 × 0.3–0.5 cm; racemes with 2(3) pairs of spikelets ....... *D. pygmaea*

1b. Vegetative culms 15–50 cm tall; leaf blades of vegetative culms 6–16 × 1–4.5 cm; leaf blades of flowering culms 3–6.2 × 0.9–1.6 cm; racemes with 4 to 6 pairs of spikelets ......... 2

2a. Racemes with 5 or 6 pairs of spikelets; leaf blades often pale green, glabrous; leaf blades of vegetative culms 8.5–16 × (2)–2.7–4.5 cm; lemma of male spikelet scabrous or glabrous ....... *D. taitanum*

2b. Racemes with 4 pairs of spikelets; leaf blades strongly bicolored, pilose on the abaxial surface; leaf blades of vegetative culms 6–8–(11) × 1–2 (–2.5) cm; lemma of male spikelet sparsely pilose ... *D. bicolor*


Haece species a congeners planta minore (8.5–19 cm alta), laminae foliariibus minoribus (eis culmus viridibus 1.8–3[–4] cm longis) et racemo ex 2(3) paribus tantum spiculae constantis differt.

Plants caespitose, without rhizomes; vegetative culms 8.5–19 cm, 0.6–1 mm diam., shortly pilose, with 4 to 8 leaves, green on both surfaces, nodes scabrous or puberulent; flowering culms 4–7 cm, 0.5–1 mm diam., scabrous, bearing 1 or rarely 2 leaves, green on both surfaces, nodes scabrous or puberulent. Leaf sheaths glabrous or sometimes fully pilose; leaf blades of vegetative culms 1.8–3–(–4) × 0.2–0.8 cm, those of the flowering culms 1.7–2.9 × 0.3–0.5 cm, lanceolate, glabrous on both surfaces or pilose only on the abaxial surface, base symmetrical or slightly asymmetrical, rounded, margins scabrous, apex acute; pseudepide 0.5–1 mm, hirsute on both surfaces; ligule 0.2–0.3 mm; sheath auriculae absent. Inflorescence a raceme 0.7–1 cm, with 2(3) pairs of female and bisexual but functionally male spikelets, with a male at the apex, these borne on one side of the axis; axis glabrous. Female spikelets 4.8–5 × 1.4–1.6 mm, ovary or ellipsoid, acute, the base of the glumes fused, thickened, and presenting a tuft of hairs; pedicel shortly pilose; glumes 4.5–5 mm, membranous, subequal, acute, sparsely pilose, especially at the base and on the nerves, 5–7–nerved; anthecium 4–4.3 × 1.2–1.5 mm, ovoid-ellipsoid, stramineous; lodicules 3, conspicuous; staminodes absent; Caryopsis ellipsoid, ca. 3 × 1 mm, hilum linear, as long as the caryopsis. Male spikelets similar but ca. 3 × 0.5 mm, lanceolate; glumes very short, not fused, and without a tuft of hairs, sparsely pilose, 5–nerved; lemma acuminate, sparsely pilose, 3–nerved; lodicules 3, conspicuous; stamens 2, anthers 0.6–0.8 mm; pistillodes present.

**Distribution and habitat.** Plants of *Diandrolra pygmaea* are very delicate, and the species is distinguished from its congeners by its small height and reduced number of leaf blades, as well as the small number of spikelet pairs in each raceme. This species is endemic to southern Bahia, where the other two *Diandrolra* species also occur (Fig. 3). This new species was found in humid forests along with ferns and other small herbaceous plants, but it is also found in transitional to mesophyllous forest at the Itanhiém site (Fig. 1A). It prefers shady, humid places and persists under trees of *Theobroma cacao* L. plantations.

**IUCN Red List category.** *Diandrolra pygmaea* is known from only two localities in southern Bahia, and only the population from Itanhiém has been found during recent field trips. The populations collected by Calderón and Soderstrom were not relocated and are possibly now destroyed, because the native forest has been converted to ample areas of grasslands. For these reasons, we suggest that *D. pygmaea* should be considered Critically Endangered (CR) according to IUCN Red List criteria (IUCN, 2001), as has been recently proposed for several other herbaceous bamboos occurring in this same
Figure 2. *Diandrolyra pygmaea* Soderstrom & Zuloaga ex R. P. Oliveira & L. G. Clark. —A. Habit. —B. Detail of the inflorescence near the base of the leaf blade, showing two pairs of spikelets (on left, the bisexual and functionally male, and right, the female ones). —C, D. Male spikelet (bisexual, but functionally male) closed, dorsal view. —E. Male spikelet opened, showing two stamens, three lodicules, and reduced female structures of stigma and style (without ovary developed). —F, G. Female spikelets closed, dorsal view. —H, I. Glumes of the female spikelets, ventral view. —J. Female anthercium, ventral view. —K. Female anthercium, dorsal view. —L. Caryopsis with linear hilum. Drawn from the holotype C. E. Calderón et al. 2407 (CEPEC), by Carla de Lima.

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Literature Cited


Taxonomic Notes on *Onobrychis* sect. *Hymenobrychis* (Fabaceae, Hedysareae) in Iran

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**Abstract.** *Onobrychis kuchanensis* Ranjbar, Hajmoradi & Karamian, a singular new species endemic to Iran, is described and illustrated. The new species belongs to *Onobrychis* Miller subgen. *Sisyroserma* (Bunge) Grossheim sect. *Hymenobrychis* DC. *Onobrychis kuchanensis* is distributed in Khorasan Province in northeastern Iran. It is closely related to *O. amoena* Popov & Vvedensky and is distinguished by its corolla neither distinctly striate nor purple maculate and its calyx shorter than 5 mm. The conservation status is evaluated as Vulnerable (VU) according to IUCN Red List criteria. Moreover, *O. amoena* subsp. *meshhedensis* Šírjaev & Rechinger is raised to specific rank as *O. meshhedensis* (Šírjaev & Rechinger) Ranjbar on the basis of morphological evidence. Relationships between both species and their closest relatives are discussed.

**Key words:** Fabaceae, Iran, IUCN Red List, *Onobrychis*, sect. *Hymenobrychis*, subg. *Sisyroserma*.

*Onobrychis* Miller (Fabaceae) comprises about 170 species arranged in 12 sections, mainly occurring in southwestern Asia, the Mediterranean region, and in temperate Europe and Asia (Cronquist, 1981). Some are cultivated as fodder or as ornamentals (Lock & Simpson, 1991; Yakovlev et al., 1996; Mabberley, 1997). In *Flora Iranica*, Rechinger (1984) accepted 54 species in nine sections for Iran: section *Dendrobrychis* DC., section *Lophobrychis* Handel-Mazzetti, section *Onobrychis*, section *Laxiflorae* (Šírjaev) Rechinger, section *Anthylltum* Nábělek, section *Afghanicae* Šírjaev, section *Heliobrychis* Bunge ex Boissier, section *Hymenobrychis* DC., and section *Insigines* (Šírjaev) Rechinger, with two species unassigned. Recently new taxa have been described in *Onobrychis* and *Hedysarum* L., both of the tribe Hedysaraceae, from Iran (Ranjbar et al., 2004, 2006, 2007a, b, 2010; Ranjbar, 2009). The present paper is focused on a new Iranian taxon from *Onobrychis* sect. *Hymenobrychis*. This section is represented in Iran by 11 species, and is the second largest section in *Onobrychis* subg. *Sisyroserma*.

The species of *Onobrychis* sect. *Hymenobrychis* can be assigned to three different natural groups distinguished from each other mainly in the shape and size of flowers. The *O. michawuii* DC. group, characterized by the corolla distinctly striate and the calyx longer than 5 mm, includes the majority of the species (ca. 6 species) belonging to this section. The species of the *O. amoena* Popov & Vvedensky group are distinguished by the corolla with purple maculae and the calyx not exceeding 5 mm. Finally, the *O. kuchanensis* group consists of the single new species described below, which is characterized by corollas neither distinctly striate nor purple maculate and the calyx shorter than 5 mm.

In order to resolve the morphological heterogeneity of the section and the assignment of doubtful specimens, a detailed morphological study has been conducted by the first author on taxa attributed to this section and other related groups. According to our results, *Onobrychis amoena* subsp. *meshhedensis* Šírjaev & Rechinger should be raised to specific rank; this is done below. Moreover, our related field research in Khorasan Province in 2007 led to the discovery of unusual plants of a related taxon occurring together with populations of subspecies *meshhedensis* near Kuchan. Studies of living material and herbarium specimens suggest that the new taxon, which occurs exclusively in the Kuchan submountains, is especially close to *O. amoena*. However, morphological differences support its recognition as a new distinctive species, which we describe here.

1. *Onobrychis kuchanensis* Ranjbar, Hajmoradi & Karamian, sp. nov. **TYPE:** Iran. Khorasan: Sabzevar to Kuchan, 97 km before Sabzevar, 1492 m, 5 June 2007, *M. Ranjbar & F. Hajmoradi* 12899 (holotype, BASU; isotypes, MO, TARI). Figure 1.

Hace species *Onobrychid amoena* Popov & Vvedensky affinis sed ad ca foliis 2-4 jugis (3-7 jugis), stipulis 3-4 mm (5-10 mm) longis, calyci ca. 3 mm (4-5 mm) longo, vexillo neque purpureo-maculato neque purpureo-atriato atque alis glabris (ciliae distinctis) distinguetur.

Ascending erect to zigzag, glabrous perennial with thick woody rootstock, to 60 cm tall. Stipules thinly free, chartaceous, 3-4 × 1.5-2 mm, triangular, 4-5 mm long, calyx ca. 3 mm (4-5 mm) longo, vexillo neque purpureo-maculato neque purpureo-atriato atque alis glabris (ciliae distinctis) distinguetur.
acuminate, glabrous in upper parts or sparsely to loosely villous at the base; leaves 5–15 × 2–3 cm; rachides remote, slender to thickened, straight or curved and ascending, glabrous, petiole 2.6–8 cm; leaflets in 2 to 4 pairs, lanceolate to oblong or elliptic, round to cuneate at base, acute to acuminate at apex, 7–30 × 2–5 mm, acute to obtuse at tip, adaxially glabrous, abaxially glabrous to rarely sparsely appressed to ascending hairy. Inflorescence 6–28 × 2–2.5 cm, narrow, oblong before anthesis, composed of
Table 1. Diagnostic morphological characters of Onobrychis kuchanensis, O. meshhedensis, and O. amoena.

<table>
<thead>
<tr>
<th></th>
<th>O. amoena</th>
<th>O. kuchanensis</th>
<th>O. meshhedensis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>40–50</td>
<td>≤ 60</td>
<td>≤ 80</td>
</tr>
<tr>
<td>Stem indumentum</td>
<td>shortly appressed pubescent</td>
<td>glabrous</td>
<td>sparsely to completely glabrous</td>
</tr>
<tr>
<td>Stipule length (mm)</td>
<td>8–10</td>
<td>3–4</td>
<td>5–8</td>
</tr>
<tr>
<td>Leaflet pairs</td>
<td>3 to 7</td>
<td>2 to 4</td>
<td>2 to 4</td>
</tr>
<tr>
<td>Leaflet indumentum,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>abaxial surface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calyx length (mm)</td>
<td>4–5</td>
<td>glabrous</td>
<td>glabrous</td>
</tr>
<tr>
<td>Corolla color</td>
<td>yellow with darker purple venation</td>
<td>ca. 3</td>
<td>7–8</td>
</tr>
<tr>
<td>Standard length (mm)</td>
<td>10–11</td>
<td>9–10</td>
<td>7–8</td>
</tr>
<tr>
<td>Wing indumentum</td>
<td>± ciliate</td>
<td>glabrous</td>
<td>± ciliate</td>
</tr>
<tr>
<td>Keel length (mm)</td>
<td>10–11</td>
<td>ca. 10</td>
<td>ca. 7</td>
</tr>
<tr>
<td>Pod indumentum</td>
<td>± toothed</td>
<td>± toothed</td>
<td>toothed</td>
</tr>
</tbody>
</table>

11 to 23 flowers, elongating in fruit; peduncle 5.5–11 (=20) cm; pedicels ca. 1.2 mm, with loosely to densely spreading trichomes 0.1–0.5 mm; bracts papery, brown, 1.3–2 × 0.3–0.5 mm, oblong to lanceolate or triangular, acute to acuminate, glabrous to sparsely pubescent; bracteoles narrowly linear, ca. 0.5 mm. Calyx ca. 3 mm, green, ± densely appressed pubescent, 0.1–0.6 mm, teeth ca. 1.8 mm, linear to triangular; corolla yellowish green, without darker venation, standard 9–10 × 8–9 mm; wings ca. 3 mm, shorter than standard and keel; limb ca. 2 × 1.2 mm, briefly oblong, rounded at tip, claw filiform, ca. 1 mm; keel ca. 10 mm; limb ca. 6 × 5.5 mm; claw ca. 4 mm; stamens 8–9 mm, the free portion ca. 3 mm. Pods with a stipe to ca. 1 mm, semiorbicular, pendent, 5–10 × 3–6 mm, hirsutulous, with trichomes 0.2–1.5 mm, foveolate on disc, with seolute crest on margin.

Distribution and habitat. Onobrychis kuchanensis appears to be extremely restricted in its geographic distribution. It is currently known only from its type locality on the south slope of Mt. Kopet Dag in Iran. It grows in the dry steppe and stony clay terrain of the submountainous region in and around the village of Kuchan; one small population has been observed.

IUCN Red List category. We observed a very low frequency of the new species in its locality, which consisted of no more than 10 plants sparsely scattered near the village. It is therefore evaluated as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001) to identify taxa with small populations that could be at risk.

Etymology. The new species is named after the village of Kuchan, in Khorasan Province of northeastern Iran.

Relationships. The isotype material of Onobrychis amoena was available at W and the detailed original description and type photo of O. amoena were compared (Popov & Vvedensky, 1927). Onobrychis kuchanensis is the closest relative to O. amoena, which is also found in Khorasan Province in northeastern Iran. The species are similar in having fewer leaves with leaflets of similar shape and size, and similar pods whose shape and structure affine O. kuchanensis to Onobrychis sect. Hymenobrychis. However, O. kuchanensis differs mainly by being completely glabrous or glabrescent, by the shape and indumentum of the standard, and by the type of pod indumentum. Important differences between the new species and its related taxa are presented in Table 1.


Onobrychis meshhedensis is recognized at the species rank for those plants previously treated as O. amoena subsp. meshhedensis; it is distinguished from O. amoena by its glabrous morphology and larger habit. Onobrychis meshhedensis is an endemic species known from the submontane regions from 1492 to 2000 m elevation near Mashhad, Sabzevar, Torbate-Heydaryeh village in northeastern Iran. In this region, O. meshhedensis forms relatively sparse populations, but it is one of the region’s most frequently observed Onobrychis species.

Specimens examined. IRAN. Khorasan: Chehel-dokhtar, Gor Khod (Gur-chal) Pro. Reg., Dasht Aheh (Ahu?); M. Moussani & A. Karavar 33963 (IRAN, W); Rebat-Safid inter Mashhad et Torbate-Heydaryeh, J. Renz & H. Runemark


New Species of *Tibouchina* (Melastomataceae) from Minas Gerais, Brazil

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**R. Romero, P. J. F. Guimarães & Leoni** (Melastomataeae & Yelloziaceae (Leoni & Souza, 1999). The State Guimaraes & Leoni, sp. nov. TYPE: Brazil. Minas Gerais: Parque Estadual da Serra do Brigadeiro, Fervedouro, 7 July 1995, L. S. Leoni 2995 (holotype, GFJP; isotypes, HUFU, MO). Figure 1.

Haec species ab omnibus speciebus generis hypanthio oblongo tereti glabro et ovario apice appendicibus oblongis 5 praedito differt.

Shrub, 0.3–1 m tall; stems black, angular, flattened at apex, glabrous or with sparse, strigose trichomes, elongate at the nodes. Petiole 3–15 mm; leaf blade 4–9 × 2–4.5 cm, ovate-oblong, apex acute, margin strigose, base rounded, trichomes strigose, blade adaxially glabrous or with strigose trichomes, abaxially with strigose trichomes under the principal and lateral veins, 5-nerved, prominent veins on the adaxial surface, impressed abaxially. Thyrs terminal, ca. 60 flowers, 20–24 cm; bracteoles 2, 8–15 × 4–9 mm, oblong, flat, both surfaces glabrous, margin ciliate, caducous. Flowers 5-merous, pedicellate, pedicels 3–4 mm; hypanthium 10.5–12 × 4–5 mm, black, oblong, terete, glabrous, calyx persistent, tube ca. 1 mm, calyx lobes 5–5.5 × 2.7–3.3 mm, oblong, apex rounded, frequently retuse or obtuse, margin ciliate, glabrous on both surfaces; petals 13–23 × 10–22 mm, purple, obovate, apex truncate, lightly retuse, glandular-ciliate; stamina 10, isomorphous, unequal size; filaments glabrous, anthers subulate, apex attenuate, ventral inclined pore, ventral biauriculate appendage with 2 apical glands or glabrous, large stamens with

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**ABSTRACT.** The new species *Tibouchina melanocalyx* R. Romero, P. J. F. Guimarães & Leoni (Melastomataeae) presents a glabrous hypanthium and calyx lobes, is black in dried material, has glabrous filaments and style, and has an ovary with a furrowed apex with five oblong appendages. These characteristics of the hypanthium and ovary are unique within the genus *Tibouchina* Aublet. This species occurs in highland, campos de altitude vegetation from the National Park of Caparaó and State Park of Serra do Brigadeiro, in Minas Gerais, Brazil.

**RESUMO.** A espécie inédita *Tibouchina melanocalyx* R. Romero, P. J. F. Guimarães & Leoni (Melastomataeae) apresenta hipanto e lacínias do cálice glabras e nigrescentes no material herborizado, filetes e estípulas glabras e ovário com ápice fendido com cinco apêndices oblongos. As características do hipanto e do ovário são únicas para o gênero *Tibouchina* Aublet. Esta espécie ocorre em campos de altitude dos Parques Nacional do Caparaó e Parque Estadual da Serra do Brigadeiro, no estado de Minas Gerais, Brazil.

**Key words:** Brazil, IUCN Red List, Melastomataeae, Minas Gerais, *Tibouchina*.
filaments 10.5–11.5 mm long, thecae 11–12 mm, connective prolonged 3–4 mm below the thecae, small stamens with filaments 8.5–9.5 mm long, thecae 9–10 mm, connective prolonged 1.5–2 mm, ovary ca. 7.5 × 5 mm, 2/3 adnate to the hypanthium, apex strongly furrowed, with 5 oblong appendages, with long strigose-sericeous and short glandular trichomes, caducous glands, 5-locular; style 5.5–7 mm, filiform, curved in the apex, glabrous, stigma punctiform. Fruit not seen.

Distribution, habitat, and IUCN Red List category. 
Tibouchina melanocalyx is endemic to the State Park of Serra do Brigadeiro and the National Park of Caparaó, Minas Gerais, Brazil. This species occurs in highland, campo de altitude vegetation between 1500 and 2200 m, in stony soil with species of Poaceae and Bromeliaceae. At this time, according to IUCN Red List categories and criteria, the conservation status for T. melanocalyx is Data Deficient (DD) because the appropriate data on abundance and/or distribution are lacking for the area (IUCN, 2001).

Phenology. This species flowers from May to August.

Etymology. The specific epithet refers to the characteristic dark color of the calyx lobes and hypanthium in dried material.

Discussion. The new species Tibouchina melanocalyx presents a glabrous hypanthium and calyx lobes with caducous bracts, is black in dried material, and has glabrous filaments and style. The ovary has a furrowed apex with five oblong appendages, with both long sericeous and short glandular trichomes and caducous glands. The presence of caducous bracts and glabrous filaments is observed frequently among the species of Tibouchina sect. Diothantha Triana, but the characteristics of the hypanthium and ovary in T. melanocalyx are unique to the genus. The foliar morphology, considering the texture, indument, and veins, suggests that this species is more closely related to T. virgata (Gardner) Cogniaux, known only from Serra dos Órgãos, Rio de Janeiro, Brazil (Guimarães, 1997). Tibouchina virgata belongs to section Pleroma D. Don, but it should be emphasized that the sectional limits in Tibouchina are tenuous because most sections reflect previously recognized genera and are not monophyletic clades based on morphological characters (Romero & Guimarães, 2005).


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Literature Cited
Opuntia chiangiana, Una Nueva Especie de Cactaceae de Oaxaca, México

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Resumen. Se describe una nueva especie de Opuntia (L.) Miller (Cactaceae), endémica de la región de Cuicatlán, estado de Oaxaca, México. Frutos rojovioláceos con espinas largas, funículos semi-secos de paredes comestibles que no se desprenden de los cladodios cuando maduran, no son comidos por pájaros debido a su sabor agrodecido (conocidos como xoconostles o xoxo-tunas). Se compara con tres especies simpatrías descritas con anterioridad: O. tehucacana S. Arias & U. Guzmán, O. parviflora S. Arias & Gama y O. olmeca Joel Pérez, J. Reyes & F. Brachet. Opuntia chiangiana Scheinvar & Manzanero es ubicada en la serie Heliabravonaec Scheinvar con base en sus frutos ácidos.

Abstract. A new species of Opuntia (L.) Miller (Cactaceae), endemic to the region of Cuicatlán in the state of Oaxaca, Mexico, is described. The fruits are red-violet with long spines, funiculars that are almost dry, and fruit walls that are edible and do not fall off when mature. However, birds have not been observed to eat the fruits of this sweet-acidic cactus pear (known as xoconostle or xoco-tuna). The new species is compared to three sympatric species formerly described: O. tehucacana S. Arias & U. Guzmán, O. parviflora S. Arias & Gama, and O. olmeca Joel Pérez, J. Reyes & F. Brachet. Opuntia chiangiana Scheinvar & Manzanero is assigned to the series Heliabravonaec Scheinvar on the basis of its acidic fruits.

Key words: Cactaceae, IUCN Red List, Mexico, Oaxaca, Opuntia.

“Especies Silvestres de Nopales Mexicanos” elaborada por Scheinvar et al. (inédito) cita 106 especies silvestres en todo el país; 22 en Oaxaca, lo que corresponde a 20.73% del total, distribuidas principalmente en la franja central del estado, en bosque tropical caducifolio mediano y en bosque de encino. Opuntia decumbens Salm-Dyck y O. pabstii Pfeffer amplían su distribución hacia la costa en el bosque tropical caducifolio bajo. Cinco especies son endémicas y de distribución restringida en Oaxaca: O. huapangensis Bravo, O. nejapensis Bravo, O. olmeca Joel Pérez, J. Reyes & F. Brachet, O. parviflora S. Arias & Gama y O. tehucacana S. Arias & U. Guzmán, todas representadas en la Reserva de la Biosfera de Tehuacán-Cuicatlán, que alberga un total de 15 especies diferentes de Opuntia. Parte del área de distribución de estas especies se encuentra ocupada por zonas agrícolas y por lo tanto son vulnerables debido a las actividades humanas que significan pérdida de hábitats naturales.

Opuntia chiangiana Scheinvar & Manzanero, sp. nov. TIPO: México. Oaxaca: Distr. Cuicatlán, a 5 km de Santiago Quiotepex, rumbo a San Juan Coyula, 170°54'10"N, 96°58'W, 800 m, 5 mayo 2006. (O. Manzanero GM370 (holotipo, MEXU; isotipos, MO, OAX). Figuras 1-4.

Hace especies quad fructus exocarpium matutinare non separatum etiam funiculos sicken subsiccavo ad species oaxacenses Opuntiam olmeca Joel Pérez, J. Reyes & F. Brachet, O. parviflora S. Arias & Gama et O. tehucacana S. Arias & U. Guzmán maxime accedit, sed al eis habito reptante, cladodiis ellipticis basi angustatis terminalibus 30–37 cm longis, cladodiorum aereis in series 13 dispositis ac spinis albis apice transulcicdis, floribus percarnello spinis duabus acicularibus ad areolas superiores tantum armato, stylo tubuloviolaceo atque fructu pyriformi dulci-acido distinguuntur.

Planta rastrera, hasta 2.5 m de altura; copa extendida, hasta de 2.5 m de diámetro. (Figs. 1A, 2A); raíces fibrosas emergen de una parte subterránea globosa; tronco rastrero, de 15–20 cm hasta la primera ramificación, 12–15 cm diámetro.; corteza escleromosa, de color gris-oscuro, con 7 espinas divergentes, hasta 2.7 cm, en todas las areolas. Cladodios ascendentes, los adultos elípticos, de base angostada,
encorvada, bordes ligeramente cóncavos, ca. 30–37 × 15–17 cm, y ca. 1.5 cm de espesor (Figs. 1B, 2B); epidermis glabra, estomas paracíclicos, poco hundidos; células epidermicas isodiamétricas, paredes anticlinales sinuosas (Fig. 3F), verde-oliva oscuro, recubierto de cera grísácea; cladodios juveniles verdes-claros; aréolas con hojas de 5–7 mm, rectas, subuladas, de color verde-claro con el ápice rosado; cladodios adultos con aréolas elípticas, elevadas, dispuestas en 11–13 series (Fig. 2B), distantes ca. 3 cm entre sí, ca. 3.2 × 1.6 mm, con lana marrón; gloquídios caducos, dispuestos cerca del borde de la aréola, amarillos, con púas adpresas e imbricadas, ápice ligeramente elevado, ca. 4 mm (Figs. 3A, B). Espinas 1 a 3 (Figs. 1B, 2A), dispuestas en todas las aréolas del cladodio, divergentes, extendidas, cuando una, doblada en la base, algo refleja, algunas torcidas, subuladas, de 1.5–2.7 cm, las más largas en los bordes del cladodio, blancas con el ápice translúcido, en la base con púas angostas y oblongas, adpresas (Fig. 3C); parte mediana con células paralelas entre sí, recubiertas de cera granulosa, con espacios intercelulares bien marcados (Figs. 3D, E). Flores amarillas, de 5.7–6 × ca. 4 cm en la antesis; pericárpelo verde, de ca. 2.5 × 3 cm, reticulado, podarios elevados, tetragonales; aréolas dispuestas en 5 series; espinas 2, blancas, aciculares, de ca. 0.5 cm, sólo en las aréolas superiores (Fig. 2C); androceo amarillo, la base de los estambres verdeosa; estilo blanco-rosado, emergente sobre los estambres, lóbulos
Figura 2. *Opuntia chiangiana* Scheinvar & Manzanero. —A. Hábito rasteiro, con flores y frutos. —B. Cladodio con espinas en todas las aréolas y 11 series de aréolas. —C. Vista exterior de una flor. —D. Corte longitudinal de una flor, vista interior. —E. Corte longitudinal de un fruto, vista interior, paredes anchas, comestibles, funículos semi-secos. (Ilustración de Albino Luna Sánchez, Instituto de Biología, UNAM.)

del estigma 6 (Fig. 2D), blanco-verdosos; granos de polen periporados, 19 poros, poliédricos, 80–88 μm diámetro, teectum reticulado, muros sin espinulae o verrugas (Fig. 4A). Frutos piriformes, rojo-violáceos, de 3.5–4 × ca. 2 cm en la parte superior; cicatriz floral hundida, de ca. 0.8 cm de profundidad; aréolas dispuestas en 5 series con 1 a 3 espinas rígidas, punzantes, aciculares, hasta de 1.6 cm de largo, blancas con el ápice púrpura, en casi todas las aréolas; paredes del fruto hasta de 1 cm de ancho (Fig. 2E), rojizas; funículos semi-secos, agrodulces; semillas discoidales (Fig. 4B), de ca. 3 × 2.9 mm;
Figura 3. **Opuntia chiangiana** Scheinvar & Manzanero. —A. Aréola con lana, gloquidios en sus bordes y base de dos espinas. —B. Gloquidios con barbas imbricadas, adpresas pero algo elevadas en sus ápices. —C. ápice de una espin con barbas largas, angostas, imbricadas, ápices ligeramente elevados (x200). —D. Parte mediana de una espin con células paralelas entre sí, con espacios intercelulares. —E. Parte mediana con mayor aumento. —F. Epidermis con estomas paracíticos y células epidérmicas anticlinales isodiamétricas a alargadas, ligeramente onduladas. (Fotos de Berenith Mendoza Garfía, Instituto de Biología, UNAM.)

arilo lateral ancho, región hilo-micropilar lateral, profunda, micrópilo y funículo inclusos (Fig. 4C).

Distribución y hábitat. Se trata de una especie del valle de Tehuacán-Cuicatlán, región de Cuicatlán, que fue encontrada por primera vez y colectada por Jerónimo Reyes, entre la región de Quiotepec, Pico del Águila hasta Soyula, cerca de Cuicatlán, donde observó como mil plantas de esta especie (com. pers.) y cultivada en el Jardín Botánico Regional “Cassiano Conzatti” del Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional del Instituto
Politécnico Nacional, Unidad Oaxaca (CIDIR, OAX), Reg. No. JBCC 125 (J. Reyes 2969), y en el Jardín Botánico del Instituto de Biología de la UNAM. La segunda autora la encontró en otra localidad de la misma área, donde sólo observó tres plantas, cuyo material sirvió para elaborar los ejemplares tipo.

De la misma zona fueron descritas tres especies de Opuntia de distribución restringida, productoras de xoconostles: O. parviclada y O. tehuacana (Arias et al., 1997) y O. olmeca (Pérez et al., 2005), cuyas características se comparan con la simpática nueva especie en el Cuadro 1.


Las paredes de los frutos y los funículos semi-secos, de sabor agridulce, nunca comidos por los pájaros, indican que se trata de una forma intermedia entre tuna y xoconostle, denominados por los campesinos como xoco-tunas. Cuando maduran, quedan adheridos a los clados hasta más de un año, así como ocurre con los xoconostles.

**Opuntia chiangiana** por poseer xoco-tunas, pudiera ser un híbrido entre una especie productora de tunas y otra de xoconostles, produciendo xoco-tunas. No hay suficientes estudios sobre sus probabilles progenitores, por lo que optamos describir este nuevo taxón dándole un nombre específico, ya que la hibridación también es un camino de especiación.

**Estatus de conservación.** Puede ser considerada según la IUCN Red List of Threatened Species (IUCN, 2001) como Vulnerable (VU) con alto riesgo de extinción y de distribución restringida (hasta donde se conoce), por los cambios climáticos y distintas actividades humanas, principalmente agrícolas en el área.

**Serie a la cual pertenece.** Con relación a la serie a la cual pertenece, pudiera ser la serie Leucotrichae Britton & Rose que incluye solamente **Opuntia leucotricha** DC., con epidermis tomentosa, productora de frutos ácidos (xoconostles). Esta serie fue descrita con las siguientes características: “espinas como pelos o cerdas largas, flexibles, en muchos de sus clados, especialmente del tallo y clados muy viejos. El fruto es muy diferente de las series relacionadas, con pulpa fragante y cuando madura, la cáscara no se desprende” (Britton & Rose, 1919: 174).

Bravo-Hollis (1978: 312) sigue el mismo criterio de Britton y Rose, pero en la descripción de la serie escribe: “arborescentes, artículos pubescentes, con
Cuadro 1. Características comparativas de cuatro especies de *Opuntia* productoras de xoconostles o xoco-tunas, de la misma región de Oaxaca.

<table>
<thead>
<tr>
<th></th>
<th><em>O. chiangiana</em></th>
<th><em>O. olmeca</em></th>
<th><em>O. parviclada</em></th>
<th><em>O. tehuncana</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hábito</td>
<td>rastrero</td>
<td>arbustivo, hasta 1 m alto; cladodios ascendentes hasta 14 cm de largo</td>
<td>arbustivo, hasta 50 cm alto</td>
<td>subarbustivo, ligeramente postrado o ascendente, hasta 80 cm alto</td>
</tr>
<tr>
<td>Epidermis</td>
<td>glabra</td>
<td>glabra</td>
<td>densa o escasamente pubescente</td>
<td>glabra</td>
</tr>
<tr>
<td>Forma de cladodios adultos</td>
<td>elípticos, base angostada</td>
<td>anchamente obovados, los juveniles deltoideos</td>
<td>oblongos</td>
<td>subcircular a anchamente obovados</td>
</tr>
<tr>
<td>Largo de los cladodios terminales</td>
<td>30–37 cm</td>
<td>ca. 14 cm</td>
<td>5–10 cm</td>
<td>20–29 cm</td>
</tr>
<tr>
<td>Número de series de aréolas en cladodios</td>
<td>11–13</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Color de las espinas en cladodios maduros</td>
<td>blancas, con el ápice translúcido</td>
<td>amarillo pálido a grisáceas</td>
<td>pardo oscuro</td>
<td>amarillo claras a blanco-grisáceas, gris con la edad</td>
</tr>
<tr>
<td>Color y largo de las flores</td>
<td>amarillas, 5.7–6 cm</td>
<td>amarillas, 5.7–6.5 cm</td>
<td>amarillas con franja media roja, 2.5–3.4 cm</td>
<td>amarillo-claras a blanco-grisáceas, grises con la edad</td>
</tr>
<tr>
<td>Pericarpelo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color y indumento</td>
<td>verde, glabro</td>
<td>verde, glabro</td>
<td>verde, pubescente</td>
<td>verde-amarillento, glabro</td>
</tr>
<tr>
<td>Dimensiones</td>
<td>ca. 2.5 × 3 cm</td>
<td>3.2–4.2 × 5.6–5.9 cm</td>
<td>1.5–1.8 × 1.3–1.5 cm</td>
<td>4.5–5 × 2.8–3.8 cm</td>
</tr>
<tr>
<td>Pódarios</td>
<td>elevados</td>
<td>ausentes</td>
<td>evidentes</td>
<td>evidentes</td>
</tr>
<tr>
<td>Presencia de escamas basales</td>
<td>aréolas sin escamas basales</td>
<td>aréolas sin escamas basales</td>
<td>aréolas sin escamas basales</td>
<td>aréolas superiores con escamas basales deltoideas</td>
</tr>
<tr>
<td>Espinas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filamentos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color de estilo</td>
<td>amarillos</td>
<td>amarillos</td>
<td>rojo-púrpureos</td>
<td>amarillo-verdosos</td>
</tr>
<tr>
<td>Fruto</td>
<td>blanco-rosado</td>
<td>blanco</td>
<td>verde claro</td>
<td>verde-amarillento</td>
</tr>
<tr>
<td>Color</td>
<td>rojo-violáceo</td>
<td>amarillo</td>
<td>rojo claro</td>
<td>verde-amarillento con manchas purpúreas</td>
</tr>
<tr>
<td>Dimensiones</td>
<td>3.5–4 cm × 2 cm de diámetro</td>
<td>4.9–5 cm de diámetro</td>
<td>1.8–2.5 cm × 1.2–1.7 cm de diámetro</td>
<td>4.5–5 cm × 2.8–3 cm de diámetro</td>
</tr>
<tr>
<td>Forma</td>
<td>piriforme</td>
<td>globoide</td>
<td>obovoide</td>
<td>subgloboso</td>
</tr>
<tr>
<td>Tipo</td>
<td>agrudelce (xoco-tuna)</td>
<td>ácido (xoconostle)</td>
<td>ácido (xoconostle)</td>
<td>ácido (xoconostle)</td>
</tr>
<tr>
<td>Color de las paredes</td>
<td>rojas</td>
<td>amarillas</td>
<td>rojas</td>
<td>verde-amarillentas</td>
</tr>
<tr>
<td>Funículos (suculencia)</td>
<td>semi-secos</td>
<td>algo jugosos</td>
<td>—</td>
<td>algo jugosos</td>
</tr>
<tr>
<td>Citrítico floral</td>
<td>hundida</td>
<td>plana a ligeramente hundida</td>
<td>hundida</td>
<td>ligeramente hundida</td>
</tr>
<tr>
<td>Espesor de las paredes del fruto</td>
<td>hasta 1 cm</td>
<td>ca. 1 cm</td>
<td>ca. 0.5 cm</td>
<td>ca. 1.2 cm</td>
</tr>
<tr>
<td>Semillas</td>
<td>discoideas, ca. 3 mm de diámetro</td>
<td>discoideas, ca. 4 mm de diámetro</td>
<td>oblongas, 3–4 × 1.7–2.3 mm</td>
<td>obovada, 3–5 × 1.5–2 mm</td>
</tr>
</tbody>
</table>
áróelas pequeñas y próximas, provistas de abundantes espinas setosas, blancas, especialmente en el tallo. Fruto globoso, blanco-amarillento, con tinte purpúreo y con olor suave y agradable”.

Scheinvar (1974: 85), al describir *Opuntia heliabravona* como rastrera y productora de frutos ácidos (xoconostles), crea una nueva serie Heliabravonae Scheinvar, con las siguientes características: “plantas cespitosas, extendidas, generalmente hasta 1.30 m de altura. Artículos de 21–50 cm de largo, de color verde-límon algo amarillentos, cubiertos de una capa de cera, glabros, con abundantes gloquidos amarillos. Flores amarillo-verdosas. Frutos carnosos, amarillo-verdosos con manchas color salmón cuando están bien maduros; comestibles, agrios. Semillas hasta 3 mm de diámetro, casi globosas, anguladas, de color gris”.

*Opuntia chiangiana*, *O. olmeca*, *O. parviflora* y *O. tehucana* comparten las siguientes características en común: frutos ácidos o agridulces, no comidos por pájaros, la cáscara no se desprende cuando el fruto madura, y funículos secos a semi-secos, por lo que se propone ubicarlos en una misma serie (Cuadro 1).

Probablemente hay otras especies mexicanas que producen xoconostles y quizá podrían ser incluidas en una misma serie, en el caso de que estudios de cladística y de biología molecular indiquen que estas especies son monofiléticas.

**Etimología.** El nombre de esta especie es un homenaje al ilustre y dedicado botánico Fernando Chiang, investigador del Instituto de Biología de la Universidad Nacional Autónoma de México, quien siempre nos ha apoyado en la traducción al latín de las descripciones originales de nuevos taxones.


**Agradecimientos.** Agradecemos a los colegas que colaboraron en la toma de fotografías: Carmen Loyola Blanco, Miriam Mena Mendicta y también a Gabriel Olalde Parra quien además colaboró en la herborización del material colectado. A Roberto Gómez, cuya ayuda fue importante en la digitalización artística de las figuras presentadas.

**Literatura Citada**


Two New Brazilian Species of *Phyllanthus* (Phyllanthaceae)

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ABSTRACT. Two new Brazilian species of *Phyllanthus* L. are described and illustrated and their morphological affinities are discussed. *Phyllanthus longipedicellatus* M. J. Silva resembles *P. augustinii* Baill. but differs by its leaves oblong-falcate to falcate-asymmetrical with margins obscurely serrulate, and pistillate flowers with patelliform disk. *Phyllanthus salesiae* M. J. Silva is similar to *P. rosmarinifolius* Müller Argoviensis but it differs from the latter by its lacerate stipules, deeply lobed pistillate disk, incurved and bifid style, and seeds with darkish punctations. Both species are endemic to Brazil and known only from a single locality. The systematic position of both species with regard to the sections and subsections of *Phyllanthus* is also discussed.

RESUMO. Duas novas espécies de *Phyllanthus* L. do Brasil são descritas e ilustradas com suas afinidades morfológicas discutidas. *Phyllanthus longipedicellatus* M. J. Silva assemelha-se a *P. augustinii* Baill., mas difere desta pelos folhas oblongo-falcadas a falcate-assimétricas com margens discretamente serruladas e flores pistiladas com disco patelliforme. *Phyllanthus salesiae* M. J. Silva assemelha-se a *P. rosmarinifolius* Müller Argoviensis do qual difere pelas estípulas laceras, disco pistilado profundamente lobado, estiletes curvados e bífidos e sementes com pontuações engrossadas. Ambas as espécies são endêmicas para o Brasil, conhecidas de suas respectivas coleções tipo e têm suas posições sistemáticas discutidas em relação a seções e subseções de *Phyllanthus*.

Key words: Brazil, IUCN Red List, Phyllanthaceae, Phyllanthus.

*Phyllanthus* L. is a heterogeneous genus in the Phyllanthaceae represented by about 1236 species widely distributed throughout the world (Kathiriaechchi et al., 2006). In Brazil, approximately 107 species are found in all vegetation types, especially in rocky fields, caatinga, and cerrado (Silva & Sales, 2007). The taxonomy and identification of the Brazilian species of *Phyllanthus* are problematic because of the tremendous diversity found in the genus and the overall similarity in habit and floral aspects.

As part of a synopsis of the genus *Phyllanthus* for Brazil (Silva, in prep.), collections originating from Bahia and Minas Gerais states were studied, and their morphological characteristics distinguish them as new species, which are described, discussed and illustrated here.


Hace species inter species brasilenses *Phyllantho* subsect. *Nirari* quoad ramulos papillosos etiam pedicelllos longiores *Phyllanthis augmentins* Baill. simillima, sed ab eo lamina foliari minore oblongo-falcata vel asymmetrice falcata atque disco pistillato patelliformi distinguuntur.

Monopodial, shrublet ca. 30 cm high; stems erect, terete, papillose in the young parts with blackish trichomes; branching phyllanthoid; cathayphylls and cathapyllary stipules 0.8–1 × 0.5–0.7 mm, triangular, not auriculate, escarosio, glabrous, margins hyaline; plagirotropic branchlets 6–14 cm with 30 to 57 leaves, axis ca. 0.2 mm wide, slightly flattened and with dark papillae; stipules 1–1.1 mm, lanceolate, acuminate, escariosio, glabrous on both surfaces. Leaves subsessile, petiole < 1 mm, leaf blades 5–6 × 2.9–3.9 mm, oblong-falcate to falcate-asymmetrical, obtuse-mucronulate, oblique at base, margins obscurely serrulate, membranaceous, abaxial surface dark green, abaxial surface light grayish green, dull, glabrous; venation brochidodromous, midvein slightly prominent abaxially, secondary veins impressed abaxially. Stamine flowers 2 or 3 in cymules at proximal axils, pistillate flowers solitary at distal axils. Stamine pedicel 9–9.2 mm, capillary, finely papillose; sepals 5, 2.1–2.2 × 1.4–1.5 mm, ovovate, rounded, membranaceous, 1-nerved; disk segments 5, alternisepalous, obtrianulate and finely papillose; stamens 3, filaments free, 2.4–2.5 mm, anthers ca. 0.2 mm, connate not enlarged, thecae not deeply emarginate, dehiscing horizontally. Pistillate pedicel 10–10.2 mm, capillary, finely papillose; sepals 5, 2.9–3 × 2–2.1 mm, widely elliptic, acute, membra-
naceous, venation pinnate; disk patelliform, margins finely undulate; ovary 0.8–0.9 × 0.9–0.91 mm, style branches 1.2–1.3 mm, free, bipartite, tips obtuse. Fruits and seeds unknown.

Distribution and habitat. *Phyllanthus longipedicellatus* is known only from the type collection, from southern Bahia State in Brazil. It grows in the coastal rainforest (Mata Atlântica) in shaded,
humid areas on clay soils covered by leaf litter.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the conservation status of *Phyllanthus longipedicellatus* must be considered Data Deficient (DD) because it is known only from the type specimen.

**Phenology.** *Phyllanthus longipedicellatus* has been collected in flower in September.

**Etymology.** The specific epithet refers to the long floral pedicels, which are distinctive for the species.

**Relationships.** The new species, *Phyllanthus longipedicellatus*, can be assigned to *Phyllanthus* sect. *Phyllanthus* subsect. *Niruri* (Webster, 2002a) by its phyllanthoid branching; the leaf blades oblique at the base; and the flowers in unisexual cymes with five sepals, three free stamens horizontally dehiscing, and a segmented disk. Among the other Brazilian species (*P. augustinii* Baillon, *P. niruri*, *P. roSELLUS* (Müller Argoviensis) Müller Argoviensis, *P. perpusillus* Baillon) of *Phyllanthus* sect. *Phyllanthus* subsect. *Niruri*, only *P. longipedicellatus* resembles *P. augustinii*. Despite the resemblance, *P. longipedicellatus* differs from *P. augustinii* in its leaf blades, with 5–6 × 2.9–3.9 mm, oblong-falcate to falcate-asymmetrical, obscurely serrulate margins, pistillate sepals widely elliptic, acute at apex, disk pistillate patelliform with finely undulate margins, and stigma obtuse. In contrast, *Phyllanthus augustinii* possesses leaf blades, 1.9–5.5 × 1–2.9 cm, elliptical to elliptic-ovate, margin foliar entire, pistillate sepals obovate to widely obturate, rounded at apex, disk pistillate cupuliform with margins lobed, and stigma capitate.

**KEY TO BRAZILIAN SPECIES OF PHYLLANTHUS SECT. PHYLLANTHUS SUBSECT. NIRURI**

1a. Plants with branches papilllose; pedicels of flowers of both sexes 0.9–3 cm; stamens 3, free.
   2a. Leaf blades 1.9–5.5 × 1–2.9 cm, elliptical to elliptic-ovate; pistillate disk cupuliform
      *P. augustinii*
   2b. Leaf blades 5–6 × 2.9–3.9 mm, oblong-falcate to falcate-asymmetrical; pistillate disk patelliform
      *P. longipedicellatus*

1b. Plants with branches glabrous; pedicels of flowers of both sexes 1.8–3.9 mm; stamens 3, free to completely connate in column.
   3a. Stamens free to partially connate; seeds > 1.5 mm
      *P. niruri*
   3b. Stamens completely connate; seeds < 1.5 mm
      4a. Plants to 6 cm tall; staminate sepals 0.5–1 mm; seeds 0.85–0.9 mm
      *P. perpusillus*
   4b. Plants 17–40 cm tall; staminate sepals 1.2–1.6 mm; seeds 1.2–1.3 mm
      *P. roSELLUS*


2. **Phyllanthus salesiae** M. J. Silva, sp. nov. **TYPE:** Brazil. Minas Gerais: Passa Quatro, Pico do Itaguaçu, Sertão dos Martins, 22°27′52.2″S, 45°04′33.7″W, 1525 m, 2 Oct. 2005 (fl., fr.), L. D. Meireles 2006 (holotype, UEC; isotypes, MO, NY, RB, SP). Figure 2.

Hace species a *Phyllantho rosamarinifolii* Müller Argoviensis folis distichis marginibus serrulatis et pappilosis, stipulis laceratis et disco pistillato dissecto differt.

Shrublet ca. 30 cm high, dioecious; stems erect, sparsely to densely ramified, papilllose; branching nonphyllanthoid with lateral branches, persistent and distinct; branchlets terete to slightly flattened, papilllose; cataphylls and cataphyllary stipules lacking; stipules 2–2.1 mm, triangular, acuminate, auriculate at base, lacerate margins, escarious, glabrous on both faces, reddish; petioles 1.9–2 mm, cylindrical, greenish, papillose; leaf blades 1.9–4.3 × 0.9–1.9 cm, elliptic, acute, obtuse at base, margins minutely papilllose, membranaceous, adaxial surface dark green, abaxial surface opaque, grayish green with papillae concentrated around the midvein; venation brochidodromous, midvein slightly prominent and secondary veins impressed abaxially. Pistillate cymes with 1 or 2 flowers, bracteoles ca. 1 mm, triangular, acuminate, margins slightly serrulate; pedicels 1.7–1.8 mm, terete, visibly articulate; sepals 5, 1.1–1.2 mm, widely elliptic to obovate, acute to obtuse, pinnate venation with whitish margins; disk deeply 5-segmented, margins slightly undulate; ovary 0.4–0.5 × 0.5–0.6 mm, depressed ovate, smooth, styles 3, incurved, bifid, stigma subcapitate. Capsule 2.2–2.1 × 3.1–3.2 mm, depressed globose, light brown when dry, glabrous, dehiscing loculicidally and septifragally; calyx and style persistent in fruit; seeds 1.8–1.9 × 1.1–1.2 mm, trigonous, brownish, longitudinally finely dark punctate.

**Distribution and habitat.** *Phyllanthus salesiae* is known only from araucaria forest in Minas Gerais State, Brazil, growing at an altitude of 1525 m at Pico do Itaguaçu, with riparian vegetation in clay soils.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the conservation status of *Phyllanthus salesiae* must be considered Data Deficient (DD) because it is known only from the type specimen.

**Phenology.** *Phyllanthus salesiae* has been collected in flower and fruit in October.

**Etymology.** The specific epithet honors Margareth Ferreira de Sales, a Brazilian botanist at Universidade Federal Rural de Pernambuco, who introduced me to the science of plant taxonomy and to the beautiful world of the genus *Phyllanthus*. 
Figure 2. *Phyllanthus saloslæ* M. J. Silva. —A. Flowering branch. —B. Leaf, showing the serrulate margins and trichomes at base and along midvein. —C. Stipule. —D. Detail of pistillate flower on branch. —E. Pistillate flower. —F. Fruit. —G. Seed and detail of the punctations on seed surface. Drawn from the type, L. D. Meireles 2064 (UEC).

*Relationships.* *Phyllanthus* sect. *Antipodanthus* G. L. Webster was established by Webster (2002b). It comprises 15 species, five of which occur in Brazil: *P. dictyospermus* Müller Argoviensis, *P. pinifolius* Baillon, *P. ramillosus* Müller Argoviensis, *P. dawsonii* Steyermark, and *P. rosmarinifolius*. According to Webster (2002b), this section is characterized by shrubs or subshrubs that are monoecious or dioecious with unspecialized branching, papillate branches, spiral phyllotaxy, and persistent stipules. By virtue of its subshrub habit, unspecialized branching, papillate branches, verruculose seeds, persistent stipules,
Table 1. Comparison of Phyllanthus salesiae and related species.

<table>
<thead>
<tr>
<th>Sex of plant</th>
<th>P. dawsonii</th>
<th>P. dictyospermus</th>
<th>P. pinifolius</th>
<th>P. ramillosus</th>
<th>P. rosmarinifolius</th>
<th>P. salesiae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch indumentum</td>
<td>smooth</td>
<td>smooth</td>
<td>smooth</td>
<td>papillos</td>
<td>smooth</td>
<td>papillos</td>
</tr>
<tr>
<td>Leaf blade margins</td>
<td>plane</td>
<td>revolute</td>
<td>revolute</td>
<td>revolute</td>
<td>plane</td>
<td>plane</td>
</tr>
<tr>
<td>Seed surface</td>
<td>verruculose</td>
<td>reticulate and verruculose</td>
<td>foveolate-reticulate</td>
<td>mucronate</td>
<td>acuminated</td>
<td>obtuse</td>
</tr>
<tr>
<td>Leaf apex</td>
<td>acuminated</td>
<td>obtuse</td>
<td>obtuse</td>
<td>obtuse</td>
<td>obtuse</td>
<td>acute</td>
</tr>
</tbody>
</table>

and bifid styles, *P. salesiae* belongs to Phyllanthis sect. Antipodanthus.

Although Phyllanthus salesiae is poorly known, it can be positively described because it is the only species of the section with distichous phyllotaxy, leaf blades with serrulate margins, and pistillate flowers with a segmented disk. Among the other Brazilian species of section Antipodanthus, *P. salesiae* is morphologically similar to *P. rosmarinifolius*, but the latter differs by its smooth branches and its leaf blades, stipules, and pistillate disk all with entire margins.

The relationships among the Brazilian taxa of section Antipodanthus are poorly known, but Table 1 offers morphological characters for the comparison of Phyllanthus salesiae with other species of the section.

**Acknowledgments.** I am very grateful to the curator of the herbarium ALCB, Maria Lenise Guedes, for the loan of the voucher material of Phyllanthus longipedicellatus; to Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for providing funding for this study (grant 140609/2006-7); to Leonardo Dias Meirelles, who collected the type specimens of Phyllanthus salesiae; and to Victoria C. Hollowell (MO) for editorial advice.

**Literature Cited**


A New Species of *Hymenocallis* (Amaryllidaceae) from the Apalachicola Forest of the Florida Panhandle, U.S.A.

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**ABSTRACT.** A new species, *Hymenocallis gholsonii* G. Lom. Smith & Garland (Amaryllidaceae), is described and illustrated. It is a rare endemic that occurs along a stream and its branches in the Apalachicola National Forest, in Liberty County, Florida, U.S.A. Its robust bulbs, narrowly oblanceolate, green-yellow leaves, and robust perianth tubes distinguish it from the allied *H. choctawensis* Traub, which has more slender bulbs, shiny green, prominently oblanceolate leaves, and slender perianth tubes.

*Key words:* Amaryllidaceae, Florida Panhandle, *Hymenocallis*, IUCN Red List, United States.


The *Hymenocallis* species with smaller ovaries (0.7–1.5 cm × 5–10 mm) and fewer ovules (1 to 3) are especially challenging to identify. Smith and Garland (1996) provided a key to identify three such species, *H. choctawensis*, *H. dwulensis*, and *H. occidentalis*, using leaf and bulb characteristics. Smith et al. (2001) added to this group when they described a new species, *H. franklinensis*, from the lower Ochlockonee River and its tributaries. *Hymenocallis franklinensis* is considered to be closely allied to *H. choctawensis*, but differs from that species by its liguliform or narrowly oblanceolate leaves, lanceolate scape bracts that taper in the distal half, and smaller subglobose fruits. *Hymenocallis gholsonii* differs from *H. gholsonii* G. Lom. Smith & Garland, newly introduced here, by its lustrous, green leaves, narrowly tapering scape bracts, slender perianth tubes, and smaller staminal cups. An ongoing phylogenetic study using both morphological and intersimple sequence repeat (ISSR) markers has revealed in a neighbor-joining analysis that *H. choctawensis* and *H. franklinensis* form a sister relationship and that *H. gholsonii* is sister to that relationship (Catherine Bush and Dollie Rollins, pers. comm.).

In 1991, Loran C. Anderson, then curator of the Florida State University Herbarium (FSU), called to the senior author’s attention a puzzling specimen that John Palis of the Florida Natural Areas Inventory had collected in the Apalachicola National Forest near the town of Sumatra. This specimen had features similar to *Hymenocallis choctawensis*, but its perianth tubes were decidedly shorter and more robust, its staminal cup was larger, and its leaves were not distinctly oblanceolate but liguliform or narrowly oblanceolate.

It was not until spring of 2004 that the authors began to study intensively the Sumatra population. We were intrigued by the characteristics of this population and planned a critical analysis of both reproductive and vegetative characteristics. In 2005, the authors returned to this population, finding a number of plants at peak anthesis. We made careful observations and measurements, selected several choice flowering specimens as vouchers, and collected living bulbs for cytological analyses. In 2006, the senior author, with botanical associates, including Angus Gholson, returned to the population. We made additional observations on fruit development and seed production and compiled a comprehensive list of associated plants (see Distribution and ecological associates below).

Distinguishing characteristics of the new species include the relatively short, robust perianth tubes; a staminal cup that is relatively large (as compared to *H.

choctawensis) and rotate at peak anthesis; relatively large, lanceolate scape bracts; green-yellow, nearly erect, liguliform or narrowly oblancoate leaves; and the robust, rhizomatous bulb.
Hymenocallis chaetaeensis Trab. affinis sed ab ea bulboreus, foliis flavovirendibus superisculiosis luteo-virescentibus et anguste oblancoleatis, bracteis scapi magnis lanceolatis, tubis perianthii brevioribus robustioribus, peculo staminum majore sub plena anthesi rotato et numero chromosomatico: 2n = 44 (ibibracteatum 34, telocentricum 10) distinguenda.

Bulb rhizomatous, robustly ovoid, 4.5–7.5 × 2.5–5.5 cm, neck 6–11 cm, basal plate 2–3 cm; tunica grayish brown. Leaves 3 to 9, erect to suberect, yellow-green, lustrous, liguliform to narrowly oblanceolate, prominently channelled, 4–6.5 dm × 2–4 cm, coriaceous, apex acute. Scape 2.7–4.3 dm, 2-edged, glaucous; 2 papery scape bracts enclosing the buds, 4–5 × 1.5–2 cm; each flower with a subtending bracteole, persistent, 3–4 × ca. 1 cm. Flowers 2 or 3, opening sequentially, fragrant; perianth segments radiating horizontally to slightly ascending, white, tinged green on keel, 9–11.5 cm × 7–8 mm; perianth tubes green, relatively robust in width, 6–7.5 cm; staminal cup white with a small yellow-green eye, rotate at peak anthesis, shortly tubular below, 3–4 × 4.8–5.5 cm; margin irregularly dentate between the free filaments; free filaments suberect, inserting on a flat sinal base, white, 2.5–3.5 cm; anthers 1.5–2 cm, pollen golden; styles green in distal third, fading to white, 14–15 cm; ovaries ovoid, ca. 1 cm × 5–7 mm; ovules 2 or 3 per locule. Fruits, subglobose to broadly trilocular, 2.2–2.5 × 2–3 cm. Seeds obovoid, 1.6–3.2 × 1–1.9 cm. Chromosomes 2n = 44 (34 2-armed and 10 telocentric chromosomes).


IUCN Red List category. Hymenocallis gholsonii is currently known from two locations in the same stream system. Its known area of occurrence is much smaller than 20 km². Both locations are in the Apalachicola National Forest and are therefore protected from many threats. Nevertheless, the species is so restricted that small disturbances can affect a large proportion of the entire population, causing it to become critically endangered or even leading to its extinction. The major plausible threat to this species is disturbance of habitat by road construction or maintenance; unauthorized collecting of bulbs may also be a threat to these showy plants. We therefore believe that this species should be considered Vulnerable (VU) according to criterion D2 in the IUCN Red List assessment: “Population with a very restricted area of occupancy (typically less than 20 km²) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period” (IUCN, 2001).

Etymology. It is with great pleasure that we name this new spider lily in honor of Angus K. Gholson, the 2007 recipient of the Elizabeth Ann Bartholomew Award presented by the Southern Appalachian Botanical Society. He has encouraged and supported

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Figure 2. —A. Somatic chromosomes of Hymenocallis gholsonii, 2n = 44, from Smith & Garland 1784. Arrows point to 10 telocentric chromosomes. —B. Somatic chromosomes of Hymenocallis chaetaeensis, 2n = 44, from Smith & Garland 1432 (FSU). Arrows point to 8 telocentric chromosomes.
our spider lily studies by always making available his herbarium in Chattahoochee, Florida, by assisting in the field, and by sending the senior author bulb and seed collections. Sometimes field trips were made with the late Robert K. Godfrey. A field day with “the dynamic Florida Panhandle duo of Gholson and Godfrey” was always highly regarded and long-remembered!

Cytology. The senior author analyzed the chromosome number and karyotype of mitotic cells in actively growing root tips from potted bulbs. The cytological techniques were those developed by Walter Flory and his graduate students at the Blandy Experimental Farm of the University of Virginia as outlined by Flory and Smith (1980) and by Smith in Jones and Luchsinger (1986). Well-spread metaphase figures were examined with a Wolfe microscope and photographed with a Canon digital camera.

Figure 2A represents a well-spread chromosomesal figure of *Hymenocallis gholsonii*. The somatic count is 2n = 44. This number is not entirely unexpected, because we consider this taxon to be allied to *H. choctawensis*, also 2n = 44 (Fig. 2B). However, the karyotype of *H. gholsonii*, unlike that of *H. choctawensis*, consists of 10 telocentric chromosomes rather than 8, and the number of 2-armed chromosomes is 34 rather than 36. The karyotype of *H. gholsonii* is unique among the 16 U.S. *Hymenocallis* species for which karyotypes have been developed (Flory, 1976, 1978; Smith & Flory, 1990; Smith & Darst, 1994; Smith & Garland, 1996; Smith et al., 2001). *Hymenocallis gholsonii* likely evolved from *H. choctawensis* by the process of centric fission, which is discussed by Flory (1976) as a dynamic cytological process leading to speciation in *Hymenocallis*.

Our studies have revealed that *Hymenocallis gholsonii* is a rare endemic in scattered populations along a stream and its branches in the Sumatra area of the Apalachicola National Forest of the Florida Panhandle. We recognize it to be morphologically distinctive from all other known spider lilies in the southeastern United States based on its bulb type, leaves, and flowers with robust, stocky perianth tubes and rotate staminal cup at peak anthesis (Smith & Garland, 2007). Supporting the morphological distinctions is a unique karyotype.


**KEY TO HYMENOCALLIS SPECIES IN THE FLORIDA PANHANDLE**

1a. Ovules 1 to 3(to 4) per locule; ovary 0.7–1.5 cm × 5–10 mm.

2a. Bulb non-rhizomatous; leaves glaucous ........................................... *H. occidentalis*

2b. Bulb rhizomatous; leaves shiny.

3a. Scales bracts linear to narrowly lanceolate, width chiefly < 10 mm at widest point ............ *H. ducalisensis*

3b. Scales bracts lanceolate, width chiefly > 10 mm at widest point.

4a. Leaves liguliform to narrowly oblanceolate.

5a. Scales bracts 3–4 (–4.5) × 1–1.5 cm; bulbs 2.5–4 cm long .................................. *H. frankinensis*

5b. Scales bracts 4–6 × 1.5–2 cm; bulbs 4.5–7.5 cm long ........................................ *H. gholsonii*

4b. Leaves distinctly oblanceolate ................................................................. *H. choctawensis*

1b. Ovules 4 to 8 per locule; ovary 1.4–3 cm × 6–15 mm.

6a. Tepals yellow-green to green; bulb non-rhizomatous .................................... *H. henryae*

6b. Tepals white; bulb rhizomatous.

7a. Staminal cup rarely wider than 6 cm; longest leaf not exceeding 4 dm at peak anthesis ...... *H. godfreyi*

7b. Staminal cup 6 cm or wider; longest leaf greatly exceeding 4 dm at peak anthesis .......... *H. rotata*


Acknowledgments. We thank John Palis for his discovery of *Hymenocallis gholsonii*. We also thank Angus Gholson, Melanie Darst, Guy Anglin, and Bryan Niedenberger for their assistance in field documentation of *H. gholsonii* and in identification of plant associates. The Biology Department of High Point University provided partial funding for this study.

Literature Cited

La Sect. Punctati del Género Lonchocarpus (Leguminosae, Papilionoideae, Millettieae) para Mesoamérica

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Abstract. An account of section Punctati Bentham for the genus Lonchocarpus Kunth in Mesoamerica is given. Of the 12 species treated, five are new to science, and one new combination is made, L. vallicola (Standley & F. J. Hermann) M. Sousa. The new species described and illustrated here are L. angusticarpus M. Sousa, L. berriozabalensis Miranda ex M. Sousa, L. cristatus M. Sousa, L. linaresii M. Sousa, and L. viitatus M. Sousa. Cyanobotrys mexicana Zuccarini and Derris peninsularis Donnell Smith are lectorotipified. The Mesoamerican species of section Punctati are contrasted with a dichotomous key.

Key words: IUCN Red List, Leguminosae, Lonchocarpus, Mesoamerica, Millettieae, sect. Punctati.

El género Lonchocarpus Kunth (Fabaceae, Millietteae) está integrado por alrededor de 150 especies de los trópicos de América, con un representante en la costa occidental de África ecuatorial. La sect. Punctati Bentham comprende alrededor de 22 especies. Está bien representada en Mesoamérica con 12 especies, de las cuales siete son endémicas; en México se cuentan con 13 especies, incluyendo a 11 endémicas; en Sudamérica con sólo tres, todas ellas endémicas; y en las Antillas Menores una endémica.


Pittier (1917) y Urban (1921), aparentemente, en forma independiente concluyeron que Robinia violacea Jacquin (Enum. Syst. Pl. 28. 1760) no se podía identificar con los conceptos de especies propuestos por Bentham (1860) y Kunth ex A. DC. (de Candolle, 1825), por lo que para las Antillas Menores era necesario crear un nuevo nombre (Lonchocarpus benthamianus Pittier [Pittier, 1917] y L. cariabaus Urban [Urban, 1921]) y para el caso de Sudamérica Pittier (1917) emplea a L. punctatus Kunth.

Robinia violacea Jacquin, se basa a su vez en un polinomio de Plumier “Pseudo acacia fraxinii folio floribus violaceis” (Plumier, 1703). Lourteig (1988) estudió las láminas inéditas de Plumier (bajo el actual resguardo de P) de Lonchocarpus y no identifica a ninguna especie de Lonchocarpus en particular para este polinomio. La descripción y figura de Jacquin (1760) es bastante general y podría parecerse a varias especies y no es posible con seguridad referirlo al concepto de L. punctatus, particularmente difiere de él, ya que R. violacea se describe con foliolos con el ápice obtuso (vs. acuminado) y pedicelos cortos (vs. 6–7 mm de largo). Robinia violacea es citada de Cartagena, Colombia, el problema es que en esa área crecen varias especies de Lonchocarpus, incluyendo a L. punctatus, y resulta arriesgado que por un simple proceso de eliminación las homologuen, por lo que R. violacea es mas adecuado como un nombre de identificación incierta, que sin embargo, podría corresponder a una especie de Lonchocarpus.

Atendiendo a la última edición del Código Internacional de Nomenclatura Botánica, McNeill et al. (2006: art. 22.6) se indica: “Cuando el epíteto en el nombre de una subdivisión [sección] de un género es idéntico al, o derivado del, epíteto de una especie [Lonchocarpus punctatus, como sinónimo] que lo constituyen, el tipo del nombre de la subdivisión del género [Punctati] es el mismo que el del nombre de esa especie [L. punctatus], a menos que el autor original [Bentham] del nombre de la subdivisión [sección] designara otro tipo [lo que no hizo Bentham]” (traducción por el autor). Por lo anterior
Bentham designó, sin ser explícito, automáticamente el lectotipo de la sect. Punctati.

De las especies incluidas por Bentham (1860) en la sect. Punctati sólo se consideran aquí dentro de la sect. Punctati a Lonchocarpus punctatus (como sinónimo de L. violaceus Bentham) y L. confertiflora. Se excluyen a L. araripensis y L. subglaucescens ambas relacionadas entre sí, pero que conforman otro grupo diferente, a pesar de que también presentan áreas pelúcidas linear-pun- tadas. Teixeira et al. (2000) estudiaron el posible significado taxonómico de las cavidades de secreción de las puntuaciones pelúcidas en el mesófilo de los folíolos de Lonchocarpus; en base a este carácter sugieren posibles cambios taxonómicos, como el agrupar junto a L. punctatus (L. violaceus (Jacquin) A. DC., según los autores), bajo el subgénero Punctati (sensu Teixeira et al., 2000), sin ser caracterizada ésta categoría, a los siguientes grupos, el primero alrededor de L. subglaucescens y L. araripensis [grupo aparte tanto morfológica, fitoquímica como genéticamente]; y el segundo en torno a L. monilis (L.) A. M. G. Azevedo [el cual debe considerarse en el género Muelleria L. f., del cual es el tipo, o bien ubicarse en otra sección diferente en el género Lonchocarpus]. Por otro lado, Teixeira et al. (2000) evalúan excluir a L. grandiflorus A. M. G. Azevedo del subgénero Punctati (sensu Teixeira et al., 2000) por carecer de cavidades de secreción, pero por lo demás esta especie pertenece al grupo de L. subglaucescens y ellos proponen su inclusión dentro del subgénero Lonchocarpus (sensu Teixeira et al., 2000). Así L. denudatus Bentham y L. montanus de Teixeira et al. (2000), los caules también carecen de cavidades de secreción, y sin embargo pertenecen al mismo grupo (Muelleria) junto con L. monilis especie que sí las tiene.

### CLAVE PARA LAS ESPECIES DE LONCHOCARPUS SECT. PUNCTATI DE MÉSOTOAMÉRICA

1a. Legumbres dehiscentes sólo en el margen vexilar.

2a. Plantas completamente glabras aún en los brotes vegetativos; folíolos maduros con los márgenes revolutos; legumbres con el margen vexilar nervado; semillas no embebidas en tejido esponjoso blanquecinco.

2b. Plantas pelosas en los brotes vegetativos y envés de los folíolos; folíolos maduros con los márgenes no revolutos; legumbres con el margen vexilar engrosado; semillas embebidas en un tejido esponjoso blanquecinco.

1b. Legumbres indehiscentes.

3a. Legumbres sublíquidas a leñosas.

4a. Pedúnculos florales 2-3 mm; botones florales casi esféricos; legumbres con el margen vexilar alado

4b. Pedúnculos florales 4-11 mm; botones florales elipsoidales; legumbres con el margen vexilar angostamente aquilado, sin ala.

5a. Folíolos con el envés canescente pubescente; inflorescencias 19-24 cm; flores ca. 19 mm.

5b. Folíolos con el envés glabrascente; inflorescencias 8-17 cm; flores (10-)12-13 mm.

3b. Legumbres con textura cartácea a coriácea.

6a. Hojas 7- a 19-folioladas.

7a. Folíolos canescentes sericosos en el envés.

8a. Legumbres cartáceas, el margen vexilar alado, el ala 1-1.3 mm de ancho; semillas con bandas y manchas irregulares.

8b. Legumbres subcoriáceas, coriáceas a subleñosas, el margen vexilar alado, el ala 2-4 mm de ancho, semillas sin bandas ni manchas irregulares.

### TRATAMIENTO TAXONÓMICO


La sect. Punctati se caracteriza por: corteza interior no exuda resina rojiza al corte; hojas con arreglo marcadamente distico en el tallo; estípulas pequeñas redondeadas a ligulares, pronto caducas; hojas frecuentemente glabras, sobre todo en el haz, esparcidamente pelosas a glabras y papilosas en el envés, los folíolos frecuentemente pelúcidos punteados, con cavidades de secreción en el mesófilo; pedúnculos florales y pedicelos delgados y generalmente largos, las bractéolas generalmente pequeñas, frecuentemente escariosas y distantes de la base del cálix; botones florales elipsoidales a esféricos; cálix trunco a casi trunco, esparcidamente sericeto a glabro, generalmente pelícido linear-punteado; corola frecuentemente pelícido linear-punteada, el estandarte abaxialmente en la base 2-lobado y calloso, en ocasiones esparcidamente canescente sericeto en el centro y base. Mecanismo floral ligeramente explosivo. Legumbre indehiscente a dehiscente sólo en el margen vexilar, aplanada, frecuentemente resinosa, la resina transparente brillosa y frecuentemente cubriendo a las semillas, las valvas lisas a crestadas, el margen vexilar en ocasiones angostamente alado. Plantas con los cotiledones epigéos en ocasiones hipógeos, cófílos opuestos 1(3)-foliolados, 1ª hoja alterna 1- a 3-foliolada.


Lonchocarpus acuminatus es una especie muy variable, en cuanto a la pelosidad de su cáñiz y pedúnculos, textura y tamaño de sus frutos y al número de foliolos por hoja, lo cual se refleja en la clave de la sección donde aparece en tres entradas.

En cuanto a la selección de A. Tonduz ex J. D. Smith 13966 como lectotipo de Derris peninsularis en lugar del otro sintipo A. Tonduz ex J. D. Smith 13812 se debió a que el material es más completo para incluir tanto material en flor como en fruto, en cambio el otro sintipo sólo cuenta con material en flor.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus acuminatus debe considerarse como: casi amenazada (NT), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, pero sus hábitats están siendo alterados o destruidos.


Arbolitos a árboles (2–)4–16(–20) m, caducífolios; corteza sin fluido resinoso rojizo al corte; ramas densamente canescente seríceas en brotes, pronto glabras. Hojas con arreglo distico en el tallo; estípulas 0.7–0.8 × ca. 0.5 mm, ligulares, pronto caducas; peciolo (2.8–)3.2–5 cm, canaliculado; hojas (5)7– a 9-folioladas; foliolos 3.5–6(–9.3) × (1.2–)2–2.4(–3.8) cm, angosta a anchamente elípticos, lanceolados,
pelícico puntuado, ligeramente discolor, la base cubierta a redondeada, los márgenes generalmente ondulados, el ápice acuminado a caudado, el haz opaco y glabro, el envés esparrácidamente canescente pubescente a seríaco, más densamente sobre las nervaduras, papiloso; nervaduras primaria y secundarias ligeramente realizadas en el envés, nervaduras secundarias 7 a 10. Inflorescencias (3–)7–10(–12) cm, erectas, densifloras, pedúnculos 2–4 cm; floración tardía; pedúnculos florales 1,5–3 mm, delgados; pedículos 3–6(–8) mm; bracteolas 0,4–0,8 mm, ovoides, escariosas, opuestas a subopuestas, del 1/2–1/4 superior del pedicelo. Botones florales elipsoidales. Flores 9–12 mm; cálices 2,5–3 mm, citrifómeo, densamente pelícico linear-puntado, esparcido a moderadamente pardillo-amarillento seríaco, ciliado en el margen, cortamente lobado, el diente carinal prominente, hasta 0,3 mm; corola lila a púrpura, moderadamente con líneas y puntos translúcidos, la lámina del estandarte 9–11(–13) mm de ancho, orbicular a oblata, ligeramente cóncava, adaxialmente esparcidamente canescente seríaco, más densamente sobre la base, abaxialmente esparcidamente canescente seríaco sobre las nervaduras, particularmente en la base; ovario 4– a 7(–9)-ovulado. Legumbre 3–5 cm de largo con 1 semilla, 6,5–9 cm con 2 semillas, 10–12 con 3 y 4(5) semillas, 1,4–1,6(–2) cm de ancho, elíptica a oblonga, déhiscente sólo en el margen vexilar, aplanada, coriácea, resinoso, recta a constricta entre las semillas sobre los márgenes, glabra, corto estipitada, margen vexilar engrosado, margen carinal aguillado, el ápice rostrado; semillas 1 a 3(5), 10,2–12,2 × 6–7 mm, color castaño a castaño oscuro, la semilla embebida en un tejido esponjoso blanquecino. Plántulas con los cotiledones epígeos; cílios opuestos, 1-foliolados, la 1ª hoja alterna 3-foliolada.

Distribución y hábitat. Esta especie habita los Valles Centrales y cuenca del Río Tehuantepec en Oaxaca y la Depresión Central de Chiapas, prospera en selvas húmedas caducifolias y leñosas con bosques de encino-pino, encinares, riparia en ríos de temporal, cañadas, sobre suelos de litosol granítico y calizos; crece en altitudes de 550 a 1700 m.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus angusticarpus debe considerarse como: preocupación menor (LC), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie relativamente localizada, pero localmente abundante, en un área relativamente conservada.

Fenología. La floración va de finales de mayo a principios de agosto; la fructificación de finales de octubre a finales de marzo.

Etimología. El epíteto hace énfasis en lo angosto del fruto.

Nombre vulgar. Armadillo (M. Sousa 7543, MEXU, Oaxaca).

Discusión. Esta especie es cercana a Lonchocarpus caudatus del occidente de México. Lonchocarpus angusticarpus se caracteriza por sus inflorescencias más cortas, frutos angostos, déhiscentes, con el margen vexilar engrosado, y semillas embibidas en un tejido esponjoso blanquecino.

Paratipos. MÉXICO. Chiapas: Mpio. Cintalapa de Figueroa, a 1 km de los límites de Oaxaca con Isis, carr. Tehuantepec–Río de Oro, E. Martínez S. y A. Aguilar 36601 (MEXU); Chiapas, carr. a Río de Oro, J. I. Calzada 14140 (XAL); a 24 km al NE de Tapanatepec (Oaxaca), M. Sousa 8321 (MEXU); a 0,8 km al N-NO del Mirador, Martínez S. y C. H. Ramos 37060 (MEXU); Ejido La Majada, Res. Biósfera La Sepultura, A. Reyes-García, D. Gómez, E. Figueroa 6875 (MEXU); La Sepultura a 3 km al S (Río de Oro) Nuevo Tenochtitla, al N Mirador Isis, M. Sousa, G. Andrade, G. Sousa A. y M. L. Sousa A. 13555 (Ecosur, San Cristóbal de las Casas, Chiapas; MEXU); Mpio. San Fernando, arriba de La Chacona, NO de Tuxtlá Gutierrez, F. Miranda 5391, 6489, 6813, 7486 (MEXU); Mpio. Tuxtlá Gutierrez, steep slope at El Sumidero, 22 km N of Tuxtlá Gutierrez, D. B. Breedlove 10664 (F, MCHE); N of Tuxtlá Gutierrez, toward Chicoasen, ca. 500 m after turnoff to Juan Crispín, 10 km from Tuxtlá Gutierrez, C. E. Hughes 1491 (MEXU); a 8 km al O de Tuxtlá Gutierrez, al O de la Colonia Juan Crispín, Reyes Garcia y R. Hampshire 1962 (MEXU). Oaxaca: Distr. Juchitán, Cerro Verde, 1,7 km al NE de Nizanda, Mpio. Asunción Ixaltepec, E. Pérez-García y B. Reyes Ríos 1809 (MEXU); a 17 km al NO de La Ventosa, M. Sousa y L. Rico 10201 (ENCB, MEXU); a 10–11 km al O de La Chiviza, hacia Lachiguiru, R. Torres y C. Martínez 5714, 5740 (MEXU); Distr. Pochutla, Rancho San Agustín, Mpio. San Miguel del Puerto, J. Pascual 804 (MEXU); Llano del Horno, S. Salas M. y J. Pascual 5147 (MEXU); Distr. Tehuantepec, carr. a Tenango, 15 km al SO de Buenos Aires, Mpio. San Miguel Tenango, A. Campos 3776 (MEXU); Santiago Lachiguiru, about 25 km N of Presa Benito Juárez and of Santa María Jalapa del Marqués, C. E. Hughes, G. P. Lewis y J. L. Coroners 3347 (MEXU, NY); El Sapotal, 37 km al O de Tehuantepec, entrando a Pozo Zorrillo a 1 km al NO de Tehuantepec, Mpio. Tehuantepec, C. Martínez 1144 (MEXU); Cerro Calderona, estación micromidas, a 7 km al S de Jalapa del Marqués, M. Sousa, L. Rico y P. Basurto 10118 (MEXU); Cerro Guengola, L. Torres y C. Martínez 106, 143 (MEXU); a 12 km al SO de La Reforma, hacia Sta. María Ecatepec, R. Torres y C. Martínez 5653 (MEXU); a 8,1–12 km al SO de Buenos Aires, camino a Tenango, R. Torres y C. Martínez 7444, 10498 (MEXU); Distr. Tlacolula, 10 km al N-NO de S. Pedro Totolapan, Mpio. Totolapan, S. Acosta 750 (MEXU, OAX); Barranca de Los Calahuzos, a 3 km al O de Totolapan, Acosta 983 (MEXU, OAX); a 7 km al NO de Santa María Zozquitlán, R. Cedillo y R. Torres 1394 (MEXU); a 8 km al NO de Totolapan, Cedillo y R. Torres 1569 (ENCB, MEXU); Tlacolula, L. Cervantes y A. García 2102 (MEXU); Cano. Pino Suárez a Duraznillo, Mpio. Totolapan, A. Flores M. 1333 (ENCB, MEXU, OAX, XAL); a 4 km al O de Totolapan, Flores 1349 (ENCB, MEXU, OAX); Portillos de San Dionisio, 13 km al S-SE de Matatlán, J. Reedsowski 4382 (MEXU); a 10 km de la desv. Portillo San Dionisio rumbo a Totolapan,

Hae specieis *Lonchocarpus longistylus* Pottier similis, a quos foliis in caule congestis usque ad 13- (vs. 19)-fóliolatis, foliolis brevibus apice acuminatis vel obtusis, pedunculis floralibus 1.5-3 mm longis (vs. [2-]4-6-9 mm), pedicellis 2.5-4 mm longis (vs. [3-]4-7 mm) et vexillii laminae 9-10 mm (vs. 11-13 mm) lata differt.

Árboles 6-25 m; corteza lisa, sin fluido resinoso rojizo al corte, ramas esparsamente canescentes, pronto glabras. Hojas con arrollo distico en el tallo, con estípulas poco notadas; peciolo 4.5-7 cm, acostillado; hojas (9)11-13-fólioladas; foliolos (4.5)-6-7-5-9 × 2.5-3.8 cm, elípticos, subcoriáceos, pelágico punteados, concoloros, la base algo oblicua, cuneada, los márgenes rectos, el ápice corte acuminado a obtuso, el haz opaco, glabro, el envés glabro, escasamente papiloso; nervaduras primarias y secundarias ligeramente realizadas en el envés, 5-11 pares de nervaduras secundarias. Inflorescencias 9-18 cm, erectas, densifloras, pedúnculo 4-5.5 cm; floración tardía; pedúnculos florales 1.5-3 mm, delgados; pedicelos 2.5-4 mm; brácteas 0.6-0.7 mm, ovadas a orbiculares, escariosas, opuestas a subopuestas, del 1/3 inferior al 1/2 del pedicelo. Botones florales elipsoidales. Flores 10-11 mm; cálice 2.5-3 mm, ciáteforme, densamente pelágico linear-punteado, glabro, excepto ciliolado en el margen, casi tronco; corola morada, guinda oscuro, esparracadamente con líneas y puntos translúcidos, la lámina del estandarte 9-10 mm de ancho, en ocasiones epunciada, adaxial y abaxialmente canescente serícica particularmente en la base; ovario 9-ovulado. Legumbre 6.5-9 cm de largo con 1 semilla, 11-15 cm con 2 o 3 semillas, 2.2-2.8 cm de ancho, elíptica a oblongo, indehiscente, aplanada, coriácea, las valvas lisas a la altura de las semillas, constricta entre las semillas sobre los márgenes, glabra, largamente atenuada en la base, margen vexilar alado, el ala hasta 2 mm de ancho, margen carinal nervado, el ápice obtuso, atenuado, en ocasiones brevemente rostrado; semillas 1 a 3 por fruto, ca. 13.4 × 7.3 mm, pardo-amarillentas. Plántulas con los cotiledones epigosis; cíliolos opuestos, I-fólioladas, la 1ª hoja alterna 3-fóliolada.

**Distribución y hábitat.** Esta especie es endémica de la Depresión Central de Chiapas; crece en altitudes entre 700 y 1000 m; la vegetación en que prospera es de selvas medianas subcaducifolias a subperennifolias, sobre suelos calizos.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus berriozabalensis* debe considerarse como: en peligro (EN), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie muy localizada, cuyo hábitat está siendo rápidamente alterado.

**Fenología.** Esta especie florece de mediados de julio a la segunda quincena de septiembre; cuenta con frutos maduros en la segunda quincena de diciembre a finales de febrero.

**Etimología.** Fausto Miranda G. (1905-1964) fue el primero en colectar y reconocer a ésta como una nueva especie, también en ejemplares de herbario, él propuso el epíteto, el cual hace énfasis en lo extremadamente endémica de su distribución, en el área de Berriozábal.

**Discusión.** Esta especie es cercana a *Lonchocarpus longistylus* de la Península de Yucatán y vertiente del Golfo de México, ambas crecen en suelos calizos, pero en pisos altitudinales diferentes. Las diferencias entre estas especies son que en *L. berriozabalensis* las hojas están dispuestas muy cercanas unas de otras, dando la apariencia en ocasiones de ser casi opuestas y cuentan con hasta 13 folíolos (vs. hojas espicadas, hasta 19-fólioladas); foliolos de ápice corte acuminado a obtuso (vs. foliolos largamente acumulados a caudados); pedúnculos florales 1.5-3 mm de largo (vs. [2-]4-6-9 mm de largo); pedicelos 2.5-4 mm de largo (vs. [3-]4-7 mm de largo); y la lamina del estandarte 9-10 mm de ancho (vs. 11-13 mm de ancho).

Esta especie fue sugerida como subespecie de *Lonchocarpus punctatus* por Sousa, en Palomino y

Sousa (2000), pero sin la intención de ser formalizada, ni validada.

Paratipos. MÉXICO. Chiapas: Mpio. Ocozocoautla, Finca El Suspiro, F. Miranda 7657, 8569 (MEXU); NO Berriozábal, en el camino a El Suspiro, Miranda 7869 (MEXU, US); a 1 km al NO del entronque Aeropuerto-Ocozocoautla, A. Reyes G. y G. Urquijo 1000, 1247, 1254 (MEXU); Las Delicias, a 9 km al SO de Berriozábal, M. Sousa, A. Delgado, O. Téllez y A. Solís M. 6677 (ENCB,
Se le ha colectado solamente en las islas y costas en el occidente de Panamá. Muy característica por sus flores grandes de ca. 19 mm de largo y frutos de gran tamaño y con texture suflé. Sus frutos muy posiblemente se dispersan por corrientes de agua.

IUCN. Categoría de la Lista Roja. El estado de conservación de Lonchocarpus chiricahus debe considerarse como en peligro (EN), de acuerdo al criterio de la Lista Roja (IUCN, 2001), especie de endemismo estrecho, cuyo hábitat insular costero esta sujeto a gran alteración.

Material representativo. PANAMÁ. Bocas del Toro: H. von Wedel 1180 (MO, US). Veraguas: G. W. Barkley 2804 (BN), J. D. Dwyer 1561 (F, MO); C. Goldsmith; B. Arauz y A. Castillo 3217, 3218; C. Goldsmith; L. Guilloë, B. Arauz; C. Guerra, J. Cuadra y N. Basillules 3639 (F, MA).


Lonchocarpus cochleatus y L. longipedicellatus, fueron publicados simultáneamente por Pittier (1917), pero se escogió el primero ya que, fue usado para la Flora Novo-Galiciana vease Sousa (1983).

Especie nativa de la costa occidental de México, cuyo límite sur es la Depresión Central de Chiapas. Se caracteriza por sus pedicelos y pedúnculos florales delgados y largos, sus frutos anchos, llenos frecuentemente cocleados y sus plántulas con cotiledones hipogéos y cófílos opuestos, 3-folíolados.

IUCN. Categoría de la Lista Roja. El estado de conservación de Lonchocarpus cochleatus debe considerarse como: casi amenazada (NT), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, cuyo hábitat está en constante proceso de alteración y destrucción, como en la Depresión Central de Chiapas, donde en la actualidad es muy escasa.


Hae specie Lonchocarpus trifolium Standley & L. O. Williams similis, sed ab eo petiolo costato (vs. canaliculato), foliis 5-foliolatis (vs. 3-foliolatis) supra opacis (vs. nítiis), inflorescentias erectis vel patentibus (vs. pendulis), pedunculis floribudis 4-7-11 mm (vs. 3-6 mm) longis, pedicellis 6-9 mm (vs. 2-4 mm) longis et legumine suberoso valvis ad positionem semià crassis ac tuberculo suberoso prominente eratris differt.

Arbolito 3-4 m; corteza sin fluido resinoso rojizo al corte; ramas esparcidamente canescente subesponjosas, pronto glabros. Hojas con arreglo distico en el tallo; estipulas ca. 1.5 × 2 mm, oblatas, anchamente elípticas, pronto caducas; peciolo 3-5.5 cm, ligamente acostillado; hojas 5-folioladas; foliolos (3-5)–10 × (2.2–3.5)–5 cm, elípticos a anchamente elípticos, subcoriáceos, en ocasiones algo cocleados, pelício punteados, algo discoloros, la base cuneada a redondeada, los márgenes rectos a ligera pendulados, el ápice acuminado a corto acuminado, el haz opaco, glabro, el envés esparcidamente canescente sericeo, papilos; nervaduras primaria y secundaria ligeramente realizadas en el envés, nervaduras secundarias 7 a 12. Inflorescencias (3.5–)5–9 cm, erectas a patentes, pauci floridas, pedúnculos 1.2–4 cm: floración tardía; pedúnculos florales 4–7(–11) mm, delgados; pedicelos 6–9 mm; bractéolas 0.8–0.9 mm, ovadas, escurias, opuestas, subpuestas a en ocasiones alternas, del 1/3 inferior al 1/2 del pedicelo. Botones florales elipsoidales. Flores 13–14 mm; cálices ca. 4 mm, ciliato, densamente pelíciico lineal-punteado, casi glabro, excepto ciliado en el margen, casi trunco; corola con abundantes láminas y puntos transilúcidos, la lámina del estandarte 13.5–15 mm de ancho, orbicular a oblata, ligera mente cónica, casi glabra; ovario 6–7-ovulado. Legumbre 4.5–5.5 × 2.5–3.5 × 1.2–1.3 cm, elíptica, indehiscente, suberosa, las valvas con crestas y tubérculos prominentes suberosos a la altura de la
semilla, casi glabra excepto esparsamente canescente seríceo en el ápice, largamente estipitada, márgenes angostamente aquilados, el ápice rostrado; semillas (inmaduras) 1 por fruto.

**Distribución y hábitat.** Esta especie es endémica del centro de Honduras, en áreas montañosas de los departamentos de Francisco Morazán y Olancho; forma parte de las selvas bajas caducifolias intermontanas; crece en altitudes entre 960 y 1100 m.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus crisatus* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); endémica restringida, cuyo hábitat está bajo presión de alteración.

**Fenología.** La floración es en la primera quincena de mayo y fructifica en septiembre y octubre.

**Etimología.** El epíteto se refiere a las valvas del fruto que cuentan con crestas y tubérculos suberosos.

**Discusión.** *Lonchocarpus crisatus* está emparentada con *L. trifoliolus*, de la cual se contrasta en su diagnóstico. Es notable por las valvas de su legumbre, con crestas y tubérculos suberosos, carácter único en la sect. *Punctati*. También ésta se relaciona con *L. linaresii* M. Sousa, para diferencias véase a ésta.

**Paratipos.** **HONDURAS.** Francisco Morazán: cerca aldea de Mateo, 12 km al SO de Tegucigalpa, A. R. Aldino 165 (TEFH); Cerro Uyuca, a 20 km E de Tegucigalpa, C. Berdect E. 43 (MO); Col. 15 de Septiembre, Conayaguila, S. C. Cerna 180 (MO, TEFH); Mateo, R. Gómez P. 241 (MEXU, MO); Col. 15 de Septiembre, Tegucigalpa, I. R. Guerra C. 177 (MO); El Picacho, arriba de Tegucigalpa, L. Paray s.n. (EAP); allredores de Mateo, 12 km al SO de Tegucigalpa, R. M. Rivas 178 (MEXU, MO). **La Paz:** Estanzuela, Marcala, a 12 km N de Marcala, R. Keyser 1479 (EAP), Olancho: Campamento, Mpio. Campamento, R. Ramos 151 (TEFH).


Hace species *Lonchocarpus trifoliolus* Standley & L. O. Williams similis, sed ab eo petiolo costato (vs. canaliculato), foliolia supra opacis (vs. nitidis), inflorescentis erectis vel patentibus (vs. pendulis), floresbus 14–16 mm (vs. 12–14 mm) longis et legumine marginve vexillari atalo (vs. sulcate) differt.

Arbustos a arboletos 2–4 m; corteza fisurada, suberosa, sin fluido resinoso rojizo al corte; ramas canescente pubescentes, pronto glabras. Hojas con arreglo dístico en el tallo; estípulas 0.9–1.1 × 1–1.2 mm, ligulares, anchamente triangulares a anchamente reniformes, pronto caducas; pecíolo 1.5–3.6 cm acostillado y ligeramente canaliculado; hojas (3)5–folioladas; foliolos (3–)5–(8–10) × (2–)2.5–4.5–(5.7) cm, elípticos, ovados a casi orbiculares, suborbiculares, pelúcidos punteados, ligeramente discoloros, la base oblíqua a redondeada, los márgenes rectos, el ápice corto acuminado a apiculado, en ocasiones redondeado, el haz opaco y casi glabro, el envés moderada a esparsamente canescente velutino a pubescente, más densamente sobre las nervaduras, escasamente papilosas; nervaduras primaria y secundarias ligeramente realizadas en el envés, nervaduras secundarias 7 a 11. Inflorescencias 6.5–18 cm, erectas a patentes, puci-floras; pedúnculos 3–6 cm, floración tardía; pedúnculos florales 2.3–4 mm, delgados; pedicelos 2.5–5 mm; bractéolas 0.6–0.7 mm, ovadas, escariosas, opuestas a subopuestas, del 1/3 inferior al 1/3 superior del pedicelo. Botones florales elípticos a subésfericos. Flores 14–16 mm: cálice 3.5–4.5 mm, ciátiforme, densamente pelúcico linear-punteado, casi glabro, excepto ciliolado en el margen, casi truncuo; corola morada a casi azul, con abundantes líneas y puntos translúcidos, la lámina del estandarte 12–13 mm de ancho, orbicular a oblata, ligeramente cóncava, canescente seríceo sobre las nervaduras, más densamente en la base; ovario 6(8)-ovulado. Legumbre 4,5–5 cm de largo con 1 semilla, 5,5–6.5 cm con 2 semillas, 6–10 cm con 4 semillas, 1,7–2,1 cm de ancho, elíptica a oblonga, indescindible, aplanada, coriácea, resinosa, las valvas lisas a la altura de las semillas, constrielta entre las semillas sobre los márgenes, casi glabra, largamente estipitada, margen vexilar alado, el ala hasta 1 mm de ancho, margen carinal angostamente aquillado, el ápice rostrado; semillas (inmaduras) 1 a 2(4) por fruto. Plántulas con los cotiledones epigéos; cófilos opuestos, 1-foliolados, la 1ª hoja alterna 3-foliolada.

**Distribución y hábitat.** Esta especie es sólo conocida en Honduras en los departamentos de El Paraíso y Francisco Morazán; crece en selvas bajas a medianas, caducífolias a subcaducífolias, en ocasiones como elemento de sabanas con pinares, frecuente como riparia; la elevación entre 400 a 800 m.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus linaresii* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie endémica, cuyo hábitat está rápidamente siendo alterado y destruido.

**Fenología.** La floración se presenta de finales de julio a principios de noviembre; fructifica de principios de noviembre a finales de diciembre.
Etimología. Esta especie se dedica al destacado botánico salvadoreño José Ledis Linares (1966–), estudiante de la flora de Centroamérica, particularmente de sus árboles, leguminosas y orquídeas de El Salvador y Honduras.

Discusión. Esta especie es cercana a Lonchocarpus trifolius, de la que se compara en la diagnóstico, también su hábitat difiere ya que L. trifolius crece en un piso altitudinal mayor, en tipos de vegetación mas templados. Esta especie también es próxima a L. crista, pero difiere de ella, por sus pedicelos 2.5–5 mm de largo (vs. 6–9 mm de largo); pedúnculos florales 2.3–4 mm de largo (vs. 4–7 mm de largo); flores 14–16 mm de largo (vs. 13–14 mm de largo); legumbres 1.7–2.1 cm de ancho, coriáceas (vs. 2.5–3.5 cm de ancho, subleñosas), y las valvas de las
legumbres lisas a rugosas (vs. las valvas crestadas y tuberculadas).

Paratipos. HONDURAS. Francisco Morazán: Las Moras, Anónimo s.n. (EAP); a 20 km SO de El Zamorano, E. Martínez S. 36278 (EAP, MEXU). Paraíso: Las Pontadas, 4-5 km al N de Oroplón, S. Dyar y J. Linares 176, 209 (EAP, MEXU); Quebrada Grande, a 1.9-2 km N de Moroceli, Mpio. Moroceli, nov. 2002, J. Linares s.n., 6099, 6257, 6846 (EAP, MEXU); El Rodeo, entre Yuscarán y Oroplón, Mpio. Yuscarán, J. Linares 4116 (EAP, MEXU); camino a El Plan, de E de Moroceli, Mpio. Moroceli, J. Linares, F. Escobedo y B. Knoblauch 5398 (MEXU); a 21 km al NE de El Zamorano, camino a Moroceli-Plan Quebrada, E. Martínez S., D. Álvarez y J. Linares 36201 (EAP, MEXU); La Quebrada, entre Yuscarán y Oroplón, A. Molina R. 8579 (EAP, F); Río Oroplón, entre Oroplón y Oroplón, A. Molina R. 13212 (EAP, F); Colinas y Quebrada Las Lajas, E de Yuscarán, A. Molina R. 13209 (EAP, F, NY); Quebrada El Muro, P. C. Standley 29265 (DS, EAP, F, US); Quebrada, El Muro, betw. Las Mesas ca. Yuscarán, L. O. Williams, A. Molina R., T. P. Williams y A. de Molina 42883 (BM, EAP, F, MICH).


El binómio más antiguo es Robinia latifolia Miller, non R. latifolia Poiret (Poiret, 1804), el cual no se puede usar de basónimo, ya que el epíteto latifolia fue empleado por Kunth ex A. L. P. P. de Candolle (1825) para otra especie de Lonicchocarpus.

Con respecto a Cyanoobtris mexicana Zuccarini, de nuevo no se puede emplear para combinación a Lonicchocarpus, ya que, existe L. mexicanus Pittier (Pittier, 1917). Cyanoobtris Zuccarini es un género basado en elementos heterogéneos, por un lado las hojas, inflorescencias y flores pertenecen a Lonicchocarpus y por otro lado, los frutos, las semillas y plántula son de Calia secundiflora (Gómez-Ortega) Yakovlev. Bentham (1860) sospechó que se trataba de dos géneros diferentes, pero sin embargo, lo transfirió al género Muellera, debido a que erróneamente pensó que Zuccarini (1845), obtuvo el material en flor a partir de germinar las semillas de los frutos (de Calia Berlandier). Debiendo a que el nombre genérico se refiere a las flores, ubicamos al género Cyanoobtris como Lonicchocarpus y no bajo Calia.

Distribución. Sobre su distribución en Chiapas, Miranda (1952) anota que esta especie se encuentra con frecuencia cultivada en los cariabes abandonados por los lacandones que emplean su corteza para una bebida fermentada. El material de Honduras es muy probable que sea introducido.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonicchocarpus longistylus debe considerarse como: casi amenazada (NT), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, con presión de destrucción de su hábitat, pero que en ciertas áreas es favorecida al recibir protección, por sus cualidades de uso.

Nombre vulgar. Bache (nombre Maya).

Discusión. Lonicchocarpus longistylus es similar a L. berriaezalensis, sus diferencias se hacen notar en esta última, también se distingue por sus hojas glabras, con foliolos numerosos (11 a 15[19]) y ápice acuminado a subacuñado.

Esta especie fue sugerida como subspecie de Lonicchocarpus punctatus por Sousa, en Palomino y Sousa (2000), pero sin la intención de ser formalizada, ni validada.


Especie endémica del área volcánica del sur de Guatemala de Sololá a Santa Rosa y en el oeste de El Salvador en Ahuachapán y Santa Ana; en altitudes entre 1400 a 1740 m.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonicchocarpus michelianus debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie
endémica, cuyo hábitat está siendo alterado y destruido.


Especie sólo conocida del Departamento de Francisco Morazán en Honduras; muy característica por contar sus hojas generalmente con tres folíolos, el haz de las hojas brillante y las inflorescencias péndulas.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus trifoliolus* debe considerarse como: en peligro (EN), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de endemismo estrecho, muy poco colectada, cuyo hábitat está siendo destruido.


Arbustos a arbóreos 2–4(-6) m; corteza sin fluido resinoso rojizo al corte; ramas glabras. Hojas con arillo distico en el tallo; estípulas 1–1.3 × 1–1.1 mm, anchamente ovadas, pronto caducas; peciolos 1.5–3 cm, marcadamente canaliculados; folíolos 5-foliolados, folíolos (1.7–)–3–10 × (0.8–)2–3.8(–5) cm, elípticos a anchamente elípticos, coriáceos, diminutas transulate punteados, ligeramente discoloros, la base cuneada a en ocasiones redondeada, las márgenes en las hojas maduras revolutas, el ápice obtusado a redondeado en ocasiones emarginado, el haz brillante a opaco, glabra, el envés glabro, pero papiloso, con las nervaduras rojizas; nervaduras primaria y secundarias ligeramente realizadas en el envés, nervaduras secundarias ca. 4 pares. Inflorescencias 3.5–10 cm, erectas a patentes, pauciﬂoras, pedúnculos 1.5–4 cm; floración tardía; pedúnculos florales (2–)3–7 mm, delgados; pedicelos 2–5(–7.5) mm; bractéolas 0.4–0.7 mm, ovadas, escariosas, opuestas, del 1/2 al 1/3 superior del pedicelo. Botones florales elípticos; flores 12–14 mm; cálices 3–4 mm, ciártimos en general pelítico lineal y punteado, esparcidamente canescenente sericeo a glabro, ciliolado en el margen, ligeramente lobulados, el lóbulo carinal más prominente; corola rojo-púrpura oscuro con abundantes líneas y puntos traslúcidos, la lámina del estandarte 9–12 mm de ancho, casi orbicular, ligeramente cóncava, glabra; ovario 8–9-ovulado. Legumbre 4–8 × 1.5–2.5, elíptica, oblonga a lineal-oblonga algo falcada, dehiscente sólo en el margen vexilar, aplanada, coriácea, las valvas lisas a la altura de las semillas, sin o con constrictiones entre las semillas, glabra, largamente estipitada, margen vexilar nervado, margen carinal angostamente aquillado, el ápice largamente rostrado; semillas 1 a 4 por fruto, 10–12 × 6–8 mm, color castaño a castaño oscuro.

El género *Terua* y su especie *T. vallicola* fueron descritos por Standley y Hermann en Hermann (1949); el único carácter que los autores apuntan para definir a este género es la dehisencia de la legumbre, por lo que lo colocaron en la tribu Galegeae y no en la Dalbergieae. Sin embargo dudan de su ubicación taxonómica y refieren varios caracteres florales y vegetativos que “mimetizan a Lonchocarpus”. La dehisencia de la legumbre en Lonchocarpus ya ha aparecido en varias ocasiones como en las sect. *Eriophylli* Bentham (Bentham, 1860) y sect. *Willardia* (Rose) M. Sousa (Sousa, 1992); y en la sect. *Punctata* en otras tres especies (L. caudatus, L. galeottianum Harms y L. angusticarpus). En casi todos los casos la dehisencia del fruto en Lonchocarpus se presenta solamente en el margen vexilar.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus vallicola* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie restringida a Honduras, pero que se ha colectado recientemente; su hábitat está siendo alterado.


Yucarán, A. Molina R. 602 (F, GH); drainage of Río Yeguare, A. Molina R. 4116 (GH); Vegas del Río Mata Indio entre San Francisco y Liapa, A. Molina R. 14454 (EAP); Río Leotuna, Galeras Guinope, Mpio. Guinope, M. Sousa et al. 13282 (EAP, MEXU); Las Casitas, P. Standley et al. 590 (GH); vic. of Galeras, P. Standley et al. 1991 (GH); along Río Yaguare, L. O. Williams y A. Molina R. 11532 (F, GH), 13414 (F, GH, MO).
12. *Lonchocarpus vitatus* M. Sousa, sp. nov.


Haece species a congeneris mesoamericanis ad *Lonchocar- pum sect. Punctato* pertinuitibus foliolis lanceolato-ellipticis infra trichomatibus canescentibus sparse minuteque sericeis, inflorantia longa, leguminex indehiscente cartaceo margine vexillari alato atque seminibus castaneis vittis maculisque irregularibus atrubrunneis notatis distinguetur.

Árboles (5–)8–20 m; corteza sin fluido resinoso rojizo al corte; ramas casi glabras. Hojas con arrollamiento distico en el tallo; estípulas ca. 1.2 × 1 mm, anchamente triangulares, pronto caducas; peciolo 2.7–5 cm, canaliculado y acostilado; hojas (9)11– a 13(15)-folioladas foliolos 4–7 × 2.3–2.8 cm, elíptico-lanceolados, cartáceos a subcoriáceos, películo punteados, ligeramente discolores, la base ligeramente oblicua, cuneada a redondeada, los márgenes ligeramente ondulados, el ápice acuminado a subacumulado, el haz ligeramente brillante, casi glabro, el envés esparcidamente dimimamente canescente sericeo, papiloso; nerveduras primaria y secundarias ligeramente realizadas en el envés, nerveduras secundarias hasta 5 pares. Inflorescencias (5–)8–10–21 cm, erectas, densíferas, particularmente en el 1/2 al ápice, pedunculadas, los pedúnculos 2.5–5.5 cm; floración tardía; pedúnculos florales 1.3–4 mm, delgados; pedicelos 3.5–5 mm, delgados; bractéolas 0.6–0.8 mm, oblongas a ovadas, esparcidamente ovadas, opuestas a subsolapadas, generalmente en el 1/3 superior del pedicelo. Botones florales angostamente elíptoidales. Flores (9–)10–12–13 mm; cálice 3–3.5 mm, ciátiforme, densamente películo linear-punteado, casi glabro a muy esparcidamente pardo-amarillento sericeo, cilindrado en el margen, ligeramente lobulado, el lóbulo carinal más prominente; corola lilá a rosada con esparcidas líneas y puntos translúcidos, la lámima del estandarte 9–12 mm de ancho, obovada, ligeramente concava, casi glabra a esparcidamente canescente sericea, sobre las nerveduras centrales más densamente en la base adaxialmente, esparcidamente en la base abaxialmente; ovario 7– a 8-ovulado. Legumbre 6–7 cm de largo cuando 1 semilla, 9–10.5 cm cuando 2 a 3 semillas, 2.4–2.7 cm de ancho, elíptica a oblonga, indehiscente, aplanada, cartácea, algo resinosa, marcadamente constricta entre las semillas sobre los márgenes, las valvas lisas, glabras, atenuadas en la base, margen vexilar alado, el ala hasta 1.3 mm de ancho, el margen carinal angostamente acuillado, el ápice rostroso, en ocasiones obtuso; semillas 1 a 3(5) por fruto, 1.4–1.7 × 0.8–0.9 mm, color castaño con bandas y manchas irregulares de castaño más oscuro. Plántulas con los cotiledones espigados; cófolos opuestos, 1-foliolados, la 1ª hoja alterna 3-foliolada.

**Distribución y hábitat.** Esta especie se encuentra en las estribaciones del Eje Volcánico Transversal, hacia la vertiente del Golfo de México, en la Sierra Madre de Chiapas, y en la Cordillera Montecillos en Honduras y El Salvador; en altitudes entre 740 y 1400 m; crece en bosques caducifolios con la que la, en bosques mesofílicos de montaña, pinares y encinares, a la orilla de corrientes de agua; sobre suelos de origen volcánico, sedimentario y metamórfico.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus vitatus* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, pero habita en vegetación que está fuertemente sujeta a alteración y destrucción.

**Fenología.** Esta especie florece en México de mediados de agosto a finales de septiembre, en El Salvador y Honduras de fines de abril principios de junio, fructifica a principios de marzo.

**Etimología.** El epíteto hace referencia a las bandas irregulares de tono oscuro en la testa de sus semillas.

**Nombre vulgar.** Frijolillo (*M. Sousa 4439, MEXU, Veracruz*).

**Discusión.** Especie característica por sus foliolos lanceolado-élficos, con el envés esparcidamente dimimamente canescente sericeo; la inflorano larga; la legumbre indehiscente, cartácea, el margen vexilar alado; semillas de color castaño con bandas y manchas irregulares de tono más oscuro; caracteres que la distinguen de las otras especies de la sección en Mesoamérica.

Esta especie fue sugerida como subspecie de *Lonchocarpus punctatus* por Sousa, en Palomino y Sousa (2000), pero sin la intención de ser formalizada, ni validada.


Agradecimientos. A Fernando Chiang, por traducir al latín las diagnósticas y aclarar dudas nomenclaturales; a Gloria Andrade por su apoyo en obtener información y organización del texto; a Alejandra Zaldívar por incorporar las descripciones para la Flora Mesoamericana; a Ramiro Cruz, Elvia Esparza y Alvino Luna por sus inmejorables ilustraciones botánicas; a Victoria C. Hollowell, editora científica...
de Novon, la cual realizó un minucioso trabajo; a los tres revisores, uno anónimo, a Ana María Azvedo-Tozzi y Roy Gereau, quienes proporcionaron sugerencias que mejoraron el manuscrito; y a los curadores de los siguientes herbarios por facilitar el material de estudio: A, B, BM, BR, CAS, CICY, CR, DS, EAP, Ecosur (San Cristóbal de las Casas, Chiapas), ENCB, F, GH, HAL, IBUG, INIF, K, LE, LL, M, MA, MEXU, MICH, MO, NA, NY, OAX, P, TEFH, UC, US, USCG y XAL.

Literatura Citada
Actinocephalus koernickeanus, a New Species of Eriocaulaceae from Minas Gerais, Brazil

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ABSTRACT. We describe and illustrate the new species Actinocephalus koernickeanus Trovó & F. N. Costa (Eriocaulaceae, Paeplanthoidae) from the Espinhaço Range in Minas Gerais, Brazil, and compare it with the morphologically similar species, Paeplanthus actinocephaloides Silveira and P. barbiger Silveira, both from Espinhaço Range.

RESUMO. Descrevemos e ilustramos a nova espécie Actinocephalus koernickeanus Trovó & F. N. Costa (Eriocaulaceae, Paeplanthoidae) ocorrente na Cadeia do Espinhaço, em Minas Gerais, Brasil, e a comparamos com as espécies de morfologia mais similar: Paeplanthus actinocephaloides Silveira e P. barbiger Silveira, ambas ocorrentes na Cadeia do Espinhaço.

Key words: Actinocephalus, Brazil, Eriocaulaceae, Espinhaço Range, IUCN Red List, Minas Gerais.

Eriocaulaceae are one of the most representative families from Brazilian rocky outcrops, comprising two subfamilies (Eriocauloideae and Paeplanthoidae) with 11 genera and approximately 1200 species. These species are mainly distributed in the mountains of the Espinhaço Range, with a secondary center of diversity in the mountains of Venezuela. In Brazil, the principal habitats occupied by these species occur in the montane rocky outcrops and montane grasslands from Minas Gerais and Bahia, but the taxa are also found in cerrado areas, especially in the states of Goiás, Mato Grosso, and São Paulo (Giulietti & Hansold, 1990; Hansold, 1991; Stüzel, 1998).

In his treatment of the family for Flora Brasiliensis, Körnicke (1863) described Paeplanthus subgen. Actinocephalus Körnicke, comprising 21 species characterized by inflorescences with an umbellate arrangement of the capitula. Ruhland (1903) reduced this to sectional rank as Paeplanthus sect. Actinocephalus (Körnicke) Ruhland, adding to the original circumscription the possession of simple stigmas in the pistillate flowers. Finally, Sano (2004) elevated Paeplanthus sect. Actinocephalus to generic status as Actinocephalus (Körnicke) Sano. In his publication, the new genus was defined as possessing paraclades that bear inflorescences arranged as an umbel of capitula and by its simple stigmas in pistillate flowers, as well as by its karyotype. Ruhland (1903) and Sano (2004) each discussed the similarity of species in Actinocephalus to certain species within Paeplanthus subsect. Aphorocaule Ruhland. As a result of revisionary studies in this group, Costa (2005) concluded that Paeplanthus subsect. Aphorocaule should be merged in Actinocephalus and redefined the group as possessing paraclades and simple stigmas in the pistillate flowers.

Actinocephalus koernickeanus Trovó & F. N. Costa, sp. nov. TYPE: Brazil. Minas Gerais: Serro, Estrada para Capivari, 6.8 km da bifurca-
ção para Diamantina, 25 Apr. 2007, M. L. O. Trovó, M. T. C. Watanabe 372 (holotype, SPF; isotypes, B, MO). Figure 1.

Hae specie a Paeplantho actinocephaioide Silveira foliorum apicibus barbatis et seapis paracladia aequantibus differt.

Perennial herbs, 25–30 cm tall; stems short, 1–2 cm. Leaves rosulate, flat, lanceolate, 2.5–4.5 × 0.3–0.6 cm, adaxial surface glabrescent, abaxial surface glabrous, apex acute, densely hairy, margins ciliate, base glabrescent. Paraclades 9–11 cm, ca. 1.5 mm diam., tomentose to glabrescent; paracladal bracts erect, lanceolate, 1.5–2 × 0.3–1.5 cm, both surfaces glabrous, apex acute, densely ciliate, margins with long trichomes, base semiamplexicaul, glabrous; spathes 1.5–3 cm, glabrous, apex acute; seapes 10 to 25 per paraclade, 9–12 cm, tomentose with simple trichomes; capitula 0.5–0.7 cm diam., hemispheric; involucral bracts light brown, elliptic, ca. 0.4 cm.
apex obtuse, ciliate; receptacle hemispheric, pubescent. Flowers 3-merous, 80 to 90 per capitulum, ca. 3× more staminate flowers in relation to pistillate flowers; floral bracts obovate, ca. 0.3 cm, hairy on dorsal surface, apex acute, ciliate; staminate flowers ca. 0.4 cm; pedicel ca. 0.1 cm, with long trichomes; sepals obovate, ca. 0.4 cm, hairy in dorsal surface, apex acute, ciliate; corolla tubular, membranous,
hyaline, ca. 1.5 mm, 3-lobed; stamens ca. 0.2 cm; pistillodes 3, papillose; pistillate flowers ca. 0.3 cm, sessile; sepals obvate, ca. 0.3 cm, hairy on dorsal surface, apex acute, ciliolate; petals obvate, ca. 0.2 cm, hairy on dorsal surface, apex acute, ciliolate; gynoecium ca. 0.2 cm, stigmatic portions filiform, twice as long as nectariferous portion; staminodes 3, scalelike. Fruit a loculicidal capsule.

Habitat and distribution. Actinocephalus koerniceanus occurs in the Espinhaço Range, in the state of Minas Gerais, near the city of Serrão, along the road to Capivari, at approximately 1800 m altitude. The vegetation at the type locality is predominantly montane grassland, and the soil of the region is rocky.

IUCN Red List category. The species is known only from a single collection from a single population, with individuals occurring relatively far from each other. According to IUCN Red List criteria (IUCN, 2001), the species should be considered Critically Endangered (CR B1a).

Etymology. The epithet koerniceanus honors the German botanist Friedrich August Körnicke (1828–1908), who developed the greater part of the basis for the modern study of Paepalanthus Martius and, consequently, Actinocephalus, in his brilliant Eriocephaloideae monograph for the Flora Brasiliensis.

Discussion. Actinocephalus koerniceanus is affiliated with species affiliated within Paepalanthus subsect. Aphrocalon. However, this subsection should be merged in Actinocephalus (Costa, 2005). Thus, we describe this species within Actinocephalus due to its paraclades bearing scapes and its simple stigmas. This genus now comprises 32 species occurring in Brazil.

Two species that are morphologically similar to Actinocephalus koerniceanus belong to Paepalanthus subsect. Aphrocalon. Paepalanthus actinocephaloides is probably sympatric with A. koerniceanus but can be distinguished mainly by its scapes that are shorter than the paraclades and its leaves with a glabrous apex. Another similar species is P. barbiger Silveira, which is restricted to Morro do Breu (Serra do Cipó, Minas Gerais). It differs from A. koerniceanus mainly in the size of its paraclades and scapes, and by the scapes with T-shaped trichomes. More detailed morphological comparisons of these three species are given in Table 1.

Acknowledgments. We thank Paulo Takeo Sano (USP) for help with the Latin diagnosis, Mauricio Watanabe (USP) for assistance during fieldwork, Klécio Sousa for the illustrations, Thomas Stützel and Victoria C. Hollowell for editorial comments that improved the manuscript, and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and the International Association for Plant Taxonomy for financial support.

Literature Cited


Stylosanthes rostrata (Leguminosae), a New Combination from Argentina and Uruguay

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ABSTRACT. As part of the revision of the genus Stylosanthes Swartz (Leguminosae) from South America, material from Corrientes, Argentina, described by Burkart as S. gracilis Kunth var. rostrata Burkart, is recognized at species rank as S. rostrata (Burkart) Vanni.

RESUMEN. Durante la revisión del género Stylosanthes Swartz (Leguminosae) para Sudamérica, el material de Corrientes, Argentina, descrito por Burkart como S. gracilis Kunth var. rostrata Burkart, es considerado una especie diferente S. rostrata (Burkart) Vanni.

Key words: Argentina, Leguminosae, Stylosanthes, Uruguay.

Stylosanthes gracilis Kunth was broadly interpreted by Burkart (1939) and included four varieties under the name, one of which was S. gracilis var. rostrata Burkart. The name S. gracilis var. rostrata was later considered by Mohlenbrock (1957) as a synonym of S. montevidensis Vogel, but he did not study type material of Burkart’s variety or of S. montevidensis. The species was recently considered under the synonymy of S. guianensis (Aublet) Swartz var. gracilis (Kunth) Vogel.

Stylosanthes rostrata occurs in northeastern Argentina and Uruguay and is sympatric with S. hippocampoides Mohlenbrock and S. montevidensis. These three species maintain their particular characteristics within the same distributional area. Stylosanthes hippocampoides and S. montevidensis have a broader distributional range, occurring from southern Brazil and south into Paraguay, Uruguay, and Argentina.


Plants perennial, branches prostrate to suberect, with setae and hair incurved, white, short. Leaves trifoliolate; stipules 11 mm, connate to the base or foliate, free in the upper half and then subulate, with setae and scattered curved trichomes; petioles 5–6 mm; leaflets 12–15 × 2–3 mm, narrowly elliptic, mucronate, apic Dyese setose; the lateral ones asymmetric, with the longest terminal; hypophyllus with scattered weak trichomes, evident, with white veins, with dense setae along the nerves, margins jagged with mucronate teeth; epiphyllyum with setae. Inflorescences terminal or subterminal, in dense spikes, with up to 8 flowers; bracts similar to stipules, with central lamina ca. 3 mm, bracteoles 2, hyaline at flower bases. Flowers yellow. Fruit with a single article, ca. 6 × 3 mm, the lower article rarely developed, with evident longitudinal veins, glabrous, a few thick hairs on the open beak, ca. 1.5 mm, with a slight apical bend.

Distribution and habitat. Stylosanthes rostrata is found in northeastern Argentina (Corrientes) and in Uruguay in humid sandy soils.

Comments. Stylosanthes rostrata is similar to S. hippocampoides, differing mainly in the article beak of the fruit, which is more incurved in S. hippocampoides. Stylosanthes rostrata differs from S. montevidensis in the latter species having plants of juncoed aspect, with fewer leaves, and fruit with a strongly uncinate beak with yellowish hairs in the concavity.

Additional specimens examined. URUGUAY. Colonia: Riauchuelo, Feb. 1930, Herter 85362 (M, NY); La Colonia (rio de la Plata), Feb. 1918, L. Hauman s.n. (BR).

Acknowledgments. Thanks are due to Ernestina Galeano for suggestions that improved the manuscript.

Literature Cited

Figure 1. *Stylosanthes rostrata* (Burkart) Vanni. —A. Branch. —B. Inflorescence. —C. Fruit. Drawn from the holotype, Spogazini & Girola 54 (SI).
Petrocosmea xingyiensis (Gesneriaceae), a New Species from
Guizhou, China

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Key words: China, Gesneriaceae, Guizhou, IUCN Red List, Petrocosmea.

Petrocosmea Oliver (Gesneriaceae) was established in 1887 and is comprised of 27 species (Li & Wang, 2004), 24 of which are found in China (Wang et al., 1990, 1998). These plants are characterized as perennial, terrestrial or epipetrie, and stemless (Li & Wang, 2004). The inflorescences are usually lax, rarely in subhulls, with corollas that are blue to purple or white, and zygomorphic. The new species is distinctive in its narrowly oblanceolate leaves that are pubescent on both surfaces, which differs from the possibly related P. grandiflora Hemsley.

Petrocosmea xingyiensis Y. G. Wei & F. Wen, sp. nov. TYPE: China. Guizhou: Xingyi, Maling Gorge, 10 Sep. 2006, F. Wen 06101 (holotype, IBK), Figure 1.

Haece species Petrocosmea grandiflora Hemsley affinis, sed ab ea foliis anguste oblanceolatis utrinque pubescentibus differt.

Perennial herb, rosettes, with short rhizome and crowded fibrous roots. Leaves 16 to 30, all basal, crowded, the inner leaves with petiole short or absent, the outer leaves with longer petiole; leaf blades papery when dry, narrowly oblanceolate, 0.3–3 × 0.2–0.7 cm, apex obtuse, base cuneate, margin entire, pubescent on both surfaces, lateral veins 2 to 3 on each side, not distinct; petioles 0.6–2.5 cm, densely pubescent. Cymes 2 to 3, 1-flowered; peduncle 3–4.4 cm, pubescent; bracts 2 or 3 at mid-peduncle, ovate, 1–2 mm, pubescent; sepals 5, triangular to ovate, ca. 4 × 2 mm, pubescent externally; corolla blue, sparsely pubescent externally; corolla tube ca. 7 mm, lobes ovate to rounded, adaxial lip ca. 6 × 6 mm, bi-lobed to basal 1/7, abaxial lip ca. 8 × 8 mm, tri-lobed to basal 1/2; stamens 2, ca. 5 mm; filaments adnate to ca. 1 mm above base of corolla tube, ca. 4 mm long, pubescent; anthers ovate, ca. 3 mm, glabrous; staminodes 2, adnate to ca. 1 mm above base of corolla tube, ca. 2 mm long, glabrous; pistil ca. 8 mm; ovary pubescent; style pubescent, ca. 6 mm.

Habitat and distribution. Petrocosmea xingyiensis is known from cliffs of limestone rock or along the Qingshuihe River, at 930–1000 m elevation in Maling Gorge, Xingyi County, Guizhou Province, in southwestern China.

IUCN Red List category. The new species is assessed as Critically Endangered (CR A2c) according to IUCN Red List criteria (IUCN, 2001). Approximately 330 individuals were found in three separate, restricted localities in the gorge: 10 individuals growing in the first locality of ca. 1 × 1 m², 20 individuals in the second locality of ca. 2 × 2 m², and ca. 300 individuals in the third locality of ca. 10 × 10 m². There is a path connecting and adjacent to the three localities, which many tourists access daily and which represents the principal threat to the plants.

Phenology. Petrocosmea xingyiensis has been collected in flower in September–October; fruits not seen.

Discussion. Based on floral structure, notably the anthers that are not constricted, the actinomorphic calyx divided in five segments, the upper lip ca. one half the length of the lower lip, and the inconspicuously two-lobed upper lip that is slightly concave, Petrocosmea xingyiensis belongs to sect. Anisochilus ser. Iodioides. The new species is related to P. grandiflora, but differs in several characters (Table 1).


Acknowledgments. We are grateful to Li Zhen-yu, Institute of Botany (CAS), for providing important comments on an earlier version of the manuscript; to Wang Wen-tsai (CAS) for correcting the description; and to He Sun-qing for preparing the illustration.

Literature Cited


Table 1. Diagnostic characters of Petrocosmea xingyiensis and P. grandiflora.

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<th>Petrocosmea xingyiensis</th>
<th>Petrocosmea grandiflora</th>
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<tbody>
<tr>
<td>Leaves</td>
<td>narrowly oblanceolate, pubescent on both surfaces</td>
<td>elliptic or lanceolate to broadly ovate, adaxially sericeous, abaxially sparsely sericeous</td>
</tr>
<tr>
<td>Corolla</td>
<td>adaxial lip ca. 0.6 cm, bi-lobed to basal 1/7</td>
<td>adaxial lip ca. 0.9–1 cm, bi-lobed to basal 1/3–1/2</td>
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Kengyilia zadoiensis, a New Species (Gramineae, Triticeae) from Qinghai, China

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ABSTRACT. Kengyilia zadoiensis S. L. Lu & Y. H. Wu, a new species of Gramineae from Zadoi County, Qinghai Province, China, is described and illustrated. The new species is related to K. kokonorica (Keng ex Keng & S. L. Chen) J. L. Yang, C. Yen & B. R. Baum. Kengyilia zadoiensis is distinguished by auricles on either side of the summit of leaf sheaths, glabrous glumes, muticous glumes that lack awns, lemmas that are 7–9 mm long, with an awn 4–10 mm, and anthers that are yellow-green, ca. 1 mm long.

Key words: China, Gramineae, IUCN Red List, Kengyilia, Qinghai, Triticeae.

During July and August 2005, while on an expedition to Lancang Jiang, numerous specimens of Gramineae were collected from Zadoi County, Qinghai Province, China. These specimens were all identified from the literature, and new species were discovered, including the new species for Kengyilia C. Yen & J. L. Yang described here.

1. Kengyilia zadoiensis S. L. Lu & Y. H. Wu, sp. nov. TYPE: China. Qinghai: Zadoi Co., Angsai, NW valley, in meadow by alpine forest & shrub, 4200 m, 10 July 2005, Wu Yu-hu 33208 (holotype, HNWP; isotype, HNWP). Figure 1.

Species nova affinis Kengyilia kokonoricae (Keng ex Keng & S. L. Chen) J. L. Yang, C. Yen & B. R. Baum, sed ab ea vagina foliari auriculis lanceolatis 1–1.5 mm longis apice praedita, glumis glabris apice acuminatis muticis, lemmaibus 7–9 mm longis apice in aristam 4–10 mm longum desinentibus atque antheris flavovirentibus ca. 1 mm longis differt.

Perennial herb; culms erect, usually solitary, geniculate at base, 50–75 cm, glabrous, with pubescence on lower half of spike only, 3- to 4-noded, nodes black, upper internode only to 1/3 culm length. Leaf sheaths smooth, glabrous, shorter than internodes, with 2 lanceolate auricles at sheath apex, 1–1.5 mm; ligule ca. 0.5 mm, glabrous; leaf blades on culms erect, sometimes complanate or involute, glabrous on both surfaces, 7–10 × 2–3 mm, basal leaves to 20 cm. Spikes crowded, erect or slightly decurved, 7–10 cm; rachis internodes 3–5 mm, ca. 9 mm at base, densely pubescent. Spikelets sessile, with 4 to 8 florets, imbricate, often secund, 7–12 mm, excluding awn, ashy green or fulvous; glumes broadly lanceolate, glabrous, 3-nerved, apex acuminate, muticous, with a micro 0.5–1 mm, without awn, with broad membranous margins, with only faint lateral nerves; proximal glumes ca. 4 mm, distal glumes ca. 5 mm; lemmas oblong to lanceolate, densely hispid, apicn awned, with awn 4–10 mm, scabrous, erect or slightly recurved; callus pubescent; first lemmas 7–9 mm, paleas nearly subequal to lemmas, ciliate along 2 keels, but otherwise glabrous; anthers yellow-green, ca. 1 mm. Only immature carpyoses seen.

Habitat and distribution. Kengyilia zadoiensis is endemic to China. The type specimen was collected in a meadow valley near alpine forest and shrub, at an elevation of 4200 m, in a valley northwest of Angsai village, Zadoi County, Qinghai Province, China.

IUCN Red List category. Kengyilia zadoiensis should be considered Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001). The new species has a very small range and limited population size; fewer than 10 plants were seen in this population during the collection expedition. Furthermore, habitat destruction represents a significant threat in China, and no protection is currently established in the type locality.

Phenology. The new species was collected in flower in July.

Etymology. Kengyilia zadoiensis is named for the type locality in Zadoi County, Qinghai Province, China.

Discussion. The new species is related to Kengyilia kokonorica, and both taxa occur in similar habitat and geographic areas. However, K. zadoiensis is distinguished by auricles on either side of the summit of leaf sheaths, glabrous glumes, muticous glumes that lack awns, lemmas that are 7–9 mm long, with an awn 4–10 mm, and anthers that are yellow-green, ca. 1 mm long (Keng, 1959; Yang & Wang, 1987; Cai, 1997, 1999; Wu & Wang, 1999; Chen & Zhu, 2006).

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Literature Cited
A New Genus of Holoparasitic Orobanchaceae from Mexico

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ABSTRACT. We describe here a novel achlorophyllous parasite on the roots of Hedysosnum mexicanum C. Cordeiro (Chloranthaceae) as a new genus and species, Eremitilla mexicana Yatskievych & J. L. Contreras. The new taxon is currently thought to be endemic to the state of Guerrero, Mexico. It is best classified in the Orobanchaceae, but differs from other members of the family in having 5-ribbed, muricate ovaries containing five parietal placentae, as well as unusual stamens in which the anther is partially embedded in an expanded filament apex. Within the Orobanchaceae, the new taxon is probably related to a group that contains the other American holoparasitic genera. Morphologically, Eremitilla Yatskievych & J. L. Contreras displays a number of autapomorphies, but few identifiable synapomorphies. This presumed relicual taxon presently is known only from a restricted habitat and a very small geographic range, and thus is of conservation concern.

Key words: Chloranthaceae, Eremitilla, Guerrero, Hedysosnum, IUCN Red List, Mexico, Orobanchaceae, parasitic plant.

In June 1985, during fieldwork in Guerrero, Mexico, New York Botanical Garden Curator Wayt Thomas stumbled upon a single inflorescence of an unusual achlorophyllous plant. He pressed a specimen and later sent this to Lawrence Heckard at the University of California, a specialist on the taxonomy of the parasitic plant family, Orobanchaceae. The late Dr. Heckard could not place the specimen; he concluded that the plant probably was not a member of the Orobanchaceae and suggested instead that it might represent an unnamed member of the mycoheterotrophic Monotropaceae (now considered a subfamily of the Ericaceae). For the next two decades, the specimen remained an undetermined entry in Dr. Thomas’s field notebook.

In 2005, Thomas showed a photograph of the plant to Gerald Schneeweis of the University of Vienna, who has been conducting molecular phylogenetic studies of the Orobanchaceae. Through the courtesy of Schneeweis, the specimen eventually found its way to Yatskievych’s attention. The senior author has been collaborating with L. Turner Collins (Evangel University) and Alison Colwell (U.S. National Park Service) on taxonomic studies and a floristic treatment of the holoparasitic genera of Orobanchaceae for the Flora of North America Project. The present study is an extension of that research.

It quickly became clear that regardless of its familial placement the original specimen represented an undescribed taxon. However, the material available at the start of the research was insufficient to allow a detailed morphological analysis without doing significant damage to the only specimen, and the lack of the basal portion of the original plant precluded a determination of whether the taxon had a parasitic or mycotrophic habit. As a young graduate student at the Universidad Nacional Autónoma de México (UNAM), the junior author accompanied Wayt Thomas on his 1985 botanical expedition and has continued to pursue floristic studies in the mountains of Guerrero. His experience with the flora and geography of the region gave hope that living material of this unusual plant might be rediscovered in the wild for further study.

Following unsuccessful searches for additional specimens in pertinent herbaria in the United States and Mexico, fieldwork was conducted in the region of the historical collection in Guerrero, Mexico, during June 2006 and July 2007 to locate and document plants in flower and fruit. Descriptions of the sites were compiled, including lists of the most significant components of the vegetation. Excavations were made to confirm the identity of the hosts (and to document the below-ground portions of the parasites), but because of the relatively small numbers of parasites present, only one host root was excised and collected. Both in situ and excavated material of the parasite and
host were documented by digital photography andvoucher specimens.

Pollen samples were mounted in glycerol for examination by light microscopy. Pollen samples for scanning electron microscopy (SEM) were acetolyzed for 8 minutes at 90°C using standard techniques (Erdtman, 1960), then dehydrated in an ethanol series and critical point-dried. Both pollen and seeds (the latter air-dried, unpreserved) were sputter-coated with gold-palladium and viewed on a Hitachi S-260H scanning electron microscope (Hitachi, Tokyo, Japan). Leaf surfaces (to check for stomates) were viewed directly under a compound microscope from epidermal peels of liquid-fixed material and also from dried material using the cellulose acetate cast technique of Payne (1968).

**Eremitilla mexicana** Yatskievych & J. L. Contreras, gen. et sp. nov. TYPE: Mexico. Guerrero. Mpio. del Rio, km 91 of Mexico Hwy 95 Libre (N of Zumpango del Rio) 2.8 km W of village of Tiquimil on dirt rd. heading W across the Sierra Madre del Sur to Puerto de Gallo, in rocky, steep-walled ravine with small permanent stream crossing rd., 17°31′27.1″N, 99°57′01.3″W, 1955 m, 12 June 2006, G. Yatskievych & J. L. Contreras J. 06-43 (holotype, MEXU; isotype, MO). Figures 1–3.

Genus novum et species nova, solitaria apud species Orobancheaeae auris valde quinquangularis, verrucosis, unilocularibus, placentis quinque parietalibus.

Perennial root parasites, achlorophyllous; not producing roots, forming amorphous, swollen, somewhat flattened vegetative bodies laterally along host roots; these bearing current year’s stems and black, senescent bases of previous year’s stems; stems solitary or in clusters of 2 to several from each vegetative body, 15–45 cm, unbranched, succulent, geniculate basally, where 6–12 mm diam., ascending irregularly to at or just above the soil surface, where 16–25 mm diam., ± cylindrical (with irregularly thinner and thicker portions), yellow externally and internally, quickly oxidizing to brown when damaged. Leaves squamiform, densely spirally imbricate, those near the stem base 4–6 × 5–8 mm, broadly oblong to depressed-ovate, rounded to broadly angled at the tip; grading quickly into those of the main stem, these 10–22 × 7–14 mm, angled to a bluntly or sharply pointed tip; all leaves glabrous, finely longitudinally striate, with erose margins, the basalmost dark brown, the main cauline leaves yellow, but those in a distal hand 1.5–6.5 cm somewhat sclerified, blackish, shiny. Inflorescences solitary, stout, terminal spikes, hemispheric to ovoid, the flowers densely spirally imbricate; bract 1 per flower, 21–28 × 14–18 mm, ovate to elliptic above a short, broad, stalklike base, the laminar portion somewhat concave (cupped around the flower), angled or slightly acuminate to a usually sharply pointed tip, the margins strongly erose, adaxially glabrous and reddish brown to reddish purple above the yellow base, abaxially densely vesicular-hairy (described under corolla) and blackened toward the tip, sometimes with the thinner margins brownish yellow; bracteoles usually present, usually 2, ± aligned with lateral sepals, 14–21 × 7–12 mm, narrowly elliptic to narrowly rhombic above a broad stalklike base, curved or bent medially, otherwise similar to the bracts. Calyces ± actinomorph, of (4)5 sepals, these 18–25 × 9–15 mm, attached separately on the corolla tube near its base, persistent, the stalklike proximal portion slightly shorter than to about as long as the laminar portion, this ovate, concave and curved or bent medially (cupped around and loosely appressed to the corolla), angled to a bluntly or sharply pointed tip, the margins strongly erose, reddish brown to reddish purple above the yellow to pale yellow base, the thinner margins brownish yellow, adaxially glabrous, abaxially densely vesicular-hairy (described under corolla); corolla aestivation coelolate-imbricate (the upper corolla lobe exterior in the bud); corollas zygomorphic, 4-lobed (by almost complete fusion of the 2 upper lobes of a 5-merous corolla), overall 24–28 mm and somewhat arcuate, persistent and becoming papery at fruiting; the tube 10–13 mm long and wide, glabrous, mostly cream-colored to pale yellow, abruptly constricted distally on the ventral side above the ovary, reexpanded to 14–17 mm diam. in the throat (here defined as the expanded, tubular portion above the constriction and below the lobes), this 2–4 mm long, the throat and lobes mostly dark red externally in proximal portion, grading into reddish brown distally, densely pubescent externally with dull yellow to yellowish orange, vesicular hairs 0.3–0.5 mm, small groups of these sometimes cohering basally into short linear clusters; the lobes 10–13 mm, slightly overlapping laterally at anthesis, strongly erose and yellowish-hyaline along the margins, the upper lobe twice as wide as the others, shallowly cuneate, very broadly oblong, shallowly notched along the otherwise ± truncate tip, the lateral lobes and lower lobe depressed-ovate to broadly oblong-ovate, shallowly concave (appearing slightly incurved); stamens 4, not exserted, the filaments free, inserted at the ovary base, 14–18 mm, equal in length or those of the anterior pair slightly longer than those of the posterior pair, relatively stout, not flattened, glabrous, white to cream-colored, ascending along the sinuses of the ovary, curved and somewhat connivent.
Figure 1. *Eremitilla mexicana* Yatskievych & J. L. Contreras. —A. Habit, including portion of host root. —B. Inflorescence and upper stem. —C. Flower, frontal view, with sepals and bract spread to facilitate observation of corolla. —D. Flower, lateral view; bl, bracteole (distal portion removed to avoid obscuring perianth); br, bract; c, corolla; s, sepal. —E. Corolla, lateral view. —F. Vesicular trichomes. —G. Stamens, lateral and ventral view of anthers and filament tips. —H. Flower with bract, bracteoles, and perianth removed to expose stamens and pistil. —I. Fruit. —J. Cross section of ovary showing placentae. A–H, I, drawn from Yatskievych & Contreras J. 06-43 (MEXU, MO); I, drawn from Yatskievych, Olson & Trejo H. 07-106 (MEXU, MO, NY).
distally under the upper corolla lobe, expanded abruptly apically, the anthers attached dorsally, but appearing partially embedded in the expanded tip, 4.0–4.9 mm long, glabrous, pale yellow grading to yellow, dithecate, the thecae ± parallel, narrowly oblong-reniform, each dehiscing on the ventral side by a longitudinal slit (the slits ventral rather than lateral), often with a narrow line of dark reddish purple along the slit; pollen sticky, the grains shed as monads or irregularly coherent, globose or nearly so, yellow, 26–30 μm diam. pantoporate with 4 equatorial and 2 polar, equidistant pores, the exine surface foveolate and slightly rugulate with scattered microporations; pistil 1, apparently of 5 fused carpels, the ovary ovoid, 12–15 mm long, strongly 5-angled with slightly concave sinuses and rounded ribs (appearing fluted), the surface muricate, otherwise glabrous, pale yellow, short-tapered apically into the solitary style, this 5–8 mm long, not exerted, strongly arcuate under the upper corolla lobe, hollow, ± persistent (the apex sometimes breaking off irregularly) at fruiting, white proximally, grading abruptly into dark red or dark reddish purple distally, the stigma 1, discoid-crateriform, 2.0–2.5 mm diam., ± circular (sometimes slightly irregular or very slightly 5-lobed), dull yellow, with a minute, ± 5-lobed, central pore; locule 1, with 5 massive placentae intrusive from the sinus portions of the ovary wall, these irregularly 2- or 3-lobed, the ovules numerous, minute, white. Fruits capsular, but essentially indehiscent (decaying in situ), overall 16–20 mm, the body ovoid, tapered to an irregular, short beak, plump (not concave between the ribs), strongly 5-ribbed, the surface muricate, reddish-tinged to reddish brown at maturity, becoming dark brown to black with age; seeds numerous, 0.4–0.9 mm, irregularly ellipsoid to obovoid, reddish brown with dark brown ridges, the surface appearing reticulate (by enlarged cells of outer testa whose outer walls rupture at maturity), the pits irregularly polygonal.

**Phenology.** *Eremitilla mexicana* flowers during June and July.

**Etymology.** From the Latin, *Eremitilla mexicana* translates literally to “little hermit of Mexico,” an allusion to the plant’s secretive habit and limited occurrence.

**Distribution.** Based on current knowledge, this species is endemic to the inland slope of the Sierra Madre del Sur in Guerrero, Mexico, at elevations of 1800–2000 m.

**Habitat.** The mostly unpaved road along the inland side of the Sierra Madre del Sur in the Mexican state of Guerrero climbs gradually from ca. 500 m near its eastern terminus at the junction with Federal Highway 95 north of Chilpancingo to a maximum elevation of ca. 3200 m to the east of Puerto Gallo. The linear distance between these points is only about 75 air km, but the road requires more than 140 km to span this distance. Along the route, it passes through several vegetation zones. The lowest elevations are a dry, deciduous woodland dominated by various Fabaceae and Cactaceae (a matrix of matorral xerófilo and bosque tropical caducifolio,
Figure 3. *Eremitia mexicana* Yatskievych & J. L. Contreras. —A. Type locality, bottom of mesic ravine. —B. Inflorescence. —C. Forest floor, showing inflorescence in situ (to left of center). —D. Detail of infructescence. —E. Close-up of flowers, showing orientation of perianth, androecium, and gynoecium. —F. Section of host root with two separate infections; note that current year's flowering stems have been removed from left-hand infection (see interpretive drawing in Fig. 1A). —G. Stem detail, showing appressed squamiform leaves. (B, C, E–G from Yatskievych & Contreras J. 06-43 [type], D from Yatskievych et al. 07-106.)
senu Rzedowski, 1981). The highest elevations support a mixed conifer-evergreen hardwood montane forest dominated by Pinus L., Abies Miller, Quercus L., and various other hardwoods, with many Ericaceae in the understory and a thick layer of mosses on the ground. Substrates are mostly of igneous and volcanic origin, except for an unusual area of weathered, dissected limestone near the village of Yextla.

Despite extensive searches in suitable habitat during two field seasons, only two populations of *Eremitilla* were discovered, each with fewer than 20 inflorescences. The apparent site of the initial 1985 discovery had suffered the effects of a fire that killed most of the primary woody vegetation and was in an early stage of recovery; no plants of the new taxon were present. Conversations with local villagers led us to believe that additional plants exist in more remote parts of the area, but the rugged terrain and lack of roads and trails precluded further searches during the time available for our work.

The two sites where we were able to study the new taxon are about 1 km apart and about 90 km from the eastern end of the road. At this intermediate elevation of ca. 1800–2000 m, the main vegetation consists of pine-oak forests. Dissecting this landscape is a network of steep-walled, rocky ravines, most of which have small springs feeding into streams that are the primary sources of water for local villages and farms. The steep walls and permanent flow in these headwater drainages provide a permanently moist, humid microenvironment that supports a diversity of tropical hardwoods (some of these trees to more than 20 m tall) and herbaceous plants (Fig. 3A). The transition between this restricted habitat and the surrounding seasonally dry forests usually is very abrupt.


Both of the localities from which *Eremitilla* was documented have sustained minor impacts. These include the construction of the dirt road (and associated bank stabilization) across the ravine, diversion by pipe of a portion of the water in the streams, and selective timber removal. Many of the other drainages along the road have sustained more significant impacts from timber harvesting, fire, livestock, and colonization by early-successional plant species, such as *Pteridium* Gleditsch ex Scopoli and *Rabus* L., including the presumed site of the original discovery of the parasite.

**IUCN Red List category.** As an apparently localized endemic, *Eremitilla mexicana* may best be considered a relictual taxon. Taxonomically isolated within the Orobanchaceae, the species probably is a relatively old one that may once have been more abundant when habitat suitable for its host plant was more continuous. Given the sporadic occurrence in the region of headwater drainages with suitable microhabitats for the host species, the parasite is likely dispersal-limited. Under such a scenario, *E. mexicana* naturally and gradually may be approaching extinction. The inland slope of the Sierra Madre del Sur in Guerrero still has abundant primary forests, but long-term logging operations in the region inevitably are taking their toll. The practice of burning cut-over areas to prevent recruitment of woody species and the conversion of many logged areas into pasturage or orchards creates additional impacts to the mesic ravines by increasing local erosion and potentially causing changes in the surface hydrology. Plant species that have a limited ecological niche are among those most vulnerable to decline as a result of habitat degradation. The observation that *E. mexicana* only flowers when attached to large lateral roots of mature trees further narrows the potential habitat for the species. It is not known whether the soil seed bank for the parasite is especially long-lived.

According to Todzia (1988), *Hedyosmum mexicanum* C. Corde moy is relatively widespread, with a range from central Mexico to Costa Rica, and occurs variably at elevations of 700–3200 m. It is the only species of *Hedyosmum* to occur in Mexico and, aside from some Caribbean species, has the most northerly distribution in the genus. Given the relatively broad distribution of *H. mexicanum* in North and Central America and its relatively great elevational range, it is surprising that *Eremitilla* has not been discovered growing in other places. Perhaps the present publi-
cation will alert collectors to be on the lookout for this unusual plant and it will be discovered elsewhere in Mexico or Central America. Certainly, it should be searched for along the inland side of the Sierra Madre del Sur in other Mexican states from Jalisco to Chiapas. The parasite is relatively easily overlooked by collectors, flowers above ground only during part of the year, and blends in with the leaf litter, thus the species probably is best considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001). However, based on the current data alone, the species would have to be classified at least as Vulnerable (VU) in that system (IUCN, 2001).

**Taxonomic relationships.** The parasitic habit of *Eremitilla mexicana* precludes its classification among the mycoherotrophic members of the Ericaceae subfamily, Monotropoideae. The production of four loosely connivent stamens (vs. six to 12) per flower (Figs. 1G, H, 3E) and the small seeds with an enlarged outer testa layer (Fig. 2B) (vs. minute seeds with a very thin testa one cell layer thick) provide morphological support for this interpretation. Flowers of *Eremitilla* also lack other characters that are common (but not ubiquitous) among the monotropoid ericads (Cronquist, 1981), such as actinomorphic corollas, production of well-developed nectaries, axile placentaion, short styles, and resupinate anthers. However, it is easy to understand why the late Larry Heckard would have annotated the original specimen as possibly belonging to this group, given the distinct sepals and strongly 5-angled ovary (Fig. 1H, J).

Placement of *Eremitilla* in the Orobanchaceae is most parsimonious. Root parasitism is a synapomorphy above the basal branch in the family and a number of genera produce a well-defined vegetative body from which the flowering stems arise (Figs. 1A, 3F). The flowers of *Eremitilla* are similar to those of most Orobanchaceae in their basically 5-merous perianth with a zygomorphic corolla (Figs. 1C, 3E), as well as an androecium of four stamens (Figs. 1H, 3E) and an ovary with parietal placentaion (Fig. 1J). The inflorescences of *Eremitilla* bear a strong resemblance to those of some genera of Orobanchaceae, both in terms of their organization and in the production of bracts and bracteoles. The seeds of *Eremitilla* also are of a type common in the Orobanchaceae (the so-called deeply reticulate type of Musselman & Mann, 1976) in having the testa with an outer layer of enlarged polygonal cells whose outer walls tend to rupture as the seed reaches maturity, leaving a highly sculptured series of reticulate ridges with deep intervening pits of characteristic morphology (Fig. 2B).

However, *Eremitilla* possesses several autopomorphic morphological characters that are discordant in the Orobanchaceae and require adjustments to the morphological circumscription of the family. Foremost among these, the 5-ribbed ovary and fruit (Figs. 1H, I, 3D) are not known in the family, which normally has a more or less terete gyroecial cross section with at most slight ridging along the septa. Species of Orobanchaceae have a 2(3)-carpellate pistil that has two(three) or four (by deep lobing), usually intrusive, parietal placentaion (Cronquist, 1981), whereas in *Eremitilla* there are five intrusive placentaion presumably derived from five carpels (Fig. 1J). The alternative hypothesis that the ovary of *Eremitilla* arose through modification (by lobing of intrusive placentaion) of a 2-carpellate pistil is plausible, but would require a much more complicated series of structural and developmental changes to have occurred. The 2-carpellate character state in most Orobanchaceae is correlated with the production of 2- or 4-lobed stigmas or of more or less unlobed, crateriform stigmas, whereas the crateriform stigmas in *Eremitilla* have a more or less 5-lobed central pore (Fig. 1H).

The stamens of *Eremitilla* also are unusual in the Orobanchaceae in having the filaments inserted at the base of the ovary and not epipetalous within the corolla tube (Fig. 1H). Anther morphology in the Orobanchaceae is variable, with various shapes and sometimes the production of appendages or spurs, but the condition of having the anthers partially embedded in the expanded filament apex (Figs. 1G, H, 3E) is not known elsewhere in the family. Pantoporate pollen (Fig. 2A), as is found in *Eremitilla*, occurs sporadically in a number of distantly related angiosperm families, but is unknown in Orobanchaceae and within the order Lamiales is characteristic only of *Plantago* L. and related genera (Plantaginaceae). Minkin and Eshbaugh (1989) found that pollen grains of *Boschniakia* C. A. Meyer ex Bongard, *Conopholis* Wallroth, *Epipagus* Nuttall, and *Orobanche* L. sect. *Gynoecaulis* Nuttall are tricolpate with various surface sculpturing. The foveolate exine surface (Fig. 2A) of *Eremitilla* is not unusual in the Orobanchaceae (Type III of Minkin & Eshbaugh, 1989).

In addition, the relatively stout, vesicular trichomes of *Eremitilla* (Figs. 1F, 3E) differ from the pubescence types present in other Orobanchaceae, which consist of slender, short trichomes that often are gland-tipped. Vegetatively, the lack of stomates on the scale leaves separates *Eremitilla* from most other genera of Orobanchaceae (Linsbauer & Ziegenspeck, 1943).

If one accepts *Eremitilla* as an unusual member of the Orobanchaceae, then the construction of hypotheses about relationships with other genera in that family is difficult. Previous molecular studies using the plastid markers *matK* (Young et al., 1999; Young
& dePamphlis, 2005), rbcL (Wolfe & dePamphlis, 1998; Young & dePamphlis, 2005), and rps2 (dePamphlis et al., 1997; Young et al., 1999; Young & dePamphlis, 2005) have shown that holoparasitism has evolved multiple times within the family, but did not provide sufficient resolution to support particular relationships within the group that includes the New World holoparasitic genera. Phylogenetic studies of the family using the nuclear markers ITS (Wolfe et al., 2005) and PHYA (Bennett & Mathews, 2006) gave better resolution within this group, disagreeing in some details but generally supporting a division between Orobanche and the other holoparasitic American genera (Boschniakia [including Kopsiopsis (Beck) Beck], Conopholis, and Epifagus). Samples of Eremitilla tissue dried in silica have been sent for analysis to Gerald Schneeveis (University of Vienna) and to Sarah Mathews (Harvard University) for molecular analysis. Preliminary results from analyses of ITS and rps2 sequences placed Eremitilla at the base of a lineage that includes the other North American holoparasitic genera, but have not been successful in adding resolution concerning intergeneric relationships within the group (Mathews et al., 2008). As with morphological characters, Eremitilla appears to possess many autopomorphies in the molecular data sets, leading to its placement on a relatively long branch. Further studies are under way, using additional markers.

Among the holoparasitic genera native in the New World, production of some sort of vegetative body is common, except in the American representatives of Orobanche, only a few of which produce such structures (e.g., O. bulbosa Beck). However, among the relative size and shape of this structure differ between species. The other North American genera all flower while attached to roots that are much more slender than those infected by Eremitilla, thus there may be architectural constraints on the vegetative body in Eremitilla that result in the development of a more flattened, rather than globose, vegetative organ (Figs 1A, 3F).

The corollas of Eremitilla have much broader tubes and throats than in any of the other ca. 20 New World species of holoparasitic Orobancheae (Figs. 1C, 3E). Genera such as Boschniakia and Conopholis share with Eremitilla the character of the upper two corolla lobes more or less fused into a single, often emarginate unit (Figs. 1C, 3E) that frequently is incurved or slightly hoods (vs. usually spreading in Orobanche s.l.). Also, as in Eremitilla, the corollas in these genera tend to be overall more shallowly lobed (Fig. 1D, E) than in North American Orobanche. The corolla tube in Boschniakia and Kopsiopsis is narrowed and curved above the ovary, similar to the condition of the corollas in Eremitilla (Fig. 1E), which, however, has a broader throat than in the other genera. However, the calyces in this group of genera are all strongly gamosepalous, whereas in the new genus the sepals are not coherent basally (Fig. 1D). The calyces in Orobanche, on the other hand, are divided nearly to the base.

The following key is artificial, rather than synoptic, given the paucity of identifiable morphological synapomorphies that would contribute phylogenetic structure to the clade. The generic classification remains a work in progress, with new data still emerging to suggest that the New World subgenera of Orobanche should be classified as segregate genera (Gerald Schneeveis, pers. comm.) and with generic limits to circumscribe monophyletic groups among the remainder of the American genera still tentative.

**KEY TO THE GENERA OF HOLOPARASITIC OROBANCHEAE NATIVE IN THE NEW WORLD**

1a. Ovaries and fruits 5-ribbed, the outer surface mucricate. .................................................. Eremitilla

1b. Ovaries and fruits tetrate or slightly flattened, not ribbed, the outer surface smooth.

2a. Calyces deeply 5-lobed; corollas with the upper lip usually moderately to strongly spreading at anthesis (flowers all cleistogamous).

3a. Pedicels 4–25 cm, mostly as long as or longer than the flowering stems; flowers 1 to 10 per flowering stem, each with a bract but lacking bracteoles .................................................. Orobanche sect. Gyronocephalus

3b. Pedicels absent or to 3(4) cm, when present shorter than the flowering stems; flowers usually numerous, each with a bract and 1 or 2 bracteoles .................................................. Orobanche sect. Nothaphyllum (A. Gray) Heckard

2b. Calyces entire along the rim or more commonly with 1 to 5 teeth or lobes, these generally shorter than to about as long as the tube (the tube split longitudinally along one side in Conopholis and sometimes with a single long tooth in Kopsiopsis); corollas with the upper lip slightly spreading (sometimes in Kopsiopsis) or more commonly straight, slightly incurved, or culminate at anthesis (except in cleistogamous flowers).

4a. Flowering stems usually well-branched above the base, slender, the flowers widely spaced along the branches; proximal flowers cleistogamous; calyces actinomorphic or nearly so ........................................ Epifagus

4b. Flowering stems usually unbranched, stout, the flowers densely spaced along the axis; cleistogamous flowers absent; calyces zygomorphic.

5a. Calyces with the tube split deeply longitudinally along the anterior side; flowering stems usually few to several in a dense cluster from the vegetative body; seeds with the outer surface nearly smooth or with a fine network of irregular, sinuous grooves, often appearing roughened or finely and irregularly reticulate-ridged in patches .......................... Conopholis
5b. Calyces often somewhat zygomorphic, but the tube not split longitudinally; flowering stems usually solitary from the vegetative body; seeds with the outer surface prominently reticulate-ridged.

6a. Corollas with the lower lip shorter than the upper lip or sometimes absent or nearly so, the lobes (when present) to ca. 1 mm long, the upper lip ± incurved to somewhat cucullate; bracteoles absent; anthers strongly exerted; fruits 2-valved; seeds obovate-cylindric; vegetative body with the surface finely granular to nearly smooth. *Boschniakia*

6b. Corollas with the lower lip about as long as the upper lip, the lobes 3-5 mm long, the upper lip straight, not cucullate; bracteoles usually present; anthers included or barely exerted; tuft of hair at base of stamen; fruits either 3- or 4-valved; seeds broadly ovoid; vegetative body with the surface divided into polygonal plates. *Kapsopis*

*Life history.* *Eremitilla mexicana* is a perennial taxon. Presently, nothing is known about seed germination, attachment to the host, or haustorial development in *Eremitilla*. In most other holoparasite *Orobanchaceae*, the seeds require host root tips nearby or even in direct contact to promote embryo development and seed germination, and a chemical stimulus (host root exudate) is thought to be necessary to stimulate maturation of the parasite embryo (Kuijt, 1969; Olsen & Olsen, 1979; Baird & Riopel, 1986a, b). During an unspecified period of time after germination (probably several years, based on its woody texture), the subterranean parasite develops an amorphous, somewhat flattened, broadly adherent, vegetative body on the exterior, lateral surface of the more or less horizontal host root (Figs. 1A, 3F).

Analogous growths of various shapes, sizes, and textures are produced in some other genera of *Orobanchaceae*, and have variously been described as tuberous, bulbous, or cormlike, but none of these terms accurately describes the flattened, relatively hardened structures produced in *Eremitilla*. In some other genera of *Orobanchaceae*, such structures have been called tubereles (Kuijt, 1969; Heide-Jørgensen, 2008), although this term also does not appear to apply accurately to the vegetative body in *Eremitilla*. Anatomical studies have not been performed, but hand-sectioning indicates that this vegetative body includes at least some anomalous growth of host tissue in its interior. There was no indication of any development of roots by the parasite; that is, it is unlikely that the parasite spreads vegetatively to form new infections along a given host root, but that adjacent parasites on the same root apparently represent independent infections. We observed one to four vertical stems of the parasite at different stages of development from a given infection site, as well as the blackened remains (Fig. 3F) of stems from the previous growing season (and in a few cases scars that may represent the emergence points of stems from even earlier years). The elongating stems are sharply pointed at the tip and eventually extend 15-45 cm to reach the soil surface. Because of rocks in the soil, frequently the stems of *Eremitilla* ascend irregularly, with kinks where they bend abruptly around obstruc-

...tions (Fig. 1A). Toward each stem tip is a zone of dark, sclerotic squamiform leaves (Fig. 1A, B) that presumably functions to protect the immature inflorescence, which shows no sign of differentiation in the material observed until the stem has nearly reached the surface.

The inflorescences of *Eremitilla* are not stalked or only short-stalked above the ground and are orangish brown in overall color, darkening to brown after flowering as the fruits develop and eventually blackening with age (Fig. 3B, C). They blend in very well with the leaf litter. No insects were observed visiting flowering individuals in situ, but excavated stems were visited by small flies, small bees, and a small butterfly on the open roadtrack prior to pressing. The stigma is positioned at about the same level but often slightly in front of the anthers of the anterior pair of stamens, which dehisce more or less inward toward the stigma (Figs. 1H, 3E). There is thus the potential of pollen transfer from the adjacent anthers to the stigma, suggesting that the species is at least facultatively inbreeding. There was no evidence of cleistogamous flower production. In the infructescences that we observed, nearly every flower had produced a fruit. Fruit development and ripening require a month or more after flowering (inferred from our field studies). The capsular fruits do not dehisce at maturity, but remain intact within the persistent perianth until ruptured by eventual decay of the infructescence. We observed black, collapsed remains of previous years’ infructescences in the field with well-formed seeds still present. In addition to soilborne fungi and bacteria, various insect larvae that tunnel through the stems contribute to the decomposition of the plants.

Seed dispersal in *Eremitilla* is likely to be accomplished by a combination of factors, mainly gravity and water. The bottoms of the steep-walled ravines where the plants grow generally are not subjected to regular wind, especially at ground level. Ants are another possible dispersal agent, as undetermined ants were observed in and around some of the decaying infructescences. As in many other species of *Orobanchaceae*, the outer layer of the seed coat consists of a layer of enlarged polygonal cells...
whose outer facets rupture with age, creating a deeply sculptured surface (Fig. 2B). Olsen and Olsen (1980) suggested that water and hydrostatic charge were the principal agents responsible for dispersal on the morphologically similar seeds of Bosciniaia hookeri Walpers, as well as their transport into the soil, but could not rule out zoochory as a contributing factor.

**Host association.** Excavation of the stems of the parasite is difficult in the rocky soils of the habitat. We were surprised to find the attachment to the host root to be relatively deep (to 45 cm), given that the developing flowering stems must push through the rocky soil to reach the surface. Our field studies indicate that the only host plant of Eremitilla mexicana is the tree species Hedysosum mexicanum (Chloranthaceae). The parasites were attached exclusively to large (6–10 cm or more diam.) lateral roots (Figs. 1A, 3F) of mature trees and formed a series of individual infections spaced 10 or more cm apart along the lateral surface of the root. In the ravines that we visited, H. mexicanum is a slender-trunked canopy tree to ca. 25 m tall with expanded, slightly buttressed bases and gray, finely roughened bark. As with most Chloranthaceae, the plants are resinous, with a distinctive aromatic odor when bruised or otherwise damaged, which facilitates identification of even the roots. Within the region, it is among the first tree species to colonize following clear-cutting or fires and also is present in runoff depressions along the road. However, even though the density of Hedysosum is much greater at such disturbed sites than in the mature primary vegetation of the less impacted ravines, no incidence of parasitism was noted in these younger stands of trees. Parasites were observed attached only to large mature individuals of the host. This is the first report of a vascular plant parasite on Hedysosum.

**Paratypes.** MEXICO. **Guerrero:** Mpio. Gral. de Heliodoro de Castillo, 50.5 km ENE of Puerto de Gallo, 9 June 1985, W. Thomas & J. L. Contreras J. 3762 (FCME, NY); 91 rd. km W of turnoff of Mexico Hwy. 95 Libre & 2.8 rd. km W of village of Tiquimal on dirt rd. to Puerto de Gallo, 24 July 2007, G. Yatskievych, M. Olson & L. Trejo H. 07-104 (topotype, MEXU, MO); 90 rd. km W of turnoff of Mexico Hwy. 95 Libre & 1.9 rd. km W of village of Tiquimal on dirt rd. to Puerto de Gallo, 13 June 2006, Yatskievych & Contreras J. 06-45 (FCME, MO); 24 July 2007, Yatskievych, Olson & Trejo H. 07-106 (MEXU, MO, NY).

**Acknowledgments.** We greatly appreciate Wayt Thomas’s perseverance in seeking a determination for his original collection for over two decades and his kindness in discussing the situation with us. Thanks also are due to Gerald Schneeweis for his role in bringing the original specimen to the authors’ attention. FNA co-authors Turner Collins and Alison Colwell provided insightful discussions and encouragement during the study, as did Peter Stevens and Roy Gereau of the Missouri Botanical Garden. Suggestions and corrections made by reviewers Dan Nieckent and Turner Collins, as well as the *Novon* editorial staff, greatly improved the manuscript. Gerald Gastony kindly assisted with the Latin diagnosis. Mark Olson and Laura Trejo Hernandez of the MEXU herbarium and UNAM botanical institute provided logistical support for the 2007 fieldwork and excellent field assistance. We appreciate the meticulous skill of John Myers in preparing the plate of illustrations. Pollen samples initially were processed for us by Steven Mancheste of the University of Florida. A second set of pollen samples, as well as seeds, were processed by University of Missouri–St. Louis doctoral student Sara Fuentes-Soriano, who also performed the scanning electron microscopy. The SEM work was conducted in the Research Center for Auditory and Visual Studies (funded by NIH grant P30 DC004665) of the Department of Otolaryngology at Washington University in St. Louis. Specimens were collected under permits issued to José Luis Contreras Jiménez and Mark Olson by CONACYT, the Mexican governmental agency responsible for the conservation of biodiversity. Portions of this research were supported financially by the Science and Conservation Division of the Missouri Botanical Garden.

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A New Variety of *Tripterospermum chinense* (Gentianaceae) from Zhejiang Province, Eastern China

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**ABSTRACT.** The new variety *Tripterospermum chinense* var. *linearifolium* X. F. Jin (Gentianaceae) is described from Zhejiang, eastern China, and distinguished from *T. chinense* (Migo) Harry Smith. Leaf characteristics of both varieties were statistically analyzed, and pollen grain and seed morphology was observed under SEM. SEM results showed that pollen and seed morphology did not differ between the new variety and the autonymic variety. According to the results of statistical analysis, *T. chinense* var. *linearifolium* differs mainly from the autonymic variety in having narrower leaves (3-9 mm vs. 11-43 mm) and solitary flowers (vs. two to five flowers).

**Key words:** China, Gentianaceae, IUCN Red List, *Tripterospermum*, Zhejiang.

*Tripterospermum* Blume is widely accepted by taxonomists (Satake, 1951; Liu & Kuo, 1978; Wu, 1984, 1988; Murata, 1989; Ho & Pringle, 1995). The genus comprises 25 species worldwide and is distributed primarily in East and South Asia (Murata, 1989). Nineteen species belonging to two sections are recognized in China, namely section *Platypermum* C. J. Wu and section *Tripterospermum* (Wu, 1984, 1988). C. B. Clarke (1875) treated the genus *Tripterospermum* in *Crauerdiac* Wallich as a section, and later he changed its rank to subgenus (Wu, 1988). Marquand (1931) reduced *Tripterospermum* and *Crauerdiac* in *Gentiana* as two different sections, but his treatment of some species was confused.

Hul (2002) described three new species from Vietnam. Recently, Fang and Qin (2001) described *Tripterospermum brevifolium* D. Fang as a new species from Guangxi, China, and Chen et al. (2006: 203) described *T. lilangshanense* Chih H. Chen & J. C. Wang (spelled by the authors as “*lilangshanensis*” in the protologue) from Taiwan.

In August 2004, during botanical exploration in Fengyang Mountain of Zhejiang Province, China, we discovered a new variety of *Tripterospermum chinense* (Migo) Harry Smith characterized by narrower leaves and pale purplish white, solitary flowers. A statistical analysis of the leaves was performed on specimens from HHBG, HTC, HZU, and ZM. Twenty-four specimens of *T. chinense* var. *chinense* and nine of the new variety were examined. SPSS Statistics 11.5 (Chicago, Illinois, U.S.A) and SigmaPlot 8.0 (Chicago, Illinois, U.S.A.) software applications were used to analyze and illustrate the leaf variation, respectively (Fig. 1). Mature pollen grains and seeds of the new variety were obtained for SEM observation from type collections X. F. Jin 803A (for pollen grains: holotype, HTC) and X. F. Jin 803C (for seeds: paratype, HTC). Material of *T. chinense* var. *chinense* was taken from anonymous s.n. (for pollen grains, HZU) and L. X. Hong & B. Y. Ding 1185 (for seeds, HZU), respectively. The seeds and pollen grains were directly observed under a Hitachi S-570 (Tokyo, Japan) scanning electron microscope.

Comparing the morphological characters of the two varieties of *Tripterospermum chinense*, the distinguishing characters were the shape of the cauline leaves (especially leaf width) and the number of flowers. Leaves of *T. chinense* var. *chinense* are ovate or narrowly ovate to ovate-lanceolate, with the base rounded, truncate, or cordate, and are 11-43 mm wide, whereas those of the new variety are linear, with the base cuneate, and are 3-9 mm wide (Fig. 1). Test of significance for leaf width showed a significant difference (*P* < 0.01). Each fertile node of *T. chinense* var. *chinense* is 2- to 5-flowered, while the new variety has solitary flowers at each node. Under SEM, the seeds of the two varieties of *T. chinense* are similar: the shape is oblong, with broad wings on margins, and seed surface ornamentation is finely reticulate, with distinct muri and small lumina with irregular folds. The pollen morphology of the two varieties is also similar in its spheroidal and 3-colporate form with distinct, irregular, and smooth raphes on the surface sculpture. Although pollen and seed morphology are similar, the differences in floral and leaf morphology clearly distinguish the two varieties.


1a. Tripterosepermum chinense (Migo) Harry Smith var. chinense.

1b. Tripterosepermum chinense (Migo) Harry Smith var. linearifolium X. F. Jin, var. nov. TYPE: China. Zhejiang: Longquan, Mt. Fengyang, under forests, 1650 m, flowers pale purple, 26 Aug. 2004, X. F. Jin 808A (holotype, HTC; isotypes, MO, ZM). Figure 2.

Hae varietas a Tripterosepermum chinense (Migo) Harry Smith var. chinensis fokiis caulinis linearibus (vs. ovatis, angustae ovatis vel ovato-lanceolatis), 3–9 mm (vs. 11–43 mm) latis, basi cuneatis (vs. rotundis, truncatis vel cordatis) atque floribus solitariis (vs. 2 ad 5) differt.

Perennial herb; stems terete, twining, green or brown. Basal leaves in 2 pairs, nearly prostrate, sessile, papyraceous, ovate, obovate, or rounded, 1.2–5 × 1–3 cm, apex acute, base cuneate or broadly cuneate, margin entire, dark green on adaxial surface, sometimes with yellowish green spots, pale green on abaxial surface; cauline leaves linear, membranaceous, 5–10 × 0.3–0.9 cm, base cuneate, margin entire, apex acuminate to caudate; veins 3; petiole 0.2–0.3 mm. Infiorescences axillary, with solitary flower per node; pedicel very short, 1–2 mm, with 1 or 2 pairs of bracts, linear, herbaceous, 3–4 mm. Calyx campanulate, 1.5–1.8 cm; tube 8–9 mm, wingless; lobes linear-lanceolate, 6–9 mm; corolla pale purplish white, with opalescent plicae; tube narrowly campanulate, 3–3.5 cm; corolla lobes triangular-ovate, 4–5 × 3–4 mm, apex acuminate; plicate semiobtuse, ca. 5 × 3 mm; filaments linear, 1.5–1.7 cm; anthers ovoid, ca. 1.5 mm; ovary elliptic-lanceolate, attenuate on both sides, ca. 2.5 cm, with a long stipe to 10 mm long; style linear, 9–11 mm; stigma persistent, ca. 1 mm. Capsules ellipsoid, compressed, 2.5–2.7 cm × 3–4 mm, included in corolla; seeds brown, orbicular, compressed, ca. 2 mm diam.; wings discoid.

Habitat and distribution. Tripterosepermum chinense var. linearifolium is known currently only from its type locality, on Mt. Fengyang and Mt. Jiulong, southern Zhejiang Province, eastern China. It grows in forests of Fokiensia hodginsii A. Henry & H. H. Thomas and Pseudotaxus chienii (W. C. Cheng) W. C. Cheng at ca. 1650 m in elevation.

IUCN Red List Category. According to IUCN Red List categories and criteria (IUCN, 2001), the new variety should be considered Near Threatened (NT), and there is a need for its future conservation. Tripterosepermum chinense var. linearifolium grows on Mt. Fengyang and Mt. Jiulong, two natural reserves of China, and its habitats are well preserved. However, its area of distribution is less than 10,000 km² and the population is less than 5000 individuals.

Phenology. The new variety was collected in flower and fruit from July to August.

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*Tripterospermum chinense* var. *linearifolium* (Gentianaceae)

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Weberbauera arequipa (Brassicaceae), a New Species from Peru

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ABSTRACT. Weberbauera arequipa Al-Shehbaz & Montesinos (Brassicaceae), a new species from Peru, is described and illustrated. It is distinguished from the other species of Weberbauera Gilg & Muschler by having ebracteate racemes, persistent sepals and petals, 4-seeded fruits, and a few simple trichomes restricted to the petiolar bases. It is closely related to the Bolivian W. retropila Al-Shehbaz, but differs by the lack of branched trichomes and by having glabrous fruits, smaller flowers, and persistent petals. The IUCN status of the new species is determined as Data Deficient (DD).

Key words: Brassicaceae, IUCN Red List, Peru, Weberbauera.

Gilg and Muschler (1909) established Weberbauera Gilg & Muschler (Brassicaceae) as a monotypic genus based on a species they described from Peru as W. densiflora Gilg & Muschler. Schulz (1924) recognized two species in the genus and reduced the above to synonymy of W. spathulifolia (A. Gray) O. E. Schulz. Mackbride (1934) expanded the limits of Weberbauera by the transfer of the type species of two monospecific genera, Alpaminia O. E. Schulz and Pelagaria O. E. Schulz. Al-Shehbaz (1990a) further expanded the genus by the discovery of five new species and by the transfer of six previously placed in Stenodraba O. E. Schulz. Several species have since been added to Weberbauera (Al-Shehbaz, 1990b, 2004) and, as presently stands, the genus consists of 23 species, including the novelty below, W. arequipa Al-Shehbaz & Montesinos. The new species was discovered during the 2005–2006 fieldwork in the Peruvian departments of Arequipa and Moquegua by the second author (D.B.M.) as part of his research toward the bachelor degree at Universidad Católica de Santa María, Arequipa.


Herba annua ca. 6 cm alta, glabra. Folia caudina ob lanceolata, 8–12 × 3–5 mm, petiolata, dentata, petiolis ad basim ciliata. Racemi ebracteati; pedicelli fructiferi divaricati, 2–4(–5) mm longi, glabri, recti. Sepala oblonga, 1.1–1.3 × 0.6–0.8 mm, glabra; petala alba, anguste obovata, 1.8–2 × 0.7–0.9 mm; ovula 4. Fructus oblongus vel lanceolatus, 5–7 × 1.3–1.6 mm, stylo 0.3–0.5 mm longo coronato; semina oblonga, uniseriata, 1.3–1.6 × 0.9–1 mm, cotyledonibus incumbentibus.

Herbs annual, ca. 6 cm tall; trichomes absent except a few simple ones at base of petioles; stems decumbent, glabrous, several branched above base. Cauline leaves oblanceolate, petiolate, 8–12 × 3–5 mm, petioles 2–4 mm, blade glabrous, base attenuate, margin dentate. Racemes ebracteate, elongated slightly in fruit; rachis straight. Sepals green, oblong, 1.1–1.3 × 0.6–0.8 mm, glabrous, membranous at margin, not saccate at base; petals white, narrowly obovate, 1.8–2 × 0.7–0.9 mm, not clawed; filaments white, 1–1.5 mm; anthers ovate, ca. 0.4 mm; ovules 4

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per ovary. Fruiting pedicels mostly divaricate, 2–4(–5) mm, straight, slender; fruits oblong to lanceolate, 5–7 \( \times \) 1.3–1.6 mm, not torulose, straight; valves with an obscure midvein, glabrous; style 0.3–0.5 mm; stigma entire. Seeds dark brown, oblong, uniseriate, 1.3–1.6 \( \times \) 0.9–1 mm; cotyledons incumbent.

**Distribution and IUCN Red List category.** *Weberbauera arequipa* grows at riverbeds in grasslands, together with *Jarava ichu* Ruiz & Pavón, *Werneria pygmyphylla* S. F. Blake, *Azorella compacta* Philippi, and *Perezia multiflora* Lessing. It is known thus far only from the type locality and appears to be extremely rare. However, its IUCN Red List category (IUCN, 2001) is determined as Data Deficient (DD).

**Etymology.** The species epithet *arequipa*, named after the Peruvian department and province Arequipa, is a noun used in apposition and, therefore, should be maintained according to Article 23.5 of the *International Code of Botanical Nomenclature* (McNeill et al., 2006).

**Discussion.** The new species is readily distinguished from the other species of *Weberbauera* by its ebraecate racemes, persistent sepals and petals, 4-seeded fruits, and few simple trichomes restricted to the petiolar bases. It is related to the Bolivian endemic *W. retropila* Al-Shehbaz but differs by the absence (vs. presence) of branched trichomes and by having glabrous (vs. retorsely pubescent), 4– (vs. 6 or 8)-seeded fruits, glabrous (vs. sparsely pubescent) leaf
surfaces, smaller flowers (sepals 1.1–1.3 mm vs. 2–2.5 mm long, petals 1.8–2 mm vs. 3–3.5 mm long), and persistent (vs. caducous) petals.

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Literature Cited


Physaria okanensis (Brassicaceae), a New Species from Catamarca, Argentina

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ABSTRACT. Physaria okanensis Al-Shehbaz & Príncipe (Brassicaceae), a new species from Catamarca, Argentina, is described and illustrated. It is distinguished from the five other South American species of Physaria (Nuttall) A. Gray by its densely pulvinulate habit and few-flowered scapes. It resembles the non-pulvinuate, often non-scapose P. pygmaea O’Kane & Al-Shehbaz, but also differs by having longer petals and larger, orbicular (vs. ovoid) fruits. The IUCN status of the new species is determined as Data Deficient (DD).

Key words: Argentina, Brassicaceae, Catamarca, IUCN Red List, Physaria.

Physaria (Nuttall) A. Gray (ca. 90 species) is a primarily North American genus, and only five species are disjunctly distributed in Argentina and neighboring Bolivia (O’Kane & Al-Shehbaz, 2004). Taxonomic limits of the genus have recently been expanded to include Lesquerella S. Watson, and for a detailed discussion and references, the interested reader should consult Al-Shehbaz and O’Kane (2002). A single species, L. mendocina (Philippi) Kurtz, was previously thought to grow in South America (Boelcke, 1967; Boelcke & Romanczuk, 1984). However, with a better understanding of the character variation in the genus and substantial fieldwork, the number of species is likely to be more than six, including the novelty below.

The new species was discovered by the authors during their separate visits to the herbarium of Fundación Miguel Lillo (LIL) in San Miguel de Tucumán, Argentina.

Physaria okanensis Al-Shehbaz & Príncipe, sp. nov.
TYPE: Argentina. Catamarca: al norte del Cerro El Manchao, 4000 m, 27 Oct. 1979, Stephan Haløy A. 809 (holotype, LIL 574675; isotype, MO [LIL fragm.]). Figure 1.

Herba perennis pulvinata scaposa 10–30 cm diam., dense argenteo-pubescent, caudice crasso lignoso multiramoso. Folia basalia rostrulata, petioluta, integra, ob lanceolate; folia caulina nulla. Racemi 2–vel 3-flori; pedicellis fructiferis rectis, 7–10 mm longis. Petala lutea, spatulata, 7–8 mm longa; ovula 10 ad 12. Fructus orbicularis, angustiseptati, 8–10 × 8–10 mm, stylo tenue 3.5–4 mm longo coronato; semi na compressa, ovata, exala ta, ca. 2.5 × 1.5 mm.

Pulvinulate, scapose perennials with cushions 10–30 cm diam., densely silvery pubescent throughout; trichomes sessile, stellate, 0.08–0.13 mm diam., not webbed, with 16 to 22 ultimate branches; caudex thick, woody, with numerous branches covered with leaf remains of previous years; stems erect, simple, 0.7–1.2 cm. Basal leaves rostrulate; petiole 4–6 mm, expanded to a base 1.5–2 mm wide; leaf blade orbiculate, 5–8 × 1.5–2 mm, base attenuate, margin entire, apex obtuse; cauline leaves absent. Racemes 2– or 3-flowered, ebracteate, scarcely elongated in fruit. Sepals oblong, ascending, 4.5–5 × 1–1.2 mm, not saccate at base, silvery pubescent, caducous; petals yellow, spatulate, 7–8 × 1.5–2 mm; filaments 3.5–4 mm; anthers narrowly oblong, 1–1.2 mm; ovules 10 to 12 per ovary. Fruiting pedicels slender, straight, ascending-divaricate, 7–10 mm; fruit orbicular, angustiseptate, 8–10 × 8–10 mm, moderately pubescent, sessile, obtuse at base, slightly emarginate at apex; replum 2.5–3 mm wide; septum perforate; style slender, 3.5–4 mm; stigma wider than style; seeds compressed, ovate, wingless, ca. 2.5 × 1.5 mm; cotyledons accumbent.

Distribution and IUCN Red List category. The new species is known only from the type specimen and appears to be extremely rare, as evidenced from the numerous Argentinean collections of other Physaria species examined by the authors. Therefore, its IUCN Red List category (IUCN, 2001) remains uncertain, with its current assessment as Data Deficient (DD).

Etymology. Physaria okanensis is named in honor of Steve L. O’Kane Jr., a world authority on the genus Physaria.

Discussion. The new species is readily distinguished from five other South American species of Physaria by forming large cushions 10–30 cm diam. and by producing few-flowered, ebracteate scapes. The other species are non-pulvinate and produce leafy flowering stems, although P. pygmaea O’Kane & Al-Shehbaz is occasionally scapose. Physaria okanensis and P. pygmaea are similar in having few-flowered racemes, but differ by having petiolate (vs. sessile) leaves, longer petals (7–8 mm vs. 4–5[–6] mm), and larger fruits that are 8–10 × 8–10 mm (vs. 4–5[–8] × 3–4[–5] mm) and orbicular (vs. ovoid).

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Literature Cited
A New Species of *Meconopsis* (Papaveraceae) from Gansu, China

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**ABSTRACT.** A new species of *Meconopsis* Viguier, *M. biloba* L. Z. An, Shu-Yan Chen & Y. S. Lian (Papaveraceae), from Gansu Province, China, is described and illustrated. The new species is related to *M. quintuplinervia* Regel by several similar characters, including the basal leaf rosettes, a solitary flower borne on the scape, and the blue petals and filaments. It differs from all known *Meconopsis* species in China in its bilobed petals.

**Key words** China, IUCN Red List, *Meconopsis*, Papaveraceae.

The genus *Meconopsis* Viguier was established with *M. cambrica* Viguier in 1814 (Fedde, 1936), and the genus currently includes 49 species (Wu & Chuan, 1980). Only one species is native to western Europe, and the remaining 48 species are distributed in the China–Himalayan region of eastern Asia, with 38 species in China. Western China and its neighboring Himalayan regions represent the center of distribution for the genus (Wu & Chuan, 1980; Wu, 1999). During floristic investigation of Lianhua Shan in Linting County of Gansu Province, China, we encountered a new species of *Meconopsis* with striking flowers. We describe this species on the basis of fresh material. The new species has basal leaf rosettes, one scape with a solitary flower, four blue petals, and blue filaments. It stands apart from related species by its petals that are 1/3 to 1/2 bilobed at the apex.

*Meconopsis biloba* L. Z. An, Shu-Yan Chen & Y. S. Lian, sp. nov. **TYPE:** China. Gansu: Linting County, Lianhua Shan, 3050 m, seerees and rocky slopes, 24 July 2004, L. Z. An 2047243 (holotype, LZU). Figure 1.

Species have *Meconopsis quintuplinervia* Regel affinis, qua (etiam ab omnibus congeneris sinusibus) petals manifeste bilobis bene differt.

Perennial herb, ca. 30–50 cm tall, covered at base by persistent leaf bases, densely pubescent with brown and short branched hairs. Leaves entire, forming a basal rosette; petioles 5–9 cm; leaf blades oblong, ovate, rectangular, or rounded-ovate, 3–8 × 1.5–3 cm, blunt at apex, broadly cuneate at base, attenuate along petioles, both surfaces pubescent with yellow or brown, short branched hairs, with 3 to 5 visible longitudinal veins. Scape 1 per rosette, pubescent with brown, branched, and inflexed hairs. Flower solitary, slightly pendant; sepal 2, caducous; petals 4, blue, 3–4 × 2.5–3.5 cm, ovate or subrotund, 1/3 to 1/2 bifid at apex; stamens with blue filaments, 1.5–2 cm; anthers pale yellow, oblong, 1–1.5 mm; ovary subglobose, 5–8 mm, densely pubescent with brown and short branched hairs; style short, 1–1.5 mm; stigma capitulate, 4-partite. Capsule formed by 4 carpels. Seeds not seen.

**Distribution and habitat.** The new species is known only from the type specimen collected from Lianhua Shan in Linting County of Gansu Province, China, growing at an altitude of 3050 m on seerees and rocky slopes.

**IUCN Red List category.** Due to the lack of information regarding the ecology, life history, and population density of the species, as well as the frequency of fire in Lianhua Shan, *Meconopsis biloba* should be classified as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

**Discussion.** This species is affinned with *Meconopsis quintuplinervia* in several characters, including the basal leaf rosettes, the solitary flower borne on the scape, and the blue petals and filaments. They differ in the petals, which are entire in *M. quintuplinervia* and bilobed in the new species. This character is extremely unusual in *Meconopsis* and therefore allows *M. biloba* to be easily distinguished from other species in the genus.

The first author visited the original collection site in July 2007, but was unable to collect paratypes because the collection site was inaccessible. There were nine other plants observed at the type locality.
where the holotype was collected. The new species is not under cultivation at Lzu.

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Literature Cited


Two New Species of *Dombeya* (Malvaceae) from Madagascar

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**ABSTRACT.** Two new Malagasy species of *Dombeya* Cavanilles subgen. *Xeropetalum* (Delile) K. Schumann (Malvaceae) are described. *Dombeya asymmetrica* Applequist is native to Mananara-Nord in northeastern Madagascar, and *D. rianensis* Applequist to the Matatana River basin. *Dombeya rianensis* is placed within subspecies *Trohy Arènes*. *Dombeya asymmetrica* is tentatively placed within subspecies *Repandae Arènes*; the species is distinguished by its long, narrow lanceolate leaves with asymmetrical apices.


**Key words:** *Dombeya*, IUCN Red List, Madagascar, Malvaceae.

*Dombeya* Cavanilles is one of the larger genera of Malvaceae s.l. (formerly Sterculiaceae; cf. Bayer et al., 1999), with over 200 species recognized, and is an important component of the Malagasy flora. The last complete revision of *Dombeya* in Madagascar and the Comores recognized 187 species (Arènes, 1958, 1959) in two well-distinguished subspecies, whereas 19 species are recognized in Africa (Seyani, 1991), with one extending to Arabia, and 14 inhabit the Mascarenes (Friedmann, 1987). Since the publication of Arènes' (1959) treatment, further taxonomic efforts related to the Malagasy species of *Dombeya* have been limited (Barnett & Dorr, 1986; Dorr, 2001). Examination of herbarium specimens at P has led to the discovery of two specimens not referable to previously described species, both of which are herein described as new. Both species are native to humid forests of eastern or northeastern Madagascar; their provisional conservation status according to IUCN Red List criteria (IUCN, 2001) must be described as Data Deficient (DD), since virtually nothing is known of their ranges or population size.

1. **Dombeya asymmetrica** Applequist, sp. nov.

**TYPE:** Madagascar. Prov. Toamasina: forêt d’Ilbanda (NW Antananarivo), Mananara-Nord, [16°23’S, 04°94’E?], 22 Feb. 1990 (fl.), *Raharimalala 190* (holotype, P). Figure 1.

Frutex usque ad 6 m altus; ramuli novelli confertim lepidoti. Folia petiolus 7–10 mm longus confertim lepidotus; lamina lanceolata basi cuneata vel rotundata-cuneata apice asymmetrica acuminita, 8–17,5 cm longa et 1,6–3,9 cm lata, infra sparsum lepidota supra sparsum lepidota vel glabra, venatione camptodroma tenui. Inflorescentia pauciflora pedunculo sparsum lepidoto usque ad 4,5 cm longo insidens; bracteae lanceolatae ca. 3 mm longae basaliter dilatatae confertim lepidotae; pedicelli 6–8 mm longi confertim lepidotae. Sepala 5, 5–6,5 mm longa basaliter connata lepidota plerumque non reflexa; petala 5 late obovata, 6,5–7 mm longa et ca. 5 mm lata, alba; stamina ca. 10 basaliter connata facies coronam brevem, filaments (1–)1,5–2(–2,5) mm longis, antheris anguste oblongis; staminodia linearia ca. 3 mm longa excedentia stamina fertilia; gynoeicum 3-carpellare, ovario lepidoto, stylo 3–3,5 mm longo basaliter lepidoto ramis 1–1,3 mm longis.

Shrub 6 m high; small twigs densely lepidote with fringed scales. Leaves lanceolate, 8–17.5 × 1.6–3.9 cm; petiole 7–10 mm, densely lepidote; base cuneate or occasionally rounded; apex usually asymmetrically acuminate; venation pinnate, camptodromous, secondary veins numerous, narrow and inconspicuous especially on adaxial surface; both surfaces very sparsely lepidote, with scales mostly near midrib, sometimes becoming glabrous on adaxial surface. Inflorescences with very few flowers, on slender peduncles to 4.5 cm long; peduncle and rachis lepidote; floral bracts ca. 3 mm, lanceolate, widening at the base, densely lepidote; pedicels 6–8 mm, densely lepidote. Sepals 5, ca. 5–6.5 mm, fused basally, densely lepidote, the lobes not reflexed; petals 5, white, 6.5–7 mm, ca. 5 mm broad, broadly obovate, margins asymmetrically curved inward; stamens ca. 10, basally fused into a short corona; filaments (1–)1.5–2(–2.5) mm long, unequal; authors narrowly oblong, 1–1.3 mm; staminodes linear, ca. 3 mm, longer than fertile stamens; gynoeicum 3-

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carpellate; ovary lepidote; styal column 3–3.5 mm, basally lepidote, with 3 curled branches 1–1.3 mm long. Fruit unknown.

Habitat and distribution. The holotype is apparently from coastal forest or humid forest near the coast in northeastern Madagascar in the region of Mananara-Nord.

Phenology. Flowers have been collected in February.

Vernacular name. Rondròo (rendro).

Discussion. The holotype specimen of *Dombeya asymmetrica* is remarkable for its long, narrowly lanceolate leaves with more or less asymmetrically acuminate apices; this leaf shape is virtually unknown in *Dombeya*, despite the exceptional range of variation within the genus. The species belongs to subgenus *Xeropetalum* (Delile) K. Schumann, which is characterized by gynoecia with fewer than five carpels. The
inflorescences of the only known specimen are very small and in poor condition. One appears to have been a reduced cyme with at least three buds, which, following Arènes’ (1958, 1959) classification, would place it in section Xeropetalum. However, the possibility that other specimens might be keyed out to section Decastemon Planchon (umbellate, gerninate or solitary flowers), perhaps even correctly so, cannot be discounted. Section Decastemon, a distinctive and probably monophyletic group, frequently has lanceolate leaves and slender, few-flowered inflorescences, as does this species. On the other hand, lepidote pedicels and sepals, such as are seen in D. asymmetrica, represent a very rare character in section Decastemon, which most often has glabrous and glandular, or occasionally stellate-pubescent, sepals. The species is tentatively placed in section Xeropetalum because of the apparently cymose inflorescence and lepidote indument, but the collection of more and better material would be highly desirable.

Once referred to section Xeropetalum, Dombeya asymmetrica is placed by Arènes’ (1958, 1959) classification within subsection Floribundae Arènes (leaves bearing small scales not totally covering the surface), series Epilasae Arènes (ovary lepidote), subspecies Repandae Arènes (sepals not reflexed), and would be identified by his key as D. sahatayensis Arènes. As discussed below, Arènes’ complex infrageneric classification, with many subgroups defined by single characters that vary repeatedly, probably includes many nonmonophyletic subgroups; thus, even if the inflorescences of D. asymmetrica are correctly interpreted, the predictive value of placement within subspecies Repandae is unclear. Dombeya asymmetrica can be differentiated from all currently recognized species in subspecies Repandae by its distinctive leaf shape and its small, slender inflorescences with only one order of branching; in fact, almost all species of section Xeropetalum normally have better developed inflorescences. Though the leaves of D. sahatayensis are sometimes asymmetrical, they never have acuminate apices; D. asymmetrica also has shorter pedicels and smaller flower parts, including petals, staminodes, and styles (though this must be interpreted with caution given the possibly poor condition of the holotype). Within subspecies Repandae, D. asymmetrica should also be distinguished in particular from the widespread D. laurifolia (Bojer) Baillon, which has leaves that are highly variable but normally not lanceolate (being usually widest above the midpoint), asymmetrical, acuminate, or exceeding 13.5 cm long.

If a specimen of Dombeya asymmetrica were keyed out as belonging to section Decastemon, it would be identified as belonging to subsection Decantherae Arènes (peduncles longer than pedicels), series Lepidotae Arènes (ovaries lepidote), which is presently a monotypic series including only D. capuroniana Arènes. That species has long narrow leaves, but the leaves are oblanceolate to oblong or elliptical, with acute, often shallowly toothed, more or less symmetrical apices. Dombeya asymmetrica is also distinguished by its flowers, which may be slightly smaller and are of different conformation (anthers oblong and at least 1 mm long vs. oval and less than 1 mm; style 3–3.5 mm long with short branches vs. about 1.5 mm long with branches to 4 mm long). The leaf shape and lepidote reproductive indument suffice to distinguish D. asymmetrica from all currently recognized species in section Decastemon.

2. Dombeya rianimensis Applequist, sp. nov.

TYPE: Madagascar. Prov. Fianarantsoa: haute vallée de la Rianana (bassin du Matianana [= Matatana]), [22°14’S, 047°07’E], forêts, 1000–1400 m, 18–22 Nov. 1924 (fl), Humbert 3524 (holotype, P). Figure 2.

Haec species a Dombeya gracilicyna Arènes stimulis longioribus longicolumnatis, inflorescentis minoribus saeppe umbelliformibus, pedicellis brevioribus, corona staminali breviore, petalis minoribus, staminibus numerosioribus atque stylo breviori difert.

Tree; twigs grayish to tan, lepidote when young. Leaves obvate to oblanceolate, 4.5–9.2 × 2.1–4.3 cm; petiole 5–13 mm, densely lepidote; base cuneate to rounded-cuneate; apex ± rounded, occasionally slightly emarginate or cuspidate; margins entire to very slightly undulate; venation pinnate, camptodontous, secondary veins 5 to 8 (to 9) pairs, alternate in middle portion of leaf, sometimes pale; both surfaces lepidote with small scales, often sparsely so in larger leaves especially on the adaxial surface; stipules awl-shaped with a broadened base, 4–6 mm, lepidote, ≥ caducous. Inflorescences few-flowered cymes, often umbelliform, lateral, borne near twig apices; peduncles 1.4–2.6 cm; inflorescence bracts 2–4 mm, lanceolate, caducous; pedicels ± angular, articulate, 5–9 (–12) mm; floral bracts 3, borne slightly below base of flower, deltoid, 1.5–2 mm, caducous; inflorescences lepidote throughout. Sepals narrowly lanceolate, 4.8–7 mm, lepidote, mostly reflexed after anthesis, short-corneate at immediate base and the adaxial surface of fused portion bearing small patches of pale, possibly glandular tissue; petals white, 6.2–8 × 3.2–4.5 mm, obovate to obdeltoid with asymmetrical apex; androecial corona 1.2–1.6 mm; fertile stamens oppositipetalous, 20 (to 25), in groups of 4 (to
6); filaments 0.8–1.4 mm; anthers oblong, 0.9–1 mm; staminodes narrowly spatulate, 3.6–4.5 mm, exceeding stamens; gynoecium 3- to 4-carpellate; ovary lepidote, inner surfaces of locules glabrous; style lepidote only at base, ca. 1.2–1.8 mm; style lobes recurved, 1.5–2.5 mm; ovules not winged. Fruit unknown.

**Habitat and distribution.** The type collection was from humid forest in southeastern Madagascar, in the upper valley of the Rienana at a relatively high altitude (over 1000 m).

**Phenology.** Flowers have been collected in November.

**Discussion.** This species’ sometimes 3-carpellate, not 5-carpellate gynoecium and characteristic small flowers place it in *Dombeya* subgen. *Xeropetalum*. The 4-carpellate condition seen in some flowers of the holotype is unusual but does occur, at least as an
abnormal condition, within other species of that subgenus. According to Arènes’ (1958, 1959) classification, it would be placed within section Xeropetala, subsection Floribunda, series Epilosa, sub-series Trothy Arènes (sepal reflexed).

Many of Arènes’ (1958, 1959) infrageneric groups are probably not monophyletic, as key characters occur repeatedly in his definitions of various infrageneric groups. For example, the presence or absence of reflexed sepal is the single character given to separate subseries Trothy from subseries Repandae within series Epilosa in Dombeya, and also the single character separating the monotypic subseries Subsquamosae Arènes from subseries Dichotoma Arènes within the hispid-ovarian series Pilosa Arènes (also within subsection Floribunda). Likewise, within section Xeropetala alone there are two pairs of sister series differentiated by having scaly versus stellate-pubescent ovaries. It is to be hoped that a molecular systematic study now in progress (Skema, pers. comm.) will identify major monophyletic lineages. Despite the serious limitations of the existing classification, D. rienanensis does generally resemble and seems to be reasonably placed with the three previously described species of subspecies Trothy, which are likewise native to humid forests of eastern Madagascar.

Those three species (Dombeya oblongipetala Arènes, D. gracilicyma Arènes, and D. trohy Arènes) are not well known; they were described from only one specimen each, with few collections added since. However, D. rienanensis can be differentiated from all three. Firstly, D. rienanensis is distinguished from D. oblongipetala and D. trohy by its obovoltae to oblanceolate leaves with rounded apices; D. oblongipetala has obovoltae-oblong to oblong leaves with obtuse apices, while D. trohy has oblong to elliptical leaves, to 14 cm long with petioles to 3 cm long. Dombeya rienanensis also has significantly smaller flowers than either of these species (petals 6.2–8 mm long vs. ca. 12–13 mm long) and more stamens (borne in groups of four or more, giving a minimum number of 20 vs. 15 or sometimes 10 in D. oblongipetala). Dombeya rienanensis most closely resembles D. gracilicyma, as both may have obovoltae leaves of similar size, but has much smaller inflorences, larger and differently shaped stamens if such are present, greater stamen number (20 or more vs. 15), and smaller floral parts (pedicels less than 12 mm vs. 15–20 mm long; style less than 2 mm vs. 3–4 mm long; androecial corona coromiform rather than tubuliform). Its petals may also be smaller (less than 8 mm, vs. a reported petal length of 9–11 mm in D. gracilicyma), but this character is often rather variable within species of Dombeya.

Dombeya rienanensis can also be easily confused with the widespread, variable eastern species D. laurifolia, mentioned above. Arènes (1959) listed the type specimen of D. rienanensis among examined material of D. laurifolia, which was placed within subseries Repandae. The leaves of D. laurifolia are sometimes similar to those of D. rienanensis, but—in addition to the non-reflexed sepal—D. laurifolia has only five or five to 10 (to 15) stamens, a very short (0.5–1 mm) style, and short (3–4 mm) calyx lobes.

Notably, the type of Dombeya rienanensis has small patches of short, possibly glandular trichomes on the adaxial sepal surfaces at the extreme base, inside the very short fused portion of the calyx. A similar character is present in all species of the related genus Helmiopsis. H. Perrier (Applequist, 2009), to which the type specimen has also once been referred. However, small glandular patches are also present in several species of Dombeya subg. Dombeya (pers. obs.) and may be present, although overlooked, in some other species of Dombeya not yet examined. Helmiopsis, whose members usually have a lepidote indument throughout, is differentiated from Dombeya by its usually winged seeds, often oppositipetalous stamens, and sometimes glandular petals; the stipules of Helmiopsis are small and immediately caducous. All but one, apparently derived species of Helmiopsis are 5-carpellate. Dombeya rienanensis, which has unwinged ovules, oppositipetalous stamens, and relatively large, occasionally persistent stipules, is clearly properly placed within Dombeya, as traditionally circumscribed, rather than Helmiopsis.

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Literature Cited


A New Combination in *Toxicoscordion* (Melanthiaceae) for the Rocky Mountain Region, North America

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Abstract. The new combination *Toxicoscordion venenosum* (S. Watson) Rydberg var. *gramineum* (Rydberg) Brasher (Melanthiaceae) is made to accommodate this taxon in this genus at the rank of variety for the Southern Rocky Mountain Interactive Flora (SRMIF) project. Recent chromosome and DNA sequence data support segregation of *Toxicoscordion* Rydberg from *Zigadenus* Michaux s.l.

Key words: Melanthiaceae, Southern Rocky Mountain Interactive Flora (SRMIF), *Toxicoscordion*, *Zigadenus*.

The need for a new combination in *Toxicoscordion* Rydberg (Melanthiaceae) was discovered in the process of constructing the Southern Rocky Mountain Interactive Flora (SRMIF) (<http://asstudents.unco.edu/students/lucid/> (Brasher & Snow, 2003, onward) and revising the accompanying “Provisional Checklist of Vascular Plants for the Southern Rocky Mountain Interactive Flora,” an earlier version of the Checklist of Vascular Plants of the Southern Rocky Mountain Region (Snow, 2009).


Distribution and habitat. Geographic distributions of the two varieties are as follows (USDA, 2009). Both occur in the American states of Utah, Idaho, Oregon, and Washington, and the Canadian provinces of Alberta and British Columbia in North America. Variety *gramineum* additionally extends eastward into the American states of New Mexico, Colorado, Nebraska, Wyoming, Montana, South Dakota, North Dakota, and the Canadian province of Saskatchewan. Variety *venenosum* additionally extends westward into the American states of Nevada and California.

Habitats of the two varieties differ. Variety *gramineum* inhabits inland grasslands and open pine woods from 500 to 1300 m (Schwartz, 2002), whereas variety *venenosum* occurs in coastal areas and well-drained grasslands from 0 to 2500 m.

Discussion. *Toxicoscordion* has been used in Colorado by Weber and Wittmann (1992, 2001) as one segregate genus removed from the broadly circumscribed genus *Zigadenus* Michaux s.l. The splitting of *Zigadenus* s.l. has been supported by chromosome number and DNA sequence data (Zomlefer et al., 2001; Zomlefer & Judd, 2002; Zomlefer, 2003).

It seems best to recognize variety *gramineum* at varietal rank in *Toxicoscordion venenosum* rather than species rank following Reveal (1977), Dorn (2001), and Schwartz (2002). This recognizes the similarity of variety *gramineum* to typical *T. venenosum* over its similarity to other species in the genus. A key to varieties adapted from Schwartz (2002) and Reveal (1977) is given below.

1a. Upper stem leaves not sheathing; inflorescences mostly racemose, occasionally paniculate with 1 basal branch; outer tepals with claw 0.5–1 mm long. **Toxicoscordion venenosum** var. *gramineum*

1b. Upper stem leaves, except for the bracts of the inflorescence, all sheathing; inflorescences mostly paniculate with 1 or 2 basal branches, occasionally racemose; outer tepals not clawed or with a claw < 0.5 mm long. **Toxicoscordion venenosum** var. *gramineum*

According to the *International Code of Botanical Nomenclature* (Greuter et al., 2000), articles 32.1, 33.2, and 41.5, the combination *Zigadenus venenosus* var. *gramineum* (Rydb.) O. S. Walsh ex M. Peck (1941) was not validated published, lacking reference to the publication of the basionym, but was later validated in Hitchcock (1969).

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Literature Cited


Un Nuevo Estatus para Sorocea sprucei subsp. subumbellata (Moraceae)

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Resumen. Considerando las distintivas características morfológicas de las infrutescencias subumbeladas y las recientemente descubiertas inflorescencias y flores estaminadas de Sorocea sprucei (Baillon) J. F. Macbride subsp. subumbellata C. C. Berg, se propone elevar su rango a nivel de especie.

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Key words: Ecuador, Moraceae, Peru, Sorocea, subgen. Paracharisia.

Sorocea sprucei (Baillon) J. F. Macbride es un arbusto o árbol dioico, perteneciente al subgen. Paracharisia (Ducke) W. C. Burger, Lanjouw & Wessels Boer. Este se caracteriza por ser deciduo, con conspicuas yemas axilares globosas, hojas con láminas escabrosas; inflorescencias subcapitadas o en espigas cortas, brácteas submembranosas y estambres con muy cortos filamentos (Berg, 2001). Sorocea sprucei comprende tres subespecies: la típica subsp. sprucei y las subespecies saccicolá (Hasler) C. C. Berg y subumbellata C. C. Berg (Berg, 2001). Las dos primeras subespecies presentan infrutescencias en espigas cortas o racemosas e inflorescencias estaminadas en espigas cortas o subcapitadas (subsp. sprucei) o capitadas (subsp. saccicolá), con flores sésiles o subésiles, cuyos pedicelos, cuando presentes, sólo alcanzan hasta 1 mm de longitud. En la subsp. subumbellata las infrutescencias son subumbeladas, con pedicelos más largos, de hasta 3.5 cm de longitud (Fig. 1), y sus inflorescencias estaminadas eran desconocidas (Berg & Rosselli, 1996; Berg, 1996, 2001). Esta es la única representante de Sorocea A. St.-Hilaire que se encuentra restringida al bosque seco del occidente de Ecuador (obs. pers.) y noreoccidente de Perú, en el Dept. Tumbes (Berg & Rosselli, 1996; Berg, 1998, 2001). En el tratamiento taxonómico de la familia Moraceae de Flora de Ecuador (Berg, 1996: 44–45), la descripción de las inflorescencias estaminadas de la subsp. subumbellata está estrictamente basada en la subespecie típica, con la indicación de que solamente las flores pistiladas habían sido colectadas, sus flores estaminadas eran desconocidas. El 26 enero 2002, en el Bosque Protector Cerro Blanco, en la provincia del Guayas, Ecuador, el autor encontró individuos estaminados florecidos pertenecientes a la subsp. subumbellata y preservó algunas inflorescencias, éstas presentan diferentes características morfológicas de S. sprucei (Fig. 2A, B), por lo que se propone elevar su estatus al rango de especie.


Las inflorescencias estaminadas de Sorocea subumbellata difieren de las dos subespecies restantes de S. sprucei por ser: (1) racemosas, con flores claramente pediceladas (distintivo de Sorocea), cuyos pedicelos tienen mayor longitud (1.5–2 mm), (2) los tépalos en la antesis son ampliamente divergentes hasta reflexos, exponiendo las 4 anteras exsertas, y (3) sus filamentos hacia la base se encuentran fusionados formando una corta columna estaminal (monadéfia) (Fig. 2B). En S. sprucei subsp. sprucei y subsp. saccicolá, los tépalos en la antesis son erectos, las anteras son sésiles o subésiles con muy cortos filamentos (cuando presentes) libres, independientes y claramente separados entre sí, de modo que cada uno está unido directamente sobre un receptáculo ± plano (Fig. 2A).

Con excepción de la distanciamente relacionada Sorocea bonplandii (Baillon) W. C. Burger, Lanjouw & Wessels Boer (del subgen. Sorocea A. St.-Hilaire), 12 de las 14 especies de Sorocea (es desconocido en S. jaramilloi C. C. Berg) presentan tépalos erectos en la antesis (Berg, 2001). La particular disposición de los tépalos (ampliamente divergentes hasta reflexos) que presenta S. subumbellata en la antesis y la particular estructura de los estambres con filamentos...
fusionados formando una corta columna estaminal, a
más de una clara diferencia morfológica en com-
paración con las subespecies sprucei (Fig. 2A) y
saxicola, también sugieren una distinta biología
floral. Además, es necesario notar que las anteras
apiculadas, el segundo caracter de S. sprucei (Berg,
2001: 94, 132 [fig. 30: 9, 11]), es ausente en S.
subumbellata, la que tiene anteras de ápices
redondeados. Finalmente, a diferencia de S. sprucei
subsp. sprucei y subsp. saxicola que tienen infru-
tescencias en espigas cortas o racemosas, las
infrutescencias de S. subumbellata son subumbela-
das. Estas diferencias morfológicas, en relación con
el patrón fitogeográfico de S. subumbellata, restrin-
gida a los bosques secos costeros de Ecuador y Perú
(Fig. 2B), ameritan para su reconocimiento formal a
nivel de especie.

**Fenología.** Los individuos estaminados de Sor-
oca subumbellata tienen una floración explosiva
aproximadamente a partir de la tercera semana
después del inicio de la estación lluviosa, durante el
mes de enero. Esta va acompañada con la producción
de hojas nuevas y dura unas dos semanas, el resto del
año los individuos estaminados permanecen estériles.
Esta rápida floración explosiva anual es una de las
razones porqué las inflorescencias estaminadas de
esta especie no habían sido colectadas y eran
desconocidas, pero al parecer también se debería a
que posiblemente las poblaciones estaminadas estar-
zan constituidas por pocos individuos.

**Especímenes seleccionados.** **ECUADOR.** El Oro: ca.
60 km SE of Arenillas, on rd. to Loja, T. D. Pennington &
G. Tenorio 10720 (QCNA, QCNE, U); Cantón Arenillas, rd.
Arenillas–Piedras, T. Plowman 5471 (GH, S, U); Santa
Rosa, E. Asplund 15775 (S); Guayas: rd. Guayaquil–
Salinas, Km 24, C. H. Dodson, A. Gentry & F. M. Valverde
9601 (F, MO, U); Cerro Blanco, X. Cornejo 1886 (BG,
GUAY), 7872 (BG, GUAY), D. Neill & T. Núñez 10473 (MO,
NY, QCNE); Cerro Azul, W. of Guayaquil, E. Asplund 15630,
15631, 15389 (S); rd. Guayaquil–Daule, Km 21, C. H.
Dodson & P. M. Dodson 11454 (MO), C. H. Dodson & A.
Gentry 12346 (F); Loja: Bosque Petrifícalo Puyango,
Quebrada El Chirimoyo, X. Cornejo & C. Boníz 5021
(BG, GUAY); Puente Chico, 12 km N of Alamar, A.
Samaniego et al. 50 (LOJA, QAME, US); PERÚ. Tumbes:
Tumbes, Pampas del Hospital, El Cañcho, C. Díaz, T.
Pennington & C. Reynel 3224 (BG, MO).

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Blanco, quien concedió al autor el permiso para
realizar las observaciones de campo; a los curadores y herbarios visitados: GUAY, LOJA, MO, QCA, QCNE, WIS; a Claes Persson (GB) y Janeth Santiana (QCA), quienes gentilmente proporcionaron al autor fotografías digitales del holotipo e isótipo de *Sorocea sprucei* subsp. *subumbellata*; y a Kandis Elliot, artista del Departamento de Botánica de la Universidad de Wisconsin, por mejorar la ilustración de la Figura 2. Sergio Romaníe Neto (SP) y un revisor anónimo realizaron críticas constructivas del manuscrito.

Literatura Citada
Nomenclatural Actions for the New World Cypresses (Cupressaceae)

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Key words: *Callitropsis*, Cupressaceae, *Cupressus*, *Neocupressus*, New World cypresses, ×*Neocupropsis*.

In order to separate the Old World cypresses from the New World cypresses, Little (2006) placed the New World cypresses into the genus *Callitropsis* Oersted, a conclusion that sidesteps several clear-cut morphological differences. It has long been obvious to me and also to various other botanists (Little et al., 2004; Xiang & Li, 2005) that the New World cypresses differ markedly from the Old World cypresses. In my opinion, this is based on two distinct morphological characters: (1) all of the New World cypresses have multiple cotyledons (three or more; I collected some seedlings with two cotyledons in the southern range of *Neocupressus pygmaea* (Lemmon) de Laubenfels [de Laubenfels, 1963]). All of the Old World cypresses have two cotyledons, but with a distinct further character: the cotyledons are followed at the same level after germination by two smaller leaves and then by alternating whorls of four leaves, later reduced to whorls of three and then eventually to opposite decussate placement (a character shared by most of the remaining Cupressaceae s. str., de Laubenfels, 1953). Misidentification of *Cupressus lusitanica* Miller, which is widely cultivated and possibly escaped in the Old World, has led to reports of additional cotyledons there. For example, seed from a cultivated plant, said to be *C. assamica* Silba (*C. hinalaica* Silba) (Silba, 1994), was grown at Hillier Gardens in England, where it later turned out to be *C. lusitanica* (de Laubenfels, pers. obs.). The New World cypress cotyledons are followed directly by alternating whorls of three or four leaves. Relatives of species with the special dicot habit can lose it, as in several species of *Juniperus* L. and in *Tetracnemis* Masters, but the presence of this unusual cotyledonal trait marks a clear-cut distinction. The occurrence of a few examples of this trait in *N. pygmaea* suggests that it is also a lost trait in the New World cypresses. (2) All of the New World cypresses, except *C. benthamii* Endlicher (see treatment below), have monomorphic leaves. Only rarely are the branchlets distichous (*C. macnabiana* A. Murray bis). All but one of the Old World cypresses (*C. duclouxiana* B. Hickel in Camus) have distichous branchlets whose leaves, furthermore, are dimorphic with lateral leaves keeled so that the branchlets become flattened. The dimorphic character is most obvious on juvenile branchlets and can be more or less obscure or even lost with age. A majority of Cupressaceae genera have the dimorphic habit and, as in Old World cypresses, some related species may have lost it, but the dimorphic leaf trait, where it occurs, is a clear-cut distinction. The distichous habit of branchlets is not lost with age.

Little (2006) based the distinction between the Old World and New World cypresses on a suite of characters, no one alone being diagnostic. He presented a series of cladograms to demonstrate the relationship. In fact, the cotyledonal condition is, indeed, diagnostic. This, then, is further supported by Little’s careful statistical analysis. Unfortunately, for identification purposes, the cotyledonal character is not usually available. The dimorphic habit, for its part, distinguishes all but *Cupressus duclouxiana*
among the Old World species. Because this species, as seen in Little’s analysis (Little, 2006), falls well within the suite of Old World cypress characters, it would appear that it has lost the distichous habit rather than being a transitional species. There is no argument here with the generic separation of the Old World cypresses from the New World cypresses, but rather with the strategy of how to bring it about.

In Little’s (2006) analysis, he identified two monophyletic groups of species, one being the genus Juniperus and the other forming the genus Callitropsis, intermediate between the Old World and the New World cypresses. The genus Juniperus can be readily distinguished by non-dehiscent cones and other characters. In his analysis, Little found the genus Callitropsis to be closer to the New World cypresses than to the Old World cypresses. This led him to consider several strategies, among which he included the placing of the New World cypresses into Callitropsis or, conversely, erecting a new genus for the New World cypresses, and he chose the former strategy. This is unfortunate, because no matter how closely the two may be related, they are strikingly different in obvious ways. Not only do the species of Callitropsis have markedly distichous ultimate branch systems, but the lateral leaves are sharply bent and distinctly larger than other Cupressaceae genera including Fokienia A. Henry & H. H. Thomas, Thujopsis Siebold & Zuccarini, Calocedrus Kurz, and Libocedrus Endlicher, particularly at the juvenile stage. Furthermore, both species, on juvenile shoots, show a clear differentiation between the upper and the lower sides of the branchlets. Another distinction is the small cones of Callitropsis normally with only four fertile scales, whereas all cypresses normally have six or more. The dimorphic leaf sizes, sometimes different for leaves on the upper branchlet surface versus those on the lower branchlet surface, as well as the smaller cones make Callitropsis differ from the New World cypresses in ways that the Old World cypresses do not. The two previously described species of Callitropsis further have the coryledonal condition of the Old World cypresses and rather few seeds per fertile scale.

The position of Cupressus benthamii requires special consideration at this point. It is often considered a variety of C. lusitanica simply because they both grow in Mexico. These two taxa are sharply different. Cupressus benthamii has well-marked distichous branchlets with distinctly dimorphic leaves such that the ultimate branch systems are strongly flattened. The seed cones normally have only four fertile scales. These characters not only distinguish it from C. lusitanica, but also from other New World cypresses while allying it with Callitropsis. One of Little’s cladograms (Little, 2006: 469, fig. 4) actually groups it (along with Cupressus funebris Endlicher) with Callitropsis. Because of these obvious distinctions and because, in my experience, most specimens in herbaria and arboreta identified as C. benthamii have been misidentified, I consider that error may have contaminated the data used by Little (although, to be sure, Little’s personal collections at BH are correctly identified). For that reason, I am not prepared to separate it from Callitropsis as I would all the remaining species of New World cypresses. Unlike the other Callitropsis species, but like C. lusitanica, C. benthamii has three or four cotyledons and has numerous seeds per fertile scale. These conditions could be the result of introgression from C. lusitanica. It is worth noting that Callitropsis (Cupressus) benthamii is morphologically very close to ×Neocupressus leylandii (A. B. Jackson & Dallimore) de Laubenfels, a hybrid between Callitropsis and Neocupressus, the main distinction being that the latter normally has six seed cone scales.

In order to separate the New World cypresses from Callitropsis (including Cupressus benthamii), it is necessary to erect a new genus, for which the name Neocupressus is here proposed. Eight species and seven varieties are involved. There are nine species of Old World cypress and, with C. benthamii, three species of Callitropsis. This treatment would require a small revision of the genus Callitropsis.

I. Neocupressus de Laubenfels, gen. nov. TYPE: Neocupressus macrocarpa (Hartweg) de Laubenfels.

Hoc genus a Callitropside Oosted foliis non dimorphis et strobili feminei squamis fertilis plerumque 6 ad 12 (raro 4) differt.

Trees or shrubs with multiple cotyledons (3 or more, most commonly 4 [Wolf, 1948]; in a few species 3 may be most common); branchlets not distichous or rarely distichous. Leaves in alternate whorls, each whorl at first in seedlings usually of 4 linear leaves, gradually reduced to whorls of 3, and finally opposite deciduous leaves scale-like when adult and similar (never differentiated into lateral and facial forms). Seed cones with 6 to 12 pellate woody fertile scales (sporadically 4), 8 to 15 erect seeds per fertile scale (sometimes less on lowest or uppermost scales).

Infrafascia as varieties are applied here, as historically they have been used in Cupressus L Synonyms are given only where not found in Wolf (1948) or Farjon (2005) or where they are different from these.

1. Neocupressus arizonica (Greene) de Laubenfels, comb. nov. Basionym: Cupressus arizonica

The type variety of *Neocupressus arizonica* is substantially variable, especially as to the degree of leaf gland activity, peeling of the bark, and number of serotinous seed cones, such that examples closer to its varieties or other species could be selected within normal populations.

1a. *Neocupressus arizonica* (Greene) de Laubenfels var. *arizonica*.


*Neocupressus arizonica* var. *glabra* has bark peeling in plates rather than the fibrous bark in strips of the type variety and is generally much more glaucous with more active leaf glands.

*Callitropsis stephensonii* is known from one small population near San Diego, California. The large seed lies within the size range of seed of variety *glabra*.

Farjon (2005) placed *Cupressus arizonica* var. *reveliana* in synonymy with his variety *stephensonii* such that now it must be transferred to synonymy with variety *glabra*. The relatively small seed in this small population is within the size range of variety *glabra*.


The variety *nevadensis* has blunter umbo on the seed cone scales and much more active glands on the leaves than the type variety.


Variety *montana* differs from the type variety in the immediate opening of the seed cones upon maturity.


3a. **Neocupressus goveniana** (Gordon) de Laubenfels var. **gibsonensis**.


Subspecies *gibsonensis* highlights the non-dwarfed form of the type variety found also in the type locality, with trees to 7 m and seed cones about 2 cm long with seed to 4 mm long.

Subspecies *neolomondensis* differs from variety *abramisiana* in the non-glaucousness of the seed such that the subspecies as described is identical to the variety *goveniana*. The subspecies *neolomondensis* population adds a third grove to variety *goveniana* on the north side of Monterey Bay. A fourth grove is found near Anchor Bay in Mendocino County near the variety *pygmaea*.


Variety *abramisiana* differs primarily in the glaucousness of the seeds, which may be due to introgression from nearby stands of *Neocupressus sargentii* (Jepson) de Laubenfels, which until now have been misidentified as *Cupressus abramisiana* (perhaps due to their geography!). Strictly speaking, this variety occurs only in the vicinity of Bonnie Doon in California.


Variety *pygmaea* differs from the type variety in *Neocupressus goveniana* in having shiny black seeds that are not dull blackish to dark brown. The inclusion of the Anchor Bay grove in this variety by Wolf (1948) and many others (rather than the type variety of *N. goveniana*) has confused the status of variety *pygmaea*.


4a. **Neocupressus guadalupensis** (S. Watson) de Laubenfels var. **guadalupensis**.


*Cupressus forbesii* Jepson has been widely considered a variety of *C. guadalupensis*, differing in the
lack of glaucousness and a slightly shorter pollen cone.


The origin of Neocupressus lusitanica has long been a problem inasmuch as it was described from Old World material. Martinez (1942), in particular, rejected a Mexican origin. More recently, Silba (1994) has pressed that claim. However, most, if not all of the critical material from the Old World is from cultivation, and I have personally collected material exactly of the species in the forests on the slopes of Mt. Ixtacihuatl along the route of conquistadors where cypress surely were first encountered in Mexico by Europeans (de Laubenfels 687, personal collection). Franco (1945) and Farjon (1993, 2005) have made the case for a New World origin, the position adopted here. My collection could be considered an epitype.


Silba’s (1990) description of Cupressus himalaica var. darjeelingensis material does not match his holotype, which is Neocupressus lusitanica, in that he reports flattened branchlets in long chain-like segments.


Cupressus lindleyi is better identified as a more robust variety of the species Neocupressus lusitanica that is common to drier and more exposed locations. Martinez (1942) took great pains to distinguish C. lindleyi from C. lusitanica because of his belief that the latter was not of Mexican origin. My own experience collecting in Mexico supports the conclusion that two varieties are involved. The holotype of C. lindleyi has been destroyed, but isotypes exist from which a lectotype was selected.


The subspecies lobosensis, from the southern grove population of the species in Monterey County, as described by Silba in 2003, lies within the range of characters of the type and tends to emphasize the tendency of older trees of Cupressus macrocarpa to have larger seed cones and thicker foliage, also found in its type locality on Carmel Bay.


Differences of subspecies locatellii and the following synonymous taxa from Neocupressus go-


**KEY TO THE SPECIES OF NEOCUPRESSUS**

1a. Active glands on at least some of the leaves (leaves never rich green).

2a. Immature seed cone scale conical-acute, branchlets distichous.

2b. Seed cone scales peltate with a central umbo, branchlets not distichous.

3a. Seed cone scales covered with warts, branchlets to 1.3 mm diam.

3b. Seed cone scales not warty, branchlets to 1.7 mm diam.

1b. Glands inactive to absent.

4a. Seed cone serotinous, at least partially.

5a. Bark fibrous in strips.

6a. Usually 8 pollen sacs per scale, seed cone 24–33 mm diam. (seed not glaucous, foliage bright green). .

7a. Pollen sacs 3 to 4 per scale, branchlets 1.5–2 mm diam. (seed glaucous, foliage dull green).

8a. N. sargentii

7b. Pollen sacs 5 to 6 per scale, branchlets 1–1.5 mm diam.

5b. Bark exfoliating in plates (branches 1–1.4 mm diam., seed not glaucous) .

4b. Seed cone always opening on maturity (bark fibrous, 4 pollen sacs per scale, seed not glaucous) .

5. N. lusitanica

Several hybrids involving Callitropsis nootkatensis (D. Don) Oersted ex D. P. Little, and various species of New World cypressus have been reported by Jackson and Dallimore (1926) and Mitchell (1970) and have been placed in the hybrid genus ×Cupressocyparis Dallimore, formed from the genera Chamaecyparis Spach (considered the genus for C. nootkatensis) and Cupressus. Because the genera involved in the parent formula for the nothogenus have changed, the name of the hybrid genus ×Cupressocyparis must also be changed, for which the name ×Neocupressus is proposed.

II. ×Neocupressus de Laubenfels, nothogen. nov. TYPE: ×Neocupressus leylandii (A. B. Jackson & Dallimore) de Laubenfels. 


All three ×Neocupropsis species are strictly horticultural in origin and, because they all involve Callitropsis nootkatensis, they are quite similar. ×Neocupropsis leylandii is a hybrid with Neocupressus macrocarpa and is very similar to C. nootkatensis including seed cones to 20 mm in diameter but without the drooping branches. ×Neocupropsis notabilis is a hybrid with Neocupressus arizonica var. glabra and has much more open branching with glaucous seed cones only 12 mm in diameter. ×Neocupropsis ovensis is a hybrid with Neocupressus lusitanica and has the open branching with the drooping habit and also small glaucous seed cones.

Literature Cited


Martínez, M. 1942. Las Pinaceas Mexicanas. Universidad Nacional Autónoma de México, Mexico D.F.


A New Combination in Mackaya (Acanthaceae), with Lectotypification for Mackaya tapingensis

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ABSTRACT. Comparative survey of morphological characters shows that *Eranthemum tapingense* W. W. Smith is better treated in Mackaya Harvey. Consequently, a new combination, *M. tapingensis* (W. W. Smith) Y. F. Deng & C. Y. Wu, is proposed, and its lectotype is designated. The species is distributed in China and Burma (Myanmar).

Key words: Acanthaceae, Eranthemum, Mackaya, Pseuderantherum.

While revising the family Acanthaceae for the forthcoming volume 19 of *Flora of China*, the position of *Pseuderantherum tapingense* (W. W. Smith) C. Y. Wu & H. S. Lo (Anonymous, 1975) was drawn to our attention because it differs from other members of *Pseuderantherum* Radlk. in its second flowers in terminal racemes and its campastulate corolla without a long slender cylindrical tube. The species was originally described as *Eranthemum tapingense* W. W. Smith (Smith, 1918) from three collections from Burma (Myanmar), i.e., Forrest 9655, 9484, and 12149. In the original description, Smith (1918) indicated that this taxon was related to *E. indicum* (Nees) C. B. Clarke and *E. lateriflorum* C. B. Clarke. *Eranthemum indicum*, originally described in Thysacanthus Nees as *T. indicus* Nees, was transferred to Mackaya Harvey by Ensermu et al. (1992), and *E. lateriflorum* to Gymnostachyum Nees by Hansen (1985a). It is reasonable, then, to re-evaluate the position of *E. tapingense*.

Wu (1984) included *Eranthemum tapingense* in his *Index Florae Yunnanensis*, cited the three Forrest collections listed above, and believed these collections to be from Longchuan xian of Yunnan Province, China. Simultaneously, he mentioned that the species might belong in *Odontonemella* Lindau, but did not actually transfer the species from *Eranthemum* L. to *Odontonemella*. Hu (2002) included this species under *Pseuderantherum* in her treatment of the family Acanthaceae for *Flora Reipublicae Popularis Sinicae* and indicated that it is distributed in the boundary areas between China and Burma (Myanmar).

*Odontonemella* was established by Lindau (1893), characterized by a ventricose corolla, two fertile stamens, two staminodes, and spangepollen, and was typified by *O. indica* Lindau. *Odontonemella indica* was originally described in *Eranthemum as E. indicum* (Clarke, 1885) and was transferred to Mackaya by Ensermu et al. (1992). Lindau (1895) added a new member to the genus, *O. leptostachya* Lindau based on *Leptostachya wallichii* Nees, which is the lectotype of *Leptostachya Nees* (Hansen, 1985b; Deng & Xia, 2005) and does not fit the original description of *Odontonemella* given by Lindau (1895). Recent studies placed *Odontonemella* in synonymy with Mackaya (Brummitt, 1992; Ensermu et al., 1992; Mabberley, 1997; Scotland & Volessen, 2000).

In October 2004, the first author had the opportunity to check the material identified as *Pseuderantherum tapingense* when he visited the herbaria of Kew and Edinburgh. In the Edinburgh herbarium, the first author saw all three collections cited by Smith, of which G. Forrest 9655 was dissected by Smith. This collection clearly shows that the species has two fertile stamens and two staminodes. It is not *Pseuderantherum* because of its campastulate corolla without a long cylindrical tube. It also differs from *Eranthemum* in the corolla shape, which is long and cylindrical in *Eranthemum* and campastulate in *Mackaya*, and in the pollen grains (Lindau, 1895; Hu,
2002). After comparison with related genera, we concluded that the species belongs in Mackaya rather than in Pseuderanthemum or Eranthemum. Our recent molecular data (unpublished) also indicate that Mackaya forms a sister group with Asystasia Blume and forms paraphyletic groups with Pseuderanthemum. A new combination, *M. tapingeensis* (W. W. Smith) Y. F. Deng & C. Y. Wu, is therefore necessary.

The genus *Mackaya* (Harvey, 1859) is characterized by its secund flowers, campanulate corolla, two fertile stamens, and two staminodes. Kanjilal and Das (1939) incorrectly included *Asystasia in Mackaya* and transferred three Assam species of *Asystasia to Mackaya*, i.e., *M. atroviridis* (T. Anderson) Das, *M. macrocarpa* (Nees) Das, and *M. neesiana* (Wallich) Das. These three species are quite different from *Mackaya* in having four stamens and we prefer to place them in *Asystasia* rather than *Mackaya*. In recent studies, however, *Mackaya* has been treated separately from *Asystasia* (Ensermu et al., 1992; Mabberley, 1997; Scotland & Vollesen, 2000; Wood, 2001). It was placed in subtribe Asystasiinae (Benth., 1876; Clarke, 1885; Lindau, 1895), tribe Odontoneemieae (Lindau, 1895), or subtribe Justiciinae (Scotland & Vollesen, 2000) together with *Dicentranthera* T. Anderson, *Asystasiella* Lindau, *Glossochilus* Nees, and *Salpinctium* T. J. Edwards.

*Mackaya* is a small genus of three species with a disjunct range: *M. bella* Harvey is restricted to South Africa (Phillips, 1951), but *M. indica* (Nees) Ensermu occurs in India, Bhutan, Nepal, and Burma (Myanmar). *Mackaya tapingeensis*, proposed herein, is found in southwestern Yunnan, China, and adjacent Burma (Myanmar).

Pollen morphology is one of the important characters defining the generic boundary in the family Acanthaceae (Lindau, 1893, 1895; Brebemakp, 1944). Pollen of *Mackaya tapingeensis* is oblate-spheroidal, 3-cotporate, and ellipsoidal with a perorate exine (polar axis [P] = 50.2 [46–53] μm; equatorial diameter [E] = 44.9 [42–48] μm) (Fig. 1). It is quite different from pollen of *Eranthemum* species but is similar to that of *Pseuderanthemum* species and other *Mackaya* species (Raj, 1961; Daniel, 1993, 1998; Scotland & Vollesen, 2000; Hu et al., 2005a, b). It differs from pollen of the other two species of *Mackaya* only in size (Ensermu et al., 1992).


Figure 1. Pollen grain of *Mackaya tapingeensis* (W. W. Smith) Y. F. Deng & C. Y. Wu from G. Forrest 9655 (IBSC).


**Distribution and habitat.** The species is distributed in southwestern China (Yunnan) and Burma (Myanmar). It grows in shady habitat under forest at elevations of 600–1800 m.

**Relationships.** *Mackaya tapingeensis* is similar to *M. indica*, but differs in its lancelolate (vs. elliptic) leaves and glabrous (vs. puberulent or glabrescent) calyx that is basally connate to 1/3–1/2 (vs. less than 1/5) (Smith, 1918; Hu, 2002).

**Additional specimens examined.** BURMA (MYANMAR). Shan Valley of the Taping, G. Forrest 9434 (E); Valley of the Taping, 2000 ft., G. Forrest 12149 (E), CHINA: Yunnan: Gengma Xian, 2250 m, 7 Jan. 2006, Deng Yuanye 18452 (IBSC); Lu-se (now Luxi Shi), 1750 m, 3 Mar. 1943, H. T. Tsai 56406 (IBSC, KUN); Lu-Hai Haien (now Luxi Shi), 1750 m, 9 Feb. 1943, H. T. Tsai 56806 (IBSC, KUN, SZ); Yingjiang Xian, 900 m, 26 Oct. 1986, Lin Qin 770760 (KUN); Yingjiang Xian, 1800 m, 19 Jan. 1989, Sun Hang 1530 (KUN); Yingjiang Xian, 1450 m, Dec. 1981, Tao Guoda 12797 (HITBC); Yingjiang Xian, 1500 m, 3 Nov. 1974, Tao Guoda 13128 (HITBC, KUN); Yingjiang to Ruili, autumn 1952, R. C. Ching 50112 (KUN, SWFC); Zhenkang Xian, 1130 m, 14 Feb. 1959, Zhu Taiping 641 (KUN); western Yunnan, autumn 1952, R. C. Ching 50833 (KUN, SWFC).

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Literature Cited


A New Combination in *Pediomelum* and a New Genus, *Ladeania*, from Western North America (Fabaceae, Psoraleeaceae)

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**Abstract.** *Psoralidium tenuiflorum* (Pursh) Rydberg, the type of *Psoralidium* Rydberg, is transferred to *Pediomelum* Rydberg requiring a new combination, *Pediomelum tenuiflorum* (Pursh) A. N. Egan in tribe Psoraleeae Lowe (Fabaceae/Leguminosae). Previously published evidence on phylogenetic relationships provides a foundation for this combination, as do shared morphological traits such as persistent bracts and an elliptical fruit that falls with the calyx. A new genus, *Ladeania* A. N. Egan & Reveal, is described to accommodate the two remaining species previously in *Psoralidium*: *L. junccea* (Eastwood) A. N. Egan & Reveal and *L. lanceolata* (Pursh) A. N. Egan & Reveal, with the latter designated as the type. *Ladeania* is distinguished by readily deciduous bracts accompanying a calyx that does not enlarge or elongate in fruit, but flares back from the receptacle. A lectotype is designated for *Psoralea floribunda* Nuttall ex Torrey & A. Gray.

**Key words:** Fabaceae, IUCN Red List, Ladeania, Leguminosae, North America, Pediomelum, Psoraleeae, Psoralidium

*Psoralidium tenuiflorum* (Pursh) Rydberg was first collected on the historical expedition of Meriwether Lewis and William Clark on 21 September 1804 at the Big Bend of the Missouri River, which would later become Lyman County, South Dakota, U.S.A. (Moulton, 1987; Reveal et al., 1999). The species is widespread across much of the Great Plains of the United States (The Great Plains Flora Association, 1986). Frederick Pursh (1813) later described it as *Psoralea tenuiflora* Pursh. Since then, the species has experienced a murky taxonomic history. Rydberg (1919) designated *Psoralea tenuiflora* as the type of a new genus, *Psoralidium* Rydberg, wherein he recognized 14 species. Four of Rydberg’s species, *Psoralidium floribundum* (Nuttall) Rydberg, *Psoralidium bigelovii* Rydberg, *Psoralidium batesii* Rydberg, and *Psoralidium obtusilobum* (Torrey & A. Gray) Rydberg, were later assigned to synonymy under *Psoralidium tenuiflorum* by Grimes (1990). Both Grimes and Isely (1998) recognized that the variation across this species is great, but with no distinct segregation as to definitively allow specific designation, an ascertaining that the authors of this paper share.

Recently, Egan and Crandall (2008) conducted a comprehensive phylogenetic analysis of North American members of tribe Psoraleeae Lowe, to which *Psoralidium* and *Pediomelum* Rydberg belong. Their study estimated evolutionary relationships within North American Psoraleeae across eight DNA regions: ITS, Waxy, trnSG, trnLF, trnK, matK, trnD/T, and rpoB-trnC. All analyses therein suggested that *Psoralidium*, as circumscribed by Grimes (1990), was not a natural grouping and that *Psoralidium tenuiflorum* nested well within *Pediomelum*. In addition, both accessions included in their analyses grouped together within a well-supported clade consisting predominately of species ascribed to subgenus *Pediomelum* by Grimes (see Egan & Crandall, 2008: figs. 2, 3).

Grimes (1990) diagnosed *Psoralidium* by its unique calyx morphology that does not enlarge in fruit, but instead flares back and tears along a lateral sinus. While *Psoralidium tenuiflorum* possesses similar calyx morphology, some of its other traits suggest an affinity with *Pediomelum*. The remaining two species that Grimes assigned to *Psoralidium*, *P. lanceolatum* (Pursh) Rydberg and *P. junccea* (Eastwood) Rydberg, possess readily deciduous bracts and globose to subglobose fruits that are deciduous above the receptacle, while *Psoralidium tenuiflorum* has persistent bracts and an elliptical fruit that falls with the calyx, traits more similar to those of *Pediomelum*. In preparation for the forthcoming treatment of Fabaceae for the *Flora of North America*, *Psoralidium tenuiflorum* is transferred from *Psoralidium* to *Pediomelum* on the basis of the above phylogenetic and morphological data.

With the transfer of the type species of *Psoralidium* (Rydberg, 1919), based on *Psoralea tenuiflora* (Pursh, 1813), to *Pediomelum*, the remaining two species assigned to that genus, *Psoralidium junccea* and *Psoralidium lanceolatum*, require a new generic name. We resolve this issue by describing the new genus *Ladeania* A. N. Egan & Reveal with two new combinations: *L. junccea* (Eastwood) A. N. Egan &
Reveal and *L. lanceolata* (Pursh) A. N. Egan & Reveal, with the latter designated as the type.


The NY specimen of *Psoralea floribunda* was chosen as the lectotype based on the fact that it was annotated by Nuttall, who stated that it was collected in the Arkansas Territory; the sheet also bears a small sketch by Torrey proving that he examined the material. The combination of these factors makes this specimen a good choice for lectotypification of *P. floribunda*.

**Distribution and habitat.** This species occurs widely across North America, mostly within the Great Plains of the United States, but also in desert shrub and woodlands at 200–1800 m elevation, from Montana east to Minnesota and south to Texas and northern Mexico (see Grimes [1990] and Isely [1998] for comprehensive maps of species distribution).

*IUCN Red List category.* We suggest that *Pediomelum tenuiflorum* be designated as a taxon of Least Concern (LC) according to the IUCN Red List Categories and Criteria (IUCN, 2001) due to its widespread distribution and presence in both natural and disturbed habitats.

**Relationships.** Molecular phylogenetic studies place *Pediomelum tenuiflorum* well within the subgenus *Pediomelum* as circumscribed by Grimes (1990). Morphology supports this placement in that *P. tenuiflorum* has a tall, branched habit with a persistent inflorescence, characteristics that distinguish subgenus *Pediomelum* from subgenus *Disarticulatum* J. W. Grimes.

*Pediomelum tenuiflorum* fits easily into the key for *Pediomelum* provided by Grimes (1990: 58) with the reformatting and addition of a new couplet to his couplet 6:

<table>
<thead>
<tr>
<th>couplet</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6a</td>
<td>Calyx 2.5–6 mm to lower tooth; peduncle always greater than 7 mm</td>
</tr>
<tr>
<td>6’a</td>
<td>Pedicel in flower 3.5–10 mm long.</td>
</tr>
</tbody>
</table>

*Pediomelum linearifolium*

*Pediomelum tenuiflorum* 6b. Calyx 5.5–19 mm to lower tooth; if as short as 5.5 mm, then peduncle 7 mm or less.

**Ladeania** A. N. Egan & Reveal, gen. nov. TYPE: *Psoralea lanceolata* Pursh [= *Ladeania lanceolata* (Pursh) A. N. Egan & Reveal].

Genus novum quod a *Pediomelum* Rydberg bracteis cito caducis et calyce e receptaculo reflexo sed nec amplificato nec elongato tempore fructificante, *Rupertia* J. W. Grimes receptaculo complanato (nec tumido) differt.

*Plants* herbaceous, usually much-branched and glandular, arising from rhizomes or from deep, woody roots. *Stems* usually much-branched basally, mostly sparingly so apically, glabrate or sericeous to densely pubescent throughout or at least basally, occasionally becoming glabrate with age, green, smooth or lightly striate, occasionally distinctly ribbed apically, lowermost portions often with thin, tan to brown cataphylls. *Leaves* palmately compound or pseudopalmate, (1) to 3- to 5-foliate; stipules quickly to tardily deciduous, usually adnate to petiole, rarely connate basally petiole, often modified to form cataphylls at base of stem; petioles not jointed to stem; leaflets petiolulate, persistent or quickly deciduous and sometimes lacking at maturity. *Inflorescence* an indeterminate, dense to interrupted pseudoraceme with (1) to 2 to 3 (to 3) flowers per node; *bracts* lanceolate to rhombic, quickly deciduous. *Flowers* pedicellate; calyx with pallid green teeth or green throughout, glandular, sometimes glabrate to sericeous; teeth 5, usually less than half as long as calyx tube, mostly equal in length, the abaxial tooth sometimes slightly longer, flaring back and tearing along a lateral sinus in fruit; corolla papilionaceous, inserted on hypanthium rim, yellowish to purple-blue or dark purple, rarely white; hammer reflexed 30°–90°, auriculate or not; wings and keel connate just above claw; wings dorsally lamellate on ventral side with a reflexed, dorsiventral lobe; keel fused apically; stamens diadelphous, the distinct portion of filaments filiform, in 2 series; anthers basifixed (upper series) and dorsifixed (lower series);
ovary 1-ovulate, short stipitate with stipe obscured by swollen hypanthial nectaries; style ± reflexed. Fruit an indehiscent, 1-seeded legume, circular, deciduous above receptacle; seed round to elliptic, somewhat compressed, brown, smooth.

Etymology. This genus is named in honor of LaDean Egan (1949–), mother of the senior author, in recognition of her steadfast support during numerous field-collecting trips throughout the course of her daughter’s study of North American Psoraleeaceae.

Relationships. Recent molecular phylogenetic work placed Ladeania as most closely related to Rupertia (Egan & Cranford, 2008). Morphology supports this conclusion in that both are characterized as having deciduous bracts and a fruit that is deciduous above the receptacle; they differ in calyx and leaf morphology as well as in the receptacle being tumid in Rupertia and flat in Ladeania.

The following key (modified from Grimes, 1990) distinguishes Ladeania from other genera of New World Psoraleeaceae. This key should be inserted in Grimes' key (1990: 16) so as to replace couplets 4 through 8.

4a. Fruit developing an internal wall of sclereids at maturity; calyx not enlarging, elongating, or changing shape during fruiting . . . . Hoita

4b. Fruit not developing an internal wall of sclereids at maturity; calyx changing shape and/or enlarging, elongating during fruiting . . . . 5

5a. Calyx not enlarging or elongating through fruiting, but flaring back widely from receptacle, this accompanied by readily deciduous bracts . . . . Ladeania

5b. Calyx enlarging or elongating, if only slightly, commonly inflating somewhat; if calyx not enlarging or elongating and flaring back, then accompanied by persistent bracts . . . . 6

6a. Pericarp rugose, glabrous (glabrate) . . . . Orbesilium

6b. Pericarp not rugose, usually pubescent, rarely glabrate . . . . 7

7a. Bracts persistent; fruit persistent on receptacle . . . . Pedionemum

7b. Bracts deciduous; fruit deciduous above receptacle . . . . 8

8a. Receptacle tumid; corolla ochroleucous or yellow . . . . Rupertia

8b. Receptacle flat; corolla blue, purple, or violet . . . . Otholobium

The following key distinguishes between the two species in the genus Ladeania:

1a. Mature stems rushlike, leafless or with only a few basal leaves; peduncle 15–40 cm long or more; calyx 3–4 mm long . . . L. lanceolata

1b. Mature stems not rushlike, with numerous leaves; peduncle 1–14 cm long; calyx 2.5–5 mm long . . . . L. lanceolata


Although traditionally the type was considered to have been collected by Meriwether Lewis in 1804, Reveal et al. (1999: 42) showed that this sheet could only have been gathered by Thomas Nuttall in 1811. If indeed Pursh had Lewis 42 in hand prior to 1813, that specimen is now lost and Grimes’ typification is an effective lectotypification (Barney, 1989). This species is quite variable among a number of its morphological characters across its wide distribution (see Fig. 1). While some geographic trends exist within the species, most traits are continuous with intermediates seemingly disbanding any coherency of morphologically diagnostic traits. In agreement with Grimes (1990) and Isely (1998), we abstain from recognizing any varieties across the range of this species. Specific and varietal nomenclature is synonymized by Grimes (1990).

Distribution and habitat. The species is widespread across the western Great Plains and throughout the Intermountain West in the United States, from Washington east to North Dakota, south to the Texas Panhandle and west to Arizona. It is also found in adjacent Canada. It flourishes in sandy soils, but is found less often on semistabilized soils of sagebrush communities (see Grimes [1990] and Isely [1998] for comprehensive maps of species distribution).

IUCN Red List category. We recommend that this species be listed as Least Concern (LC) under the IUCN Red List Categories and Criteria (IUCN, 2001) due to its widespread distribution and presence within several habitats across the Great Plains and Intermountain West.


Although Grimes (in Barney 1989: 21) termed the CAS specimen a “holotype”—as he did the Nuttall specimen of Psoralea lanceolata at PH, this is to be corrected to a lectotype. As Grimes pointed out (see also Grimes, 1990: 33), Eastwood made no reference
to any collection in 1897. Nonetheless, her collection is original material and its individual specimens qualify as syntypes from which a lectotype is to be designated.

Distribution and habitat. The species is known only from sand dunes or semistabilized sandy substrates in desert shrub communities along the Colorado River and its tributaries in Kane and San
Juan counties of Utah, as well as Coconino County, Arizona (see Grimes [1990] and Isely [1998] for comprehensive maps of species distribution).

**IUCN Red List category.** We recommend that this species be listed as Vulnerable (VU) under the IUCN Red List Categories and Criteria (IUCN, 2001) based on the fact that its geographic range is estimated to be less than 20,000 km². *Ladeania juncea* is restricted to sandy habitats mainly within the southern portions of Kane and San Juan counties in Utah. A few reports of the species are listed from Garfield County, Utah, as well as a few from Coconino County, Arizona, where it is much more sparsely distributed. While this species may be locally abundant, fruit is set infrequently (Isely, 1998). In addition, over a portion of its range, the quality of its habitat is in decline due to infringement of grazing and recreational use.

**Acknowledgments.** Many thanks go to LaDean Egan for assistance in collecting these and many other Psoraleae species across North America. We thank Marty F. Wojciechowski, Billie L. Turner, an anonymous reviewer, and the scientific editor of *Novon*, Victoria C. Hollowell, for helpful comments on an earlier version of this manuscript. We are thankful to Ben Legler for allowing us to use his photographs.

**Literature Cited**


Nomenclatural Changes for *Monardella* (Lamiaceae) in California

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Key words: California, Lamiaceae, Monardella.

Preparation of a treatment of the genus *Monardella* Bentham (Lamiaceae) for the second edition of *The Jepson Manual: Higher Plants of California* (Hickman, 1993) has revealed the need for multiple nomenclatural changes and the description of new taxa. In this paper, we primarily discuss taxa that occur in southern and central California and their relationships. We did not comprehensively analyze taxa in the *M. villosa* Bentham species complex. Below, we explain changes being made to the existing treatment of the California species of *Monardella* (Jokerst, 1993). Epling, in his 1925 monograph of the genus, grouped species according to their morphological resemblances within four sections. We organized the species into informal groupings that we refer to as species alliances. The genus *Monardella* is widespread and rather complex, with over 50 taxa distributed among more than 30 annual and perennial species in western North America. *Monardella* has a center of distribution in California with approximately 45 taxa in 30 species. *Monardella* also occurs in Washington, Oregon, Idaho, Nevada, Utah, Colorado, Arizona, and New Mexico, U.S.A., and in Baja California, Mexico. Since 1834, there have been 198 combinations published that have been reshuffled from 93 protologues.

**TAXONOMICALLY IMPORTANT CHARACTERISTICS IN MONARDELLA**

The more informative morphological characters that have been used to distinguish taxa in *Monardella* include plant habit; leaf, bract, and inflorescence morphology; and pubescence (Gray, 1876, 1886; Abrams, 1912a, b, 1951; Epling, 1925, 1939; Jepson, 1925, 1943; Munz, 1935, 1959, 1974; Jokerst, 1993). The inflorescence in *Monardella* has been commonly called a head (Munz, 1959; Jokerst, 1993). However, it has a branched internode structure and the flowers are not sessile on the apex of the peduncle. It is technically a compact, capitulate cyme or glomerule.

The glomerules in *Monardella* are immediately subtended by a series of bracts or modified leaves, and occasionally also by unmodified leaves. Bracts subtending individual flowers or inflorescence branches within the glomerule are occasional and

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much reduced. Leafy structures immediately subtending the glomerules are generally highly modified in *Monardella*, but are sometimes only slightly modified. This mix of unmodified leaves and the variability of bracts have caused difficulty in the identification of many *Monardella* specimens. The use of bract sets in separating species groups in *Monardella* was emphasized by Jokerst (1993), following on the work of Hardham (1966a, b; Hardham & Bartel, 1990), who emphasized this feature in the recognition of species. Unfortunately, the bracts in *Monardella* do not occur in discrete and static sets readily recognizable by an objective feature, but rather simply grade inward in the glomerule. The distinction between the outermost bracts and the uppermost leaves can be problematic. What some refer to as outer bracts are simply unmodified leaves immediately subtending the glomerule. In some species of *Monardella*, the bases of the outermost bracts may be broad, thick, and pale, while the distal halves are green and leafy with narrow tips. The number of bracts per plant/species is not fixed. However, there are bract morphological characters that are stable, informative, and important in differentiating between taxa (e.g., length, width, pubescence).


**Species Alliances in Monardella**

Epling (1925) grouped taxa according to their morphological resemblances within four “Sections”: Section I, Macranthae; Section II, Annuae; Section III, Villosae; and Section IV, Oloratissimae. We present the species discussed in this paper within informal groupings that we refer to as species alliances. We recognize Epling’s four sections within our alliances plus two additional ones, Undulatae and Australae. Species of the Undulatae Alliance are shrubs to shrublets with woody stems and leaves that have wavy to undulate edges. Species in the Villosae Alliance are caespitose to erect suffrutescent perennials to subshrubs with woody stems that are moderately to densely pubescent with some trichomes longer than 0.5 mm. Species in the Australae Alliance are rhizomatous to mat-forming suffrutescent perennials with woody stems with some trichomes longer than 0.5 mm. Species in the Oloratissimae Alliance are caespitose to erect, suffrutescent perennials to subshrubs with woody stems that are glabrous to slightly pubescent with trichomes shorter than 0.5 mm. Species in the Annuae Alliance are erect annuals with herbaceous stems.

1. Undulate Alliance

The Undulatae Alliance consists of perennial species that possess leaves with distinct undulate margins and that are associated with coastal dunes and scrub in Santa Barbara and San Luis Obispo counties in central California. This is a group of three closely allied taxa, two of which have been treated both as distinct species and as subtaxa within *Monardella undulata* Bentham (Bentham, 1834; Jepson, 1901, 1925, 1943; Elmer, 1905; Abrams, 1912a, b, 1951; Epling, 1925; Hoover, 1949, 1970; Munz, 1959; Jokerst, 1992, 1993). This alliance contains one species, *M. undulata*, with three subspecies, all of which are shrubs or shrublets.

1a. Monardella undulata Bentham subsp. undulata


Subshrub, suffrutescent, strongly scented, 30–70 cm tall, stems woody at base, often pubescent,
spreading or appressed puberulent; branches ascending to erect. Leaves clustered at nodes, 10–30 × 2–4 mm, linear to narrowly (obl)anceolate, thin, sparsely pubescent, green, margins wavy, petioles subsessile, to 7 mm. Inflorescence generally 1 glomerule per main stem, 10–20 mm wide; bracts 7–10 × 3–5 mm, lanceolate to narrowly ovate, thin, papery, straw-colored or purple. Calyx 4–6 mm, lobes acute, spreading to ascending pubescent, tube less pubescent, distinctly pedicellate, ca. 1 mm, within the glomerule; corolla blue-purple; stamens exerted, upper lobes gland-tipped; anthers purple.

**Discussion.** We examined the isotype sheet from GH (Fig. 1) and a high-resolution digital image of the holotype sheet from K. The holotype sheet contains fragments from two collections: Hartweg s.n. (1848, two pieces on the left) and Douglas s.n. (1833, two pieces on the right). The upper right-hand fragment is from a perennial plant and clearly shows more than one season’s growth. The other fragment in the Douglas collection could be from an annual plant, but on close examination appears more consistent with new growth as on other specimens of this perennial. The isotype sheet contains fragments from three collections: W. H. Brewer 421 (two pieces on the left); Douglas s.n. (undated, one fragment in the center); and Andrews s.n. (undated, one fragment on the right). The isotype of the Douglas collection matches the upper right-hand holotype fragment, which is from a perennial plant showing more than one season’s growth.

The name *Monardella undulata* was first misapplied to an annual plant with undulate leaf margins by Asa Gray in his description of *M. leucocephala* A. Gray (Gray, 1867). He carried this error forward in his 1876 treatment of the genus, which also included a key (Gray, 1876). This erroneous treatment was later adopted by Jepson (1901, 1925, 1943); Abrams (1912a, b); Epling (1925); Hoover (1949, 1970); McMinn, who omits *M. undulata* as a perennial (1939); Howell (1970); Smith (1998); Jokerst (1993); and Matthews (1997). The annual *Monardella* plants with undulate leaves, which have been called *M. undulata* since 1867, have, therefore, never been formally described. These plants are treated below in the Annuae Alliance.

The type specimens of *Monardella undulata* correspond with the plant that has been known as *M. undulata* Bentham var. *frutescens* Hoover and more recently as *M. frutescens* (Hoover) Jokerst, making *M. frutescens* a junior synonym of *M. undulata*. The description and type collection of *M. undulata* are inseparable from *M. frutescens* in plant habit, branching pattern, leaf shape and pubescence, stem pubescence, and bract morphology.

**Distribution, ecology, and phenology.** *Monardella undulata* subsp. *undulata* is endemic to San Luis Obispo County, California. It grows on relicual and/or stabilized sand dunes slightly removed from the immediate coast from Pismo Beach south to the Santa Maria River. It generally flowers from April through November.

**Related taxa.** *Monardella undulata* subsp. *undulata* differs from *M. crispa* in that its stems are woody and erect to ascending, branching from above with numerous secondary and tertiary branches, and commonly flowering on secondary branches. It has narrower oblanceolate (and less pubescent) leaves. *Monardella undulata* subsp. *undulata* intergrades freely with *M. crispa* in intermediate habitats where the two come into contact (e.g., C. B. Hardham 12891, SBBG; R. F. Hoover 6527, CAS, OBI; D. D. Keck 2211, CAS, DS). There are no apparent intermediate or hybrid specimens between *M. undulata* subsp. *undulata* and the *Monardella* annual (described below) that has undulate leaf margins and occurs in the same general region.


**TYPE:** U.S.A. California: Santa Barbara Co., Central Coast, Vandenberg Air Force Base, S base on flats/mesa ESE of Point Arguello, NE of Rocky Point, SW of Cypress Ridge, E of Ocean Rd., 34°34′16.1″N, 120°37′57.3″W, 110 m, coastal bluff scrub and grasslands on relicual sand dunes, 29 June 2007, M. A. Elvin & L. Lum 5505 (holotype, UCSB; isotypes, ARIZ, BRY, CAS, CHSC, F, GH, HSU, IRVC, JEPS, K, MO, NY, OBI, RSA, SBBG, SD, UCR, US). Figure 2.


Shrub, 30–100 cm tall, erect; primary axis stout, to 3.5 cm diam., woody at base, multi-branched above, stems sparsely to moderately pilose. Leaves 10–40 × 3–7 mm, narrowly lanceolate with an obtuse tip to narrowly oblanceolate, ± fleshy, margins strongly undulate, green. Inflorescence an open compound cyme; glomerules solitary on primary and secondary branches, 18–30 mm wide; bracts 9–13 × 5–9 mm, lanceolate to narrowly ovate, acuminate, scarious or purple-tinged. Calyx sparsely to moderately hispid, pubescence denser at apex; corolla 10–12 mm, rose to purple.
Figure 1. *Monardella undulata* subsp. *undulata*, isotype, center (Douglas s.n. [1 piece]); left, *Monardella* annual (not *M. undulata*; Brewer 421 [2 pieces]); and right, *Monardella* annual (not *M. undulata*; Andrews s.n. [1 piece] [GH]).

Distribution, ecology, and phenology. *Monardella undulata* subsp. *arguelloensis* is closely related to subspecies *undulata* and *M. crispa*, sharing similar leaf and bract morphologies. *Monardella undulata* subsp. *arguelloensis* is a narrow endemic that only occurs in the immediate vicinity of Point Arguello in Santa Barbara County, California. Subspecies *arguelloensis* grows on relictual, stabilized sand dunes at 50–150 m and flowers from May through September.
Figure 2. Monardella undulata subsp. arguelloensis Elvin & A. C. Sanders (holotype, M. A. Elvin 5505, UCSB). Image by David Pereksta.

Etymology. The specific epithet refers to the type locality, to which it is endemic, Point Arguello, Santa Barbara County, California.

Related taxa. Monardella undulata subsp. arguelloensis is distinguished from the other subspecies of M. undulata by its habit and larger stature, although it shares similar leaf and bract morphologies. The main stem, or trunk, in subspecies arguelloensis is stout, erect, and up to 3.5 cm in diameter. This taxon, without a doubt, includes the largest plants in
Monardella. The central stems of subspecies undulata are slender, erect, and less than 1.5 cm in diameter. Primary stems in M. crispa are stout but decumbent, while only its secondary stems are erect and slender. No hybrid or introgressant plants have been observed between subspecies arguelloensis and subspecies crispa.

Paratypes. U.S.A. California: Santa Barbara Co., M. A. Elvin 4955 (IRVC, UCR), 5511 (CAS, IRVC, MO, US), 5514 (IRVC), 5518 (GH, IRVC, NY, UCR), D. E. Hickson 40 (CHSC), 41 (CHSC), 44 (SBBG), 218 (SBBG), 223 (SBBG), 224 (SBBG), 227 (SBBG), A. P. Griffiths s.n. (OBI 58363), s.n. (OBI 58404), s.n. (OBI 58445), s.n. (OBI 58444), s.n. (OBI 58447), s.n. (OBI 58448), 18133 (OBI), D. Keil 19382 (OBI, SBBG), C. F. Smith 12621 (SBBG).


Discussion. Monardella hypoleuca is best distinguished by its bicolored leaves, usually with revolute margins. It occurs in chaparral, coastal sage scrub, and pine forest communities in central California (Santa Barbara County), U.S.A., south to northern Baja California, Mexico. It appears to intergrade with M. villosa at the northern edge of its range.

1a. Monardella hypoleuca A. Gray subsp. hypoleuca.

Distribution. Monardella hypoleuca subsp. hypoleuca is found in the western Transverse Ranges, specifically the Santa Monica, Santa Ynez, and Sierra Madre mountains of Los Angeles and Santa Barbara counties, California.

We alter the circumscription of Monardella hypoleuca subsp. hypoleuca only in removing the Santa Ana Mountains populations that have sometimes been included here to a new subspecies described below.


Hae subspecies inter Monardellam hypoleuca A. Gray subsp. hypoleuca et subesp. nanata (Abrams) Munz quod aspectum et foliorum formam intermediam, a haec folis supra subglabris vel parce pubescentibus et caule parce pubescents, ab illa folis angustis valde revolutis differt.

Perennial, tufted to matted, rhizomatous, 10–35 cm tall, sparsely short-pubescent. Leaves 20–50 × 5–9 mm, narrowly lanceolate to lanceolate, adaxially surface subglabrous to sparsely pubescent, ± arched between revolute margins, abaxial surface tomentose. Inflorescence generally solitary; glomerules 20–
35 mm wide; bracts 9–13 × 4–7 mm, ovate to lanceolate. Calyx 7.5–8.5 mm; corolla 14–17 mm, white to lavender, lobes obtuse; stamens exserted.

**Distribution, ecology, and phenology.** *Monardella hypoleuca* subsp. *intermedia* occurs in mountains and foothills at elevations of 400–1250 m, from the Santa Ana Mountains in Orange County on the north to the San Luis Rey River Valley on the south, an area that spans portions of Orange, Riverside, and San Diego Counties. It generally occurs as an understory species in chaparral, oak woodland, and occasionally coniferous forest. It is a rather localized taxon and is uncommon throughout its range in the Santa Ana and
Palomar mountains, but it can appear to be locally common due to its rhizomatous habit. Subspecies *intermedia* shares with subspecies *hypeoleuca* relatively glabrous adaxial leaf surfaces and sparse stem pubescence, but it has the narrow and strongly revolute leaf shape of subspecies *lanata*. It flowers from April through September.

**Etyymology.** The specific epithet refers to the intermediate leaf morphology, appearance, and geographical distribution of this taxon relative to *Monardella hypeoleuca* subsp. *hypeoleuca* and *M. hypeoleuca* subsp. *lanata*.

**Related taxa.** We considered the treatment of the three subspecies of *Monardella hypeoleuca* each as distinct species based on discrete characters and geographical separation of each entity. However, given the apparent and limited introgression between subspecies *lanata* and subspecies *intermedia*, we think it better at this time to retain them as subspecies of one closely related, currently recognized, wide-ranging species. Subspecies *lanata* may be best treated as a discrete species from subspecies *lanata* and subspecies *intermedia* based on its distinct geographic range and lack of introgression, but we are being conservative at this point.

**Paratypes.** U.S.A. California: Orange Co., S. Boyd 8352 (RSA, SD), P. C. Everett 7266 (RSA), J. T. Howell 1094 (RSA), s.n. (IRVC 13858), s.n. (IRVC 18577), s.n. (IRVC 20008), K. G. Marsh s.n. (IRVC 18602), s.n. (IRVC 18642), s.n. (IRVC 25321), P. A. Munz 7742 (GH, LA in UC, POM, UC), J. C. Nevin s.n. (DS 130615), F. W. Peirson 4036 (RSA), F. M. Roberts 1128 (IRVC), 2939 (IRVC), 3115 (IRVC), 4117 (RSA), A. C. Sanders 407 (UCR), 31607 (IRVC, UCR), 31699 (IRVC, UCR), 31613 (CAS, IRVC, K, RSA, SD, UCR), C. B. Wolf 8003 (DS, LA in UC, MO, NY, RSA, UC), J. M. Wood 15 (UCR); Riverside Co., W. P. Armstrong 1277 (RSA, SD), E. E. Schellenger s.n. (UC 56935).


**Distribution.** *Monardella hypeoleuca* subsp. *lanata* is found in the Peninsular Ranges of southern San Diego County, California, U.S.A., and Baja California, Mexico.


**Discussion.** *Monardella saxicola* is recognized at the species level. It was treated as a subspecies of *M. viridis* by Jokkerst (1993), but for no stated reason. *Monardella saxicola* and *M. viridis* are morphologically distinct and not easily confused, even if specimens without location data are examined. The structure of the trichomes on the leaves is strikingly different. *Monardella saxicola* is very similar to *M. hypeoleuca* in leaf morphology and pubescence. Johnston (1919) reached this conclusion when he described the species and placed it closest to *M. hypeoleuca* based on its habit and leaf morphology. Jepson (1925) agreed with the close relationship when he placed it as a variety of *M. hypeoleuca*. Both taxa occur in the TransverseRanges, but *M. saxicola* occurs in the eastern San Gabriel Mountains while *M. hypeoleuca* occurs in the Santa Monica and Santa Ynez mountains, 135 km to the west. *Monardella viridis* occurs in the Inner North Coast Ranges, ca. 600 km to the north. This large geographic separation between *M. viridis* and *M. saxicola* makes it virtually impossible for genetic material to move between them naturally.


**Discussion.** *Monardella villosa* is a complex species that may have numerous narrow endemics throughout its range.

3a. **Monardella villosa** Bentham subsp. *villosa*.


Aug. 1892, Michener & Bioletti s.n. (holotype, NDG 44399 [digital image]).

**Distribution.** Monardella villosa Bentham subsp. villosa is found in the coastal mountain ranges of central and northern California.


**Distribution.** Monardella villosa subsp. franciscana is found in the coastal mountain ranges of central California.


**Discussion.** Monardella villosa subsp. obispoensis is a difficult taxon to place. It is very distinct in the center of its range and can be separated from all other Monardella taxa by the abundance of long, branched trichomes on its stems and leaves, especially the abaxial leaf surface. However, sub-species obispoensis has a zone of introgression with M. hypoleuca subsp. hypoleuca in the southern portion of its range where a few M. hypoleuca subsp. hypoleuca specimens have some branched trichomes (e.g., D. E. Diehl s.n., POM 70434; H. Baer s.n., POM 18167). It has a larger zone of introgression in the northern portion of its range, where a number of sub-species obispoensis specimens have bicolor and widely triangular-ovate leaves similar to M. villosa subsp. franciscana (e.g., A. P. Griffiths s.n., OBI 58449; C. B. Hardham 10911, SBBG). We placed these specimens in sub-species obispoensis based on the abundance of branched trichomes on their foliage.

### III. AUSTRALAE ALLIANCE

The Australae Alliance consists of several geographically isolated taxa that may be relictual remnants on isolated mountaintops. They have morphological characters that are more similar to parapatric taxa in this alliance than to other sympatric species. The taxa in this alliance are mat-forming to rhizomatous perennials that have long trichomes (generally longer than 0.5 mm). Species in this alliance in California include Monardella australis Abrams, M. beneolens Shevock, Erter & Jokerst, M. cinerea Abrams, M. stebbinsi Hardham & Bartel, and a new entity described below. Epling (1925) tentatively included M. cinerea in his Section III, Villosae, and M. australis in his Section IV, Odoratissimae, as a subspecies of M. odoratissima.

1. **Monardella australis** Abrams, Muhlenbergia 8: 34. 1912. TYPE: U.S.A. California: Riverside Co., open forests of Tamarack Valley, July 1901, H. M. Hall 2486 (holotype, DS; isotypes, MO, UC not seen).

1a. **Monardella australis** subsp. australis.

**Distribution.** Monardella australis subsp. australis is found in the San Bernardino, San Gabriel, and San Jacinto mountains, in Riverside and San Bernardino counties, California.


**Discussion.** Monardella australis subsp. cinerea is reduced to a subspecies of M. australis based on introgressed and/or hybrid specimens in the San Gabriel, San Bernardino, and San Jacinto mountains (which is outside the traditional range of M. cinerea). Plants in the San Gabriel Mountains range from classic M. cinerea to classic M. australis with a continuous gradient of specimens in between. Additionally, plants approaching (if not indistinguishable from) M. cinerea outside of the traditional range of this species have been collected in the San Bernardino (Elvin 3591, IRVC, UCR; E. C. Van Dyke s.n., CAS 157273) and San Jacinto mountains (R. Hoffmann s.n., SBBG 72009; C. M. Wilder I, UC).

1c. **Monardella australis** subsp. jokerstii Elvin & A. C. Sanders, subsp. nov. TYPE: U.S.A. California: San Bernardino Co., S face of Cucamonga Peak, just W of Day Creek, 25

Haec subspecies a Monardeilla australis Abrams subsp. australis foliis serratis et caule ramoso, a M. australis subsp. cinerea (Abrams) A. C. Sanders & Elvin foliis longioribus et habitu alioiecto erecto difert.

Perennial, tufted to matted, rhizomatous, 15–35 cm tall, sparsely long-spreading and short-glandular pubescent. Leaves 14–30 × 4–8 mm on fertile stems, lanceolate, denticulate to serrate, sparsely long pubescent. Inflorescence an open compound cyme; glomerules one to several per main stem, 8–23 mm wide, often subtended by unmodified leaves; bracts 7–9 × 2–4 mm, narrowly lanceolate to lanceolate, membranaceous, generally inconspicuous in color and size. Calyx 6–8 mm, short-glandular pubescent, lobes long and acute to acuminate; corolla 10–11 mm, white to creamy with purple markings appearing pale lavender, stamens exserted.

Distribution, ecology, and phenology. Monardeilla australis subsp. jokerstii is a rare and localized species. It occurs in the southeastern San Gabriel Mountains, in the vicinity of Cucamonga Peak (Mount San Antonio) and the western portion of Lytle Creek. It was collected once in a wash along the San Antonio River, in the area currently occupied by the Prado Flood Control Basin, presumably washed down from the mountains above. It can appear to be locally common due to its matted, rhizomatous nature. It grows on talus slopes between breccia, ranging in size from 10–40 cm wide, and on secondary alluvial benches along drainages and washes. It occurs at elevations between 1350 and 1750 m with the Santa Ana River collection an exception at 160 m. It flowers from July through September.

Etymology. The specific epithet refers to James Jakerst, who identified the uniqueness of specimens of this entity by annotation of one of them in 1993 (L. M. Johnston 5118, GH), in honor of his work on this genus prior to his untimely death in 1995.

Related taxa. This plant is closely related to both Monardeilla australis subsp. australis and M. australis subsp. cinerea. It differs from subspecies australis in having prominent serrations on the leaves, up to 2 mm, and in having branched stems with multiple glomerules in a compound cyme. It differs from M. australis subsp. cinerea in having longer leaves (to 30 mm vs. to 10 mm) and a taller, erect habit (to 35 cm vs. to 15 cm).


IV. ODORATISSIMAE ALLIANCE

The Odoratissimae Alliance consists of plants that range from sulfurouscent perennial to shrubs with erect, woody stems. The plants in this alliance are generally glabrous to pubescent (with trichomes up to 0.5 mm) and have similar pubescence on both sides of the leaves. The taxa in this alliance occur in many plant communities throughout the western United States from Colorado to Washington, south through Oregon and California, U.S.A., to Baja California, Mexico. Species in this alliance that occur in California include Monardeilla folletti (Jepson) Jakerst, M. lineoides A. Gray (including five subspecies), M. odoratissima (only two subspecies occur in California), M. palmeri A. Gray, M. purpurea Howell, M. robissonii Epling, M. stoneana Elvin & A. C. Sanders, M. viminea Greene, and three new taxa from the Mojave Desert that warrant recognition, but for which appropriate relationships and ranks are unresolved.

Therefore, we tentatively describe each of these three below as species, with the understanding that they may eventually only warrant recognition as subspecies. Epling (1925) grouped M. odoratissima and M. lineoides together in Section IV, Odoratissimae, in his monograph. We are also including M. robissonii in the Odoratissimae Alliance based on similarities of its habit and herbage to both M. odoratissima and M. lineoides. Monardeilla robissonii was not described until after Epling wrote his monograph, so its placement was not discussed. We are also including M. palmeri in this alliance based on its glabrous pubescence and apparent close relationship to M. purpurea, which Epling included as a synonym of M. odoratissima in his monograph.


Haec species Monardeilla lineoides A. Gray similis, sed ab ea infloroeentia ramosa, glomerulis minoribus, bracteis brevioribus (< 10 mm) angustioribus (< 4 mm) et calyce breviore differt.

Subshrub to shrub, 12–40 cm tall, erect; stems visibly woody at base, multi-branched from middle to apex, pubescence fine and dense (mostly 0.03–0.05 mm long), but not completely obscuring epidermis, lacking conoid glands on stems, aromatic. Leaves 7–15 × 1–3(–5) mm, narrowly

Elliptic, acute, gray-green or silvery green. Inflorescence an open cyme, (1)3 to 5 glomerules per main stem, 10–20 mm wide; bracts 8–9 × 2–3 mm, less than or equal to calyces, narrowly elliptic, inconspicuous, deciduous, green to purple tinged, acuminate. Calyx 6–8 mm, lobes acute, pubescent, with abundant, spreading, nonglandular trichomes 0.2–0.3 mm long, sparsely and minutely puberulent with...
gland-tipped trichomes 0.01–0.02 mm long. Corolla 10–11 mm, white with purple markings, appearing lavender, pubescent, tube slightly exserted beyond calyx.

**Distribution, ecology, and phenology.** *Monardella boydii* is a rare plant known only from the Ord and Rodman mountains in the southern Mojave Desert. It grows in mixed desert scrub, desert riparian scrub,
and juniper woodland habitats. It has been documented at elevations between 1400 and 1650 m, primarily in alluvial soils and cracks of bedrock in washes on canyon bottoms and rocky slopes. It flowers from August to October.

**Etymology.** The specific epithet refers to Steve Boyd of Rancho Santa Ana Botanic Garden Herbarium, who in 1995 led the expedition that first collected this plant in the Ord Mountains of the southern Mojave Desert, far from any other known *Monardella* populations. This species also commemorates Steve’s contributions, dedication, and driving curiosity to understand and explain the unique flora of southern California.

**Related taxa.** *Monardella boydii* is a difficult taxon to place. It is similar to, and apparently closely related to, several taxa that occur in the desert, specifically, *M. robisonii*, *M. arizonica* Epling, *M. linoides* s.l., and two other new taxa that occur in the Mojave Desert. It has a series of differences (sometimes small, but still discrete) from these other taxa. Cladograms analyzing morphological characters indicate that its relationship to these other taxa is unresolved. We are provisionally describing *M. boydii* here as a species because of this lack of resolution in relation to other taxa, and this placement is likely to require minimization of the necessary taxonomic revisions once more information is obtained (i.e., genetic data). Because of this apparent close relationship with *M. robisonii*, *M. arizonica*, *M. linoides* s.l., and two other new taxa, *M. boydii* may be best recognized as a subspecies of one of them.

*Monardella boydii* is similar to *M. linoides* s.l. in its habit and the presence of a short, dense, uniform pubescence. Its pubescence is similar to that of *M. linoides*, even more so than that of *M. timinea*, which has been placed as a subspecies of *M. linoides* in various publications (Epling, 1925; Munz, 1974; Jokarst, 1993). Individual trichomes are distinguishable at 10X and, while the pubescence is dense, it does not completely cover the epidermis (as in *M. linoides*), resulting in the stems appearing greenish with the naked eye. Even with magnification of just 10X, the epidermis can easily be observed. It is distinguished from *M. linoides* by its branching inflorescence, smaller glomerules (10–20 mm vs. 10–30 mm wide), smaller, narrower bracts (2–3 mm vs. 5–14 mm wide), shorter calyx (6–8 mm vs. 8–9 mm), and its distinct and separate geographic distribution.

*Monardella boydii* is similar to *M. robisonii* in its habit, leaf morphology, narrow bracts, and the presence of small glomerules and branching inflorescences. It is distinguished from *M. robisonii* in that the calyces contain minute, glandular trichomes (0.01–0.02 mm) and the stem contains minute trichomes (0.03–0.05 mm) and lacks the longer, spreading trichomes (0.1–0.2 mm and 0.3–0.5 mm) and short glandular trichomes (0.01–0.03 mm) of *M. robisonii*.

*Monardella boydii* is also very similar to two other taxa that occur in mountains of the Mojave Desert (described below) in general habit, bract morphology, and floral morphology (e.g., inflorescence branching pattern, glomerule size). *Monardella boydii* differs from these taxa in leaf, bract, and pubescence characters and they each have distinct, non-overlapping geographic ranges. These similarities and differences are discussed below.

**Paratypes.** U.S.A. California: San Bernardino Co., S. Boyd 1704 (RSA), M. A. Elvin 5776 (GH, IRVC, K), 5779 (IRVC, OBI, SBBG, UCSD), 5801 (IRVC, SD), 5802 (IRVC, MO), 5803 (BRY, IRVC), 5804 (IRVC, JEPS), 5805 (CHSC, IRVC), 5806 (IRVC, UCR), 5807 (IRVC, UCR), 5808a, b, c (IRVC), 5809 (IRVC, RSA), 5810 (IRVC, US), 5822 (ARIZ, CAS, IRVC, NY), 6181 (UCSB), 6183 (UCSB), 6184 (UCSB), 6185 (UCSB), 6186 (GH, LA, UCSB), 6187 (UCSB), 6188 (RSA, UCSB), 6189 (BRY, GDMDRC, UCSB), 6190 (UCR, UCSB), 6193 (CAS, SD, UCSB), A. C. Sanders 34399 (UCR), 34403 (UCR), 34404 (UCR), 34405 (UCR).


Hae species quod habiat, inflorescentiam ramosum, glomerulos parvos et hecetae angustas *Monardella robisonii* Epling et *M. arizonica* Epling similis, sed ab eis caulis glandulos conoides praedictis, trichomatibus glandularibus patellibus carentibus et calyce brevior difert.

Subshrub to shrub, 15–55 cm tall, erect, camphor-like aroma; stems visibly woody at base, pubescence fine and dense (with some trichomes 0.03–0.08 mm long, and some longer, spreading trichomes approximately 0.2–0.3 mm), but not completely obscuring the epidermis, numerous stout, conoides glands. Leaves 12–27 × 3–10 mm, narrowly elliptic, acute to obtuse, subsessile, pale or grayish green. Inflorescence an open compound cyme; glomerules solitary on secondary stems, 7–20 mm wide; bracts 4.5–9 × 2–4.5 mm (ca. equal to the calyces), narrowly elliptic to narrowly lanceolate, acute. Calyx 5–7 mm, pubescence nonglandular; corolla 8–11 mm, white with purple markings, appearing lavender.

**Distribution, ecology, and phenology.** *Monardella eremicola* is a rare plant of the desert mountains in the northeastern Mojave Desert. It apparently has a limited distribution, having only been documented...
from the Clark and Kingston mountains of California. *Monardella eremicola* occurs well above the desert floor at elevations between 1500 and 2100 m. It grows in rock outcrops, among boulders, in boulder cracks, on rocky canyon slopes, and on the margins of desert washes. It is associated with granite or limestone soils in desert riparian scrub and pinyon-juniper woodland and is particularly common in bedrock cracks and on benches along canyon washes. It flowers from June to August.
Etymology. The specific epithet refers to the fact that all known collections of this plant have been made in the desert.

Related taxa. *Monardella eremicola* is a difficult taxon to place. It is similar to, and apparently closely related to, several taxa that occur in the desert, specifically, *M. robisonii*, *M. arizonica*, *M. linoides* s.l., *M. boydii*, and one other new taxon that occurs in the Mojave Desert. It has a series of differences (sometimes small, but still discrete) from these other taxa. Cladograms analyzing morphological characters indicate that its relationship to these other taxa is unresolved, perhaps due to relictualization. We are provisionally describing *M. eremicola* here as a species because of this lack of resolution in relation to other taxa, and this placement is likely to minimize the necessary taxonomic revisions once more information is obtained (i.e., genetic data). Because *M. eremicola* appears to be closely related to *M. robisonii*, *M. arizonica*, *M. linoides* s.l., *M. boydii*, and one other new taxon, it may best be treated as a subtaxon of one of them. Numerous introgressant specimens occur between *M. eremicola*, a new subspecies of *M. linoides* (described below), and *M. odoratissima* subsp. *glauca* (Greene) Epling in the mountain ranges of the northern Mojave Desert, particularly in the Panamint and Amargosa mountain ranges of Inyo County. One specimen from the Kingston Mountains (R. F. Thorne 54796, RSA) contains few conoides glands, but matches the rest of the plants from this area in all other characters, and we are tentatively including it here as *M. eremicola*. A specimen from northwest Arizona (G. L. Clifton 39183) is intermediate between *M. arizonica* and *M. eremicola* in that it contains some characters from both *M. eremicola* and *M. arizonica* that the other does not possess (e.g., nonglandular trichomes on the calyx; minute, glandular trichomes on the stem; long, spreading trichomes [0.25–0.5 mm] on the stem).

*Monardella eremicola* is similar to *M. linoides* s.l. in its habit, lack of glandular pubescence on the stems and calyces, and leaf length and morphology. It is distinguished from *M. linoides* by its branching inflorescence; smaller glomerules (7–20 mm vs. 10–30 mm wide); smaller, narrower bracts (2–4.5 mm vs. 5–14 mm wide); shorter calyx (5–7 mm vs. 8–9 mm); sparser, longer pubescence; abundance of conoides glands on the stem; and its distinct and separate geographic distribution. The stem epidermis of *M. eremicola* is more visible than in *M. linoides* because of this sparser pubescence. Individual trichomes are distinguishable at 10× and, while the pubescence is dense, it does not completely cover the epidermis (as in *M. linoides*), resulting in the stems appearing greenish with the naked eye. Even with magnification of just 10×, the epidermis can easily be observed. The conoides glands are miniature, stout protuberances that are subcylindrical to conical in shape and resemble miniature volcanoes (Fig. 7). They are an extension of the epidermis and occasionally have a pubescence similar to that on the adjacent stem. These structures were noticed by Johnston (1919), who called them stalked glands, and by Hardham (in unpublished notes and specimen annotations), who called them hydathodes. Some taxa always have them (e.g., *M. lanceolata* A. Gray var. *glandulifera* I. M. Johnston, *M. eremicola*), but most taxa do not have them.

*Monardella eremicola* is similar to *M. robisonii* and *M. arizonica* in its habit, narrow bracts, small glomerules, branching inflorescences, and presence of longer, spreading trichomes (ca. 0.25 mm) on the stem. It shares with *M. robisonii* the presence of longer spreading trichomes (0.2–0.3 mm) and lack of glandular pubescence on the calyx. It is similar to *M. arizonica* in leaf length and width. It is distinguished from *M. robisonii* and *M. arizonica* by the presence of conoides glands on the stems, the absence of spreading, glandular trichomes on the stems, shorter calyces (5–7 mm vs. 6–9 mm and 5–9 mm, respectively), and its distinct and separate geographic distribution.

*Monardella eremicola* is similar to both *M. boydii* and another taxon from the mountains of the central Mojave Desert (described below) in general habit, pubescence, bract morphology, leaf morphology, and floral morphology (e.g., inflorescence branching pattern, glomerule size). *Monardella eremicola* differs from *M. boydii* in that it contains conoides glands on the stem; it lacks minute, glandular trichomes on the calyx; it contains longer, spreading trichomes >
0.1 mm on the stem; it has leaves that are > 15 mm long and > 5 mm wide; and its geographic distribution is distinct and separate. It differs from the new Mojave Desert taxon in that it contains conoides glands on the stem; it lacks minute glandular trichomes on the calyx; it contains long (0.2–0.3 mm), spreading, nonglandular trichomes on the calyx; the bracts are shorter (4.5–9 mm vs. 10–11 mm); and its geographic distribution is distinct and separate.

Paratypes. U.S.A. California: San Bernardino Co., G. de Nevers 445 (CAS), 268 (CAS, RSA), J. Hendrickson 14057 (NY, SD), E. C. Jaeger s.n. (POM 187366), s.n. (POM 179282), B. A. Prage 1327 (RSA), 2186 (CAS, RSA), 2198 (RSA, UCR), 1975 (UCR), J. C. Roos 4642 (RSA, UCR), A. C. Sanders 24565 (IRVC, UCR), 24566 (UCR), 24567 (UCR), 24569 (UCR), 24571 (UCR), C. B. Wolf 7577 (DS, RSA, UCR), 7650 (RSA).


Discussion. Monardella linoides s.l. (including all subtaxa) only seems to hybridize with other Monardella species in three portions of its extensive range: the eastern San Bernardino Mountains, the mountains of the northern Mojave Desert (e.g., the Panamint, White, and Inyo mountains), and the southern Sierra Nevada Mountains region. Notably, M. linoides seems not to form hybrids anywhere in the Peninsular Ranges, not even in the San Jacinto Mountains, where M. linoides subsp. linoides is sympatric with M. australis (a species that it putatively hybridizes with in the San Bernardino Mountains).

3a. Monardella linoides A. Gray subsp. linoides.

Distribution. The range of Monardella linoides subsp. linoides encompasses the Peninsular Ranges in Riverside and San Diego counties, California, U.S.A., and Baja California, Mexico. We tentatively include plants from the Little San Bernardino Mountains (of the Transverse Ranges) that are, for the most part, consistent with M. linoides subsp. linoides. Specimens from the Morongo Valley and Pioneertown areas of the Little San Bernardino Mountains (at the eastern edge of the San Bernardino Mountains) correspond best with subspecies linoides; however, there are slight but consistent differences between the plants in the Little San Bernardino Mountains and those in the Peninsular Ranges. Beyond the plants in the Little San Bernardino Mountains, subspecies linoides does not occur north of the Transverse Ranges (i.e., Mojave Desert, Sierra Nevada Mountains), despite numerous, previous reports and determinations (Epling, 1925; Jepson, 1943; Munz, 1974; Jorker, 1993).


Distribution and ecology. Monardella linoides subsp. anemonoides is recognized as a subspecies of M. linoides. It is a rather local endemic of the southwestern Sierra Nevada Mountains in Kern and Tulare counties. It is closely allied to both M. linoides subsp. oblonga (Greene) Abrams and an unnamed M. linoides subspecies from the eastern Sierra Nevada Mountains that is described below. The tall, thick stems (to 60 cm, 1–1.5 mm thick just below glomerule) and very large bracts (15–25 × 10–14 mm) of subspecies anemonoides are quite distinct and make it rather easy to recognize. A few specimens at the southern edge of its range in the Tehachapi Mountains (Kern Co., Dudley 429 [DS], Dudley 476 [DS, NY, US]) appear to be intermediate between subspecies anemonoides and subspecies oblonga.


Distribution and ecology. Monardella linoides subsp. ereta is endemic to the eastern San Bernardino Mountains of San Bernardino County, California. The Monardella populations in the San Bernardino Mountains are confusing, with many of the plants
containing characters from both *M. australis* s.l. and *M. linoides* s.l. It appears likely that these two generally distinct species hybridize here and have formed a large zone of introgression, perhaps because of the distinctive topography of this area. There is no similar geographical feature in other mountain ranges where these two species come into contact. *Monardella linoides* subsp. *erecta* represents one end of the spectrum of these plants with regard to habit, pubescence, and leaf and bract morphology, while *M. australis* subsp. *australis* represents the opposite extreme. *Monardella linoides* subsp. *erecta* is an erect, caespitose plant, 15–30 cm tall, with a short, dense, and uniform pubescence that obscures the epidermis. It has broadly linear to narrowly lanceolate leaves with entire margins, and the narrowly lanceolate bracts are roughly equal to the calyces. *Monardella australis* subsp. *australis* is a mat-forming, rhizomatous plant, 10–20 cm tall, with rather long and variable pubescence, lanceolate to narrowly ovate leaves that are entire to weakly serrate, and lanceolate to long acuminate bracts that exceed the calyces.

The type specimens for *Monardella linoides* var. *stricta* Parish (San Bernardino Co., S. B. Parish 2077 [holotype, UC; isotype, DS]) and *M. epilobioides* (San Bernardino Co., S. B. Parish 3008 [holotype, US; isotypes, MO, UC]) represent introgressant individuals that are intermediate in characters between *M. linoides* subsp. *erecta* and *M. australis* subsp. *australis*. It is also possible that there may be several recognizable entities in the San Bernardino Mountains that are closely related to both *M. linoides* subsp. *erecta* and *M. australis* subsp. *australis*. It has been observed by one of the authors that there appear to be correlations or groupings of character suites to specific microhabitats and general geographic ranges in this area that may represent local differentiation and incipient speciation associated with localized substrates. We cannot separate these entities at this time and more study is needed.

### 3d. Monardella linoides A. Gray subsp. oblonga


**Distribution.** *Monardella linoides* subsp. *oblonga* is found in the Tehachapi Mountains of Kern County and the Mount Pinos region of Ventura and Kern counties, California.

### 3e. Monardella linoides A. Gray subsp. sierrae

Elvin & A. C. Sanders, subsp. Nov. TYPE: U.S.A. California: Inyo Co., desert slopes near Big Pine Creek at foot of trail to Big Pine Lakes, 8500 ft., 24 July 1934, R. S. Ferris 8983 (holotype, UC; isotypes, DS, NY). Figure 8.

Hence subspecies quoad habitum, pubescentiam, foliorum formam et glomerulos solitarios *Monardella linoides* subsp. *anemonoides* (Greene) Elvin & A. C. Sanders et subsp. *oblonga* (Greene) Abrams similis, sed a hac caulibus altioribus et bracteis lateribus, alia bracteis minoribus, pedunculo breviore et glomerulis minoribus differt.

Subshrub to shrub, 20–50 cm tall, erect, visibly woody at base, densely pubescent. Leaves 20–30 × 4–10 mm, length to width ratio 3:5:1, lanceolate to broadly (ob)lanceolate, pale green, petioles 2–4 mm, base acute, subglabrous to sparsely puberulent adaxially and sparsely puberulent abaxially (especially on the veins). Inflorescence solitary, peduncles slender (<1 mm thick just below glomerule), generally 1–7 cm long (from highest definite leaf to glomerule); glomerule 15–25 mm wide; bracts 11–16 × 5–9 mm, broadly lanceolate to narrowly ovate, attenuate, greater than or equal to the calyces. Corolla pale to rose.

**Distribution, ecology, and phenology.** *Monardella linoides* subsp. *sierrae* is the predominant form of *M. linoides* northwest of the Mojave Desert. It is commonly collected in the Sierra Nevada Mountains at elevations of 1000–3500 m along the ridge and eastern slope, from Kern, through Tulare, Inyo, Fresno, Madera, and Mono counties in California and Washoe and Esmeralda counties in Nevada. It occurs mostly on open, gravelly to rocky slopes with granitic soils in montane coniferous forest, pinyon-juniper woodland, and chaparral. Subspecies *sierrae* is similar to subspecies *anemonoides* and subspecies *oblonga* in habitat, pubescence, its solitary glomerules, and leaf morphology. It is distinguished from subspecies *anemonoides* by its smaller bracts (11–16 × 5–9 mm vs. 15–25 × 10–14 mm), shorter peduncles (1–7 cm vs. 5–15 cm), and smaller glomerules (15–25 mm vs. 20–30 mm wide). It is distinguished from subspecies *oblonga* by its taller stems (20–50 cm vs. 15–25 cm) and wider bracts (5–9 mm vs. 4–7 mm). It flowers June through September. Leroy Abrams noted the distinctiveness of this entity in an annotation on an *H. M. Hall 8380* collection (UC).

**Etymology.** The specific epithet refers to the Sierra Nevada Mountains, where this plant occurs.
Related taxa. *Monardella linoides* subsp. *sierrae* appears to have one zone of limited hybridization and two extensive zones of introgression. It hybridizes with *M. odoratissima* on the Kern Plateau in the southern Sierra Nevada Mountains, where scattered intermediate specimens have been found. It intergrades with multiple *Monardella* taxa in two areas, one in the southern Sierra Nevada Mountains extending down into the Tehachapi Mountains of Kern and Ventura counties and one in the desert mountains at the

Hace species Monardella mojavensis A. Gray similis, sed ab ea caulibus trichomatibus sparsioribus, inflorescentia ramosa, calycie breviore trichomatibus glandulosis vestito et bracteis angustioribus calycem superantibus differt.

Subshrub to shrub, 30–60 cm tall, erect; stems visibly woody at base, multi-branched from middle to apex, pubescence fine, dense, and short (ca. 0.03 mm), partially obscuring epidermis, aromatic. Leaves 8–20 × 2–4 mm, narrowly elliptic, acute, gray-green or silvery. Inflorescence an open compound cyme with 3 to 7 glomerules per stem; glomerules 10–20 mm wide; bracts 10–11 × 2–5 mm, longer than calyces. Calyx 5–7 mm, lobes acute, puberulent and with spreading gland-tipped hairs; bracts becoming pale and scariosus inward, the outermost often green and leaf-like, narrowly ovate with acuminate tips. Corolla 10–11 mm, white with purple markings, appearing lavender, pubescent, tube exserted from calyx.

Distribution, ecology, and phenology. Monardella mojavensis is presently known from five mountain islands in the arid regions of the eastern Mojave Desert in California (Old Woman, Granite, Old Dad, and Providence mountains) and southwestern Nevada (Newberry Mountains). It may be more widely distributed in California and southern Nevada and could also occur in northwestern Arizona. It grows in mixed scrub desert, pinyon-juniper woodland, and desert riparian scrub habitats. It has been documented at elevations between 800 and 1500 m. It grows among granite boulders and on decomposed granite soils but has also been collected on limestone soils. Microhabitats include flats, boulder fields, washes, crevices among boulders, and cliffs. Leroy Abrams noted the distinctiveness of this entity in an annotation on a K. Brandegee s.n. collection (UC 104649). It flowers from May to August.

Etymology. The specific epithet refers to the Mojave Desert in the western Mojave, where all known collections have been made.

Related taxa. Monardella mojavensis is a difficult taxon to place. It is similar to, and apparently closely related to, several taxa that occur in the desert, specifically, M. robisonii, M. arizonica, M. lindoides s.l., M. boydii, and M. eremicola. It has a series of differences (sometimes small, but still discrete) from these other taxa. Cladograms analyzing morphological
characters indicate that its relationship to these taxa is unresolved. We are provisionally describing *Monardella mojavensis* here as a species because of this lack of resolution in relation to other taxa, and this placement is likely to minimize the necessary taxonomic revisions once more information is obtained (i.e., genetic data). Because *M. mojavensis* appears to be closely related to *M. robisonii*, *M. arizonica*, *M. linoides* s.l., *M. boydii*, and *M. eremicola*, it may best be treated as a subtaxon of one of them.
Monardella majavensis is similar to *M. linoides* s.l. in its habit, leaf width, and the presence of a short, dense, uniform pubescence. Individual trichomes are distinguishable at 10 X and, while the pubescence is dense, it is less dense than that of *M. linoides* and does not completely cover the epidermis (as in *M. linoides*), resulting in the stems appearing greenish with the naked eye. Even with magnification of just 10 X, the epidermis can easily be observed. It is distinguished from *M. linoides* by its branching inflorescence; smaller glomerules (10–20 mm vs. 10–30 mm wide); smaller, narrower bracts (2–5 mm vs. 5–14 mm wide); shorter calyces (5–7 mm vs. 8–9 mm); the presence of glandular trichomes on the calyces; and its distinct and separate geographic distribution.

Monardella majavensis is similar to *M. robisonii* in habit, leaf morphology, bract length and width, and the presence of small glomerules and branching inflorescences. It is distinguished from *M. robisonii* in that the calyx contains minute, glandular trichomes (0.01–0.02 mm) and spreading, glandular trichomes (0.06–0.1 mm); the stem contains minute trichomes (0.03–0.05 mm) and lacks the longer, spreading trichomes (0.1–0.2 mm and 0.3–0.5 mm) and short glandular trichomes (0.01–0.03 mm) of *M. robisonii*; its shorter calyces (5–7 mm vs. 6–9 mm); and its distinct and separate geographic distribution.

Monardella majavensis is also very similar to *M. boydii* and *M. eremicola* in general habit, bract morphology, and floral morphology (e.g., inflorescence branching pattern, glomerule size). *Monardella majavensis* differs from *M. boydii* in bract length (10–11 mm vs. 8–9 mm); it lacks spreading, glandular trichomes and contains spreading nonglandular trichomes (0.2–0.3 mm) on the calyces; and it has a distinct and separate geographic range. *Monardella majavensis* differs from *M. eremicola* in that it lacks conoidus glands on the stem; lacks longer spreading trichomes (> 0.1 mm) on the stem; the leaves are shorter and narrower; the bracts are longer (10–11 mm vs. 4.5–9 mm); it contains glandular trichomes on the calyces; and its geographic distribution is distinct and separate.

Paratypes. U.S.A. California: San Bernardino Co., B. Baldwin 273 (RSA), Mrs. K. Barnes s.n. (LA 62688 in UC), D. Bradbury 277 (RSA [2]), K. Brandegee s.n. (UC 104649), J. Donahue 76214 (RSA), M. A. Elvin 6151 (JEPS, UCSR), 6152 (UCR, UCSR), 6153 (UCSB), 6154 (UCSB), 6155 (UCSB), 6156 (MDRC, JEPS, RSA, UCSB), 6157 (BRY, UCSB), 6158 (SD, UCSR), 6159 (GH, OBI, UCSR), 6160 (CAS, LA, UCSR, US), 6162 (NY, SBBG, UC), E. C. Jaeger s.n. (POM 254461), M. E. Jones 25505 (POM), J. R. Holler 1329 (UCB), s.n. (UCB 10511), J. Hendrickson 12734 (RSA), 12746a (NY), 18834 (RSA), P. A. Muns 4234 (POM), B. Pitzer 4013 (UCR), D. Silverman 7 (SD, UCR), B. Stein 43 (RSA [2]), R. F. Thorne 50689 (RSA). Nevada: Clark Co., J. S. Holland 1440 (UCR, UNLV not seen), G. E. Marrs-Smith BLM 30 (UCR, UNLV not seen).


Distribution. *Monardella odoratissima* subsp. *odoratissima* occurs in southern Washington and northern Oregon. This subspecies does not occur in California. No material that has been collected in California conforms to material from the type locality.


Discussion. *Monardella odoratissima* subsp. *glauca* is recognized as a subspecies of *M. odoratissima*. It was treated as a full species by Jokerst (1993), but for no stated reason. Subspecies *glauca* plants are highly variable, and there is a large zone of introgression between subspecies *glauca* and *M. pallida* A. Heller along the crest of the Sierra Nevada Mountains. Plants in California attributed to *M. odoratissima* subsp. *parefolia* (Greene) Epling are misapplied to that name and are part of the above-mentioned hybrid swarm.


Discussion. *Monardella odoratissima* subsp. *pallida* is recognized as a subspecies of *M. odoratissima*. It was treated as a full species by Jokerst (1993), but
for no stated reason. There is a vast zone of introgression with subspecies *glauca* along the crest of the Sierra Nevada Mountains. Subspecies *palida* generally has leaves that closely subdivide the glomerules, but are not modified. Some call these leaves bracts. They are generally green, but some plants have slightly modified leaves in this position and when these are purplish some suspect hybridization with subspecies *glauca*.


**Discussion.** *Monardella robisonii* has been thought to be closely related to *M. linoidea* based on similarity in habit and leaf morphology (Epling, 1939), and one of the authors has expressed doubts about their separation. These species have been separated largely on the basis of differences in their pubescence (Epling, 1935, 1939; Abrams, 1951; Munz, 1974; Jokerst, 1993), which is long, spreading, and variable in length and direction on *M. robisonii* in contrast to the short, appressed, and uniform pubescence of all subspecies of *M. linoidea*. *Monardella robisonii* is best distinguished by its long, spreading trichomes (0.3–0.5 mm long), branching inessence, narrow bracts, and glandular trichomes on the stem. It occurs in the San Bernardino Mountains at the southern edge of the Mojave Desert. *Monardella robisonii* differs from *M. linoidea* in that it has (1) minute, glandular trichomes (0.01–0.03 mm) under the rather long, spreading pubescence on the stems; (2) small bracts (9–12 × 3–5 mm) that are generally equal to the calyces; (3) leaves that are generally wider than the linear to narrowly lanceolate leaves of *M. linoidea*; (4) smaller glomerules (7–20–25 mm wide); and (5) multi-branching inessences; but it lacks the short, dense, uniform pubescence that obscures the epidermis of *M. linoidea*.

V. ANNUAE ALLIANCE

The Annuae Alliance consists of erect, annual plants that occur throughout California including coastal, montane, and desert habitats. Plants in this alliance occur throughout California and into southwestern Nevada, U.S.A., and northern Baja California, Mexico. The plants of this alliance can be distinguished by their stature (herbaceous stems), annual growth form, lanceolate foliage, and pubescence. Much of the variation in these plants occurs in characters associated with the flowers (i.e., bracts, calyces). Several species in this alliance are narrow endemics (two of which are considered extinct, neither having been seen since 1941), but a few are quite wide-ranging with one species occurring from northern California, U.S.A., to Baja California, Mexico. Species in this alliance in California include *Monardella breviflora* A. Gray, *M. candidans* Bentham, *M. douglasii* Bentham (including two subspecies), *M. exilis* (A. Gray) Greene, *M. lanceolata* (including three varieties), *M. leucocephala*, *M. pringlei* A. Gray, and a new taxon described below (including two subspecies).


**Discussion.** *Monardella breviflora* occurs throughout California’s Coast, Transverse, Sierra Nevada, and Peninsular ranges. We recognize this species as comprising four subspecies, including *M. lanceolata* and its sometimes recognized varieties *M. lanceolata* var. *glandulifera* and *M. lanceolata* var. *microcephala* A. Gray.

1a. **Monardella breviflora** A. Gray subsp. *breviflora*.

**Distribution and ecology.** *Monardella breviflora* subsp. *breviflora* occurs primarily in the South Coast Range from Ventura County northward to Alameda County, but extends southeast into the Tehachapi, San Gabriel, and western San Bernardino mountains. The type was collected from the northernmost station for this species.


**Discussion.** *Monardella breviflora* subsp. *glandulifera* is recognized as a subspecies of *M. breviflora* It was described as a variety of *M. lanceolata* (Johnston, 1919), separated based on the abundance of conoid glands on the stem and other characters (e.g., pubescent calyx sinuses). It was recognized as a variant of *M. lanceolata* by Munz (1974) and then synonymized with *M. lanceolata* by Jokerst (1993) as “generally indistinct.”
Distribution and ecology. Monardella brevleri subsp. glandulifera is a local endemic of the southern San Gabriel Mountains in Los Angeles County, California. While it does occur within the range of *M. lanceolata*, it differs from it in its smaller stature, smaller glomerules, and the abundance and density of conoides glands on the stem. Conoides glands occur on some *M. lanceolata* specimens, but are found only in very low densities. *Monardella lanceolata* specimens that have conoides glands are sparsely distributed across the southern slopes of the Transverse Ranges. This may indicate that reproductive isolating mechanisms have not fully developed between *M. brevleri* subsp. glandulifera and *M. lanceolata*. *Monardella brevleri* subsp. glandulifera is similar to *M. lanceolata* var. microcephala in its stature, small glomerules, and the size of its bracts. It differs from it in that its stems are covered with an abundance of conical glands, the sinuses of the calyx are pubescent, and it has a distinct geographic range in the San Gabriel Mountains, ca. 195 km northwest of the Jacumba Mountains, where *M. lanceolata* var. microcephala reaches its northern limit.


Distribution and ecology. Monardella breweri subsp. microcephala is similar to subspecies lanceolata, to which it has generally been allied. Munz (1959) mentions it as a minor variant under M. lanceolata; Jokerst (1993) thought that named “forms” [subtaxa] of M. lanceolata were indistinct, but did not formally address M. breweri subsp. microcephala; Wiggins (1980) treated it as a variety of M. lanceolata and considered it to be the only taxon of M. lanceolata present in Baja California, Mexico. It is predominantly a plant of northern Baja California, Mexico, but extends into southern San Diego County, California, U.S.A., where the type was collected. This plant is apparently rare north of Mexico.

Related taxa. Monardella breweri subsp. microcephala is characterized by very small glomerules (7–15 mm broad, rarely to 20 mm), a highly branched habit with short internodes, and glomerules in a ± cymose arrangement. Both subspecies breweri and subspecies lanceolata have larger glomerules that tend to be solitary at the ends of the relatively few and long inflorescence branches. Subspecies microcephala plants are generally short (9–30 cm), as compared to 15–65 cm for subspecies breweri and lanceolata, even when they are well developed. It has a conspicuously short and bushy habit compared to subspecies breweri and lanceolata. The bracts of subspecies microcephala seem to nearly always lack purple pigments, as do many subspecies lanceolata specimens, unlike bracts of subspecies breweri, which are almost always purple tinted. Perhaps the most notable characters of subspecies microcephala are that its bracts are extremely short (5–7 mm), no longer than the calyces that they subtend, and generally lanceolate-ovate. Conversely, the bracts of subspecies lanceolata are longer (10–15 mm), extend beyond the calyces that they subtend, and broader. Even diminutive plants of subspecies lanceolata have bracts that are at least 10 mm long and exceed the calyces. Monardella breweri subsp. microcephala rarely has leaves that subtend the glomerules, and if it does they tend to be short. Conversely, subspecies breweri and subspecies lanceolata often have long leaves immediately subtending the glomerule that extend beyond it. Subspecies microcephala has five to six bracts per glomerule, whereas subspecies breweri and subspecies lanceolata generally have eight to 10 bracts per glomerule. Subspecies microcephala calyces are short (ca. 6–7 mm), but are only slightly shorter than subspecies breweri and lanceolata, whose calyces are ca. 6.5–7.5 mm. The low number of flowers per glomerule (three to 25) appears to be the major factor governing glomerule size and the main defining character for this taxon. As is expected with subspecies, there is a large zone of introgression with numerous intermediate specimens between subspecies microcephala and lanceolata. Abrams (1912b) noted an abundance of specimens in southern California (specifically in central San Diego County) that demonstrate a clear gradient between subspecies microcephala and subspecies lanceolata.


Distribution. Monardella douglasii occurs in the foothills of the coastal mountain ranges adjacent to and south of San Francisco Bay.


Hae species a Monardella brevleri A. Gray folis margin undulato et bracteis anguste ovatis scariosis vel viridibus differt.

Annual, erect, gracile, 8–65 cm tall, simple or sparsely to moderately branched, sparsely pubescent, stems straw to tan. Leaves 10–55 × 3–8 mm, in axillary clusters, linear to oblanceolate, ± fleshy, subglabrous to sparsely pubescent, margins weakly to strongly wavy. Inflorescence open compound cyme; glomerules 10–25 mm wide; bracts 7–12 × 3–9 mm, elliptic to narrowly ovate, tips obtuse to acute, but not attenuate, scarious to green, purple-tinted or not. Calyx lobes acute, densely pubescent, tube less pubescent than lobes; corolla 14–20 mm, upper 2 lobes gland-tipped, lavender to purple.

Etymology. The specific epithet refers to the sinuous leaf edges.

Related taxa. Monardella sinuata is an annual plant with undulate leaf margins that occurs along the central coast of California. It has long been mistakenly called M. undulata, but as noted above, the type specimen and description of M. undulata are of a perennial plant. The annual with undulate leaf margins has not been described to date, even though it is well known to California botanists.

The exact relationship of Monardella sinuata to other similar Monardella species is not obvious. Epling (1925) placed M. undulata in the annual
section, Section II, Annuae, even though under his concept *M. undulata* included perennials and shrubs as well. *Monardella sinuata* has clear affinities with the other undulate-leaved *Monardella* taxa with which it has typically been associated. However, overall, it is more similar and appears to be more closely allied with *M. brevii*, *M. douglasii*, and other annual *Monardella* species, based on its leaf and
bract morphology, pubescence, stature (herbaceous stems), the presence of glands on the tips of the upper petals, and especially its annual habit. *Monardella sinuata* primarily differs from the other annual *Monardella* species in its possession of undulate leaf margins. Based on these characteristics, we are including it in the annual species alliance.

**Paratypes. U.S.A. California:** San Luis Obispo Co., B. Anderson 173 (OBI), A. Eastwood 14954 (CAS), C. Eppling s.n. (IRVC 4605), A. P. Griffiths s.n. (OBI 58373), s.n. (OBI 58377), s.n. (OBI 58392, UCR 115289), s.n. (OBI 58393), s.n. (OBI 58394), s.n. (OBI 58395), C. B. Hardham 7047 (SBBG), 12070 (SBBG), G. K. Helmkamp 5676 (UCR), s.n. (UCR 15783), R. F. Hoover 7394 (CAS [2], DS, OBI [2]), 9033 (CAS, OBI), D. F. Howe 3568 (SD), M. P. Ingalls s.n. (CAS 25461), J. D. Jokert 2902 (CHSC), D. Keil 16322 (OBI, SBBG), B. Moess 141 (OBI), R. J. Rosin 6080 (OBI), F. Rush s.n. (OBI 13617), M. E. Schneider s.n. (OBI 26252), R. W. Summers 656 (CAS [2]), E. C. Twisselmann 2428 (CAS [2]); Santa Barbara Co., L. E. Allen s.n. (SBBG 45184), s.n. (SBBG 45719), E. R. Blakley 3487 (SBBG), D. E. Breidlove 4140 (CAS, DS), J. Broughton 1191 (SBBG), P. Burns 100 (UCSB), E. R. Chandler 3746 (OBI, SBBG), E. Collins 31 (UCSB), K. C. Danielsen 7 (UCSB), 55 (UCSB), L. W. Edge 899 (SBBG), s.n. (SBBG 53007), W. R. Ferren LP-107 (UCSB), LP-420a (UCSB), H. C. Forbes LP-122 (IRVC, UCSB), A. P. Griffiths s.n. (OBI 58369), J. R. Haller 1714 (UCSB), D. Hickson 16 (UCSB), R. Hoffmann s.n. (SBBG 6420), s.n. (SBBG 72003), D. F. Howe 3562 (SD), D. Keil 24596 (OBI), 23530 (OBI), H. L. Mason 408 (DS), H. E. McMin 1041 (DS), M. Olson 225 (UCSB), B. Ore LP-92 (UCSB), H. M. Pollard s.n. (SBBG 41477), P. H. Raven 15513 (DS), L. Roundtree s.n. (CAS 299291), C. F. Smith 6286 (SBBG), 8918 (SBBG), 9957 (SBBG), A. Whistler 1A (UCR, UCSB); Ventura Co., N. French 311 (UC), D. Howe 4924 (SD); county not listed, St. Simeon, s.d., Gambel s.n. (GH), s.d., E. Palmer 362 (GH).


**Distribution and ecology.** *Monardella sinuata* subsp. *sinuata* occurs in coastal areas from Morro Bay in San Luis Obispo County south to Surf in Santa Barbara County with historical collections in Ventura County, California; however, it has not been collected or reported from Ventura County since 1976, and there is little suitable habitat remaining where it formerly occurred (M. A. Elvin & R. Burgess, pers. obs.). *Monardella sinuata* is restricted to sandy soils in coastal strand, dune scrub, openings in sagebrush scrub, coastal chaparral, and coastal oak woodlands from sea level to approximately 300 m. It flowers from April through September. It is rather uncommon overall, but can be locally common.

There is an undated collection by Gambel (*Gambel* s.n., GH), with the label as “St. Simeon” (presumably San Simeon, San Luis Obispo County), that may be from north of the otherwise known range of subspecies *sinuata*. This collection is intermediate between subspecies *sinuata* and another, more northerly, subspecies (described below) in bract characters. Other subspecies *sinuata* plants from the Morro Bay area also tend toward some aspects of the northern subspecies in that they exhibit some darkening of the tips of the calyces, slightly darkened bract veins, and a more compact habit relative to the plants from Santa Barbara County. However, they still fit better within subspecies *sinuata* and we include them there.

3b. *Monardella sinuata* Elvin & A. C. Sanders subsp. *nigrescens* Elvin & A. C. Sanders, subsp. nov. **TYPE:** U.S.A. California: Marin Co., Point Reyes Peninsula, 12.5 mi. from Inverness, sandy knoll on crest of ridge, 18 May 1938, A. Carter 1417 (holotype, GH; isotypes, DS, RSA not seen, UCR). Figure 11.

Hae subspecies a *Monardella sinuata* Elvin & A. C. Sanders subsp. *sinuata* caule robusto fusculo et bracteis latioribus brevioribus apice nigrescentibus venis furvis differt.

Annual, erect, stout, 8–45 cm tall, branched throughout to simple, sparsely pubescent, stems dark. Leaves 10–30 × 4–10 mm, in axillary clusters, lanceolate to narrowly oblanceolate, ± fleshy, margins weakly wavy. Inflorescence cyme or compact cyme; glomerules 10–35 mm wide; bracts 9–16 × 6–12 mm, elliptic to ovate, obtuse to acute, but not attenuate, scarios to green, purple-tinged or not, tips dark (black), veins dark (black) and spreading hairy. Calyx pubescent, lobes dark-tipped and acute; corolla 14–20 mm, upper 2 petals gland-tipped, lavender to purple.

**Distribution, ecology, and phenology.** *Monardella sinuata* subsp. *nigrescens* ranges from just south of Monterey Bay in Monterey County, north to Point Reyes in Marin County, California. It is restricted to sandy soils in dunes, dune scrub, and openings in coastal scrub with occurrences documented in Marin, San Francisco, Santa Cruz, Contra Costa, Santa Clara, San Mateo, and Monterey counties, California. It grows from sea level to approximately 300 m elevation and flowers from May through July. It is apparently very uncommon.

**Etymology.** The subspecific epithet refers to the black (dark) tips on the calyces and bracts and the dark bract veins.

**Discussion.** *Monardella sinuata* plants in the northern part of the species range differ from those in the southern portion, and are here recognized as a distinct subspecies. The bract tips and veins are noticeably dark brown to black. The glomerules are larger (10–35 mm vs. 10–25 mm wide for subsp.
Figure 11. Monardella sinuata subsp. nigrescens Elvin & A. C. Sanders (holotype, A. Carter 1417, GH).

sinuata) and the bracts are wider, shorter, and darker. The stems are stout, robust, and dark.

R. Dudley s.n. (DS 23587), A. Eastwood 6941 (CAS), A. D. E. Elmer 4379 (CAS), L. A. Greato 615 (DS), A. A. Heller 8426 (DS, GH), R. F. Howes 9113 (CAS, OBI), J. Jokset s.n. (CHSC 67992), V. Krestovsky s.n. (CHSC 67993), E. A. Purser 3838 (SD), 3861 (SD), F. G. Woodcock s.n. (CAS 299962); San Francisco Co., A. Eastwood s.n. (CAS 25463), J. T. Howell 11481 (CAS, GH), W. N. Sukatschev 786 (GH); Santa Cruz Co., W. R. Dudley s.n. (DS 572519, DS 63417), R. S. Ferris 11138 (DS, GH), V. F. Hesse 981 (CAS), J. H. Thomas 6016 (DS, SD); s. loc., H. N. Bolander 69 (GH), Hartweg 1912 (GH).


**Discussion.** *Monardella venosa* is recognized at the species level. Jepson (1943) first recognized the close relationship between *M. douglasii* and *M. venosa* by making *M. venosa* a variety within *M. douglasii*. Jokset (1992) also recognized this close relationship and elevated *M. venosa* to the subspecific level. We now recognize *M. venosa* as a full species, but maintain that there is a close relationship between the two species.

**Distribution and ecology.** *Monardella venosa* occurs in the foothills of the western Sierra Nevada and southwestern Cascade mountain ranges in Butte, Mono, Tuolumne, and Yuba counties, California. It is morphologically distinct from *M. douglasii* in bract shape, size, and architecture; glomerule size; and stem stoutness and is therefore treated as a separate species. There are no collections that we have seen that express intermediate characters between *M. venosa* and either *M. douglasii* or *M. candidans*. It is biologically isolated from *M. douglasii* because the two species are separated by the floor of the San Joaquin–Sacramento Valley, a distance of more than 90 km with no suitable habitat.

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**Literature Cited**


———. 1912b. The Monardellas of Southern California—II. Muhlenbergia 8: 37–44.


Description of Four New Species of Bulbophyllum (Orchidaceae) from Madagascar

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ABSTRACT. Four new orchid species from Madagascar are described and illustrated. Notes on the distribution, ecology, and conservation status are provided. Bulbophyllum uroplatoides Hermans & G. A. Fischer, B. histrionicum Reichenbach f. ex G. A. Fischer & P. J. Cribb, and B. senghasii G. A. Fischer & Sieder belong to section Calararia Slecheter, whereas B. bryophytoide G. A. Fischer & Andriatiana belongs to section Lichenophylyx Slechter. Bulbophyllum uroplatoides Hermans & G. A. Fischer is related to B. cardiolbulbus Bosser, but differs in the thickened racemes, overall plant size, the shape of the sepals, petals, and lip, and coloration. Bulbophyllum histrionicum Reichenbach f. ex G. A. Fischer & P. J. Cribb was previously recognized by Reichenbach as a new species, but was never formally described. It is characterized by its large, orbicular to somewhat ovoid pseudobulbs that are green flushed with red, large, ovate-oblong to ovate-lanceolate leaves, red floral bracts, long sepals, narrowly triangular petals, and glabrous lip. Bulbophyllum senghasii G. A. Fischer & Sieder has orbicular, non-compressed bifoliolate pseudobulbs, flowers with greenish yellow sepals that are spotted with dark brown on the outside, and an elliptic lip that is not compressed in the middle and has erose rather than long-ciliate margins and falcate rather than straight stellid. Bulbophyllum bryophytoide G. A. Fischer & Andriatiana is a very tiny plant distinguishable from other species of section Lichenophylyx by its densely long-ciliate petals and its ciliate lip that lacks a median callus and has a glabrous surface.


Key words: Bulbophyllum, IUCN Red List, Madagascar, Orchidaceae.

The first taxonomic treatment of Bulbophyllum Thouars for Madagascar and the Mesoamericans was

completed at the beginning of the 19th century (Thouars, 1822), and Thouars described 16 species of *Bulbophyllum* including *B. nutans* Thouars, the type species of the genus. Cordemoy (1893) later listed 15 species for La Réunion. Schlechter (1924) described 117 species of *Bulbophyllum* for Madagascar in his work *Orchidaceae Perrieranae*, which he attributed to 19 sections. His classification is, with some adaptations, still used today.

A milestone for the knowledge of the orchids of Madagascar was the publication of Perrier de la Bâthie (1939). In his comprehensive account (still forming the basis for all taxonomic treatments up to the present), he described in detail 179 species of *Bulbophyllum* for Madagascar. During the past four decades, Bosser and collaborators (Bosser, 1965, 1969, 1971, 1989, 2000, 2004; Bosser & Cribb, 2001) published several papers on Malagasy *Bulbophyllum*, including sectional treatments and new descriptions. Currently, some 211 species names (including several varieties) are accepted for Madagascar and the Mascarenes; 26 species names are unclear and in need of revision. Checklists of the orchids of Madagascar have been published by Du Puy et al. (1999) and Hermans et al. (2007). Recently, the number of sections was extended to 20 (Fischer et al., 2007a).

During the past four years, the genus *Bulbophyllum* in Madagascar was intensively investigated using phylogenetic and molecular methods (Fischer et al., 2007b). Several botanical surveys were undertaken in various parts of Madagascar. During this work, three new species belonging to section *Calamina* Schlechter and one new species belonging to section *Lichenophy lax* Schlechter were discovered and are described here. Notes on their distribution, ecology, and conservation are provided.

### I. Bulbophyllum sect. Lichenophylax Schlechter.

Section *Lichenophylax* was established by Schlechter (1924) for a group of unique species endemic to the humid forests of eastern Madagascar. All species are tiny creeping plants clearly characterized by a ramified rhizome, ovoid to oblong bifoliate pseudobulbs, and a setaceous and uniflorous inflorescence.

#### I. Bulbophyllum bryophytoides G. A. Fischer & Andriantiana, sp. nov. TYPE: Madagascar. Toamasina: Dist. Maroantsetra, Sahantaha, Mt. Anjanaharibe, 900 m, 15°10′56″S, 49°37′17″E, very local, 19 Nov. 2005, G. A. Fischer & Andriantiana FS2595 (holotype, WU). Figure 1.

Affine Bulbophyllo lichenophylaci Schlechter et B. afzelii Schlechter sed petalis dense longiciliatis, labello ciliato ecalloso glabro et sepalis 6–8 mm longis (9–10 mm longis in *B. afzelii*; 10–12 mm longis in *B. lichenophylacei*) satús differt.

Rhizome 0.6–1 mm diam., nodes slightly swollen; roots 0.25–0.35 mm diam.; rhizome sheaths tubular, membranous, covering the new growth and bulb bases, disintegreating when old; pseudobulbs green, bifoliate, oblong to elliptic, 2–3 × 1.3–1.6 mm, 5–7 mm apart. Leaves green, elliptic, acute, ca. 6 × 3.5 mm, tip acuminate, thin and very soft. Inflorescence 20–30 mm, single-flowered; peduncle erect, not swollen, setaceous, with 2 to 3 sheaths, ending in 1 terminal flower; peduncle sheath tubular, 2–3 mm, caudate, membranous; floral bracts triangular, ca. 2 mm, membranous, slightly keeled, tip acuminate, base broadly attached. Flower resupinate, apically drooping from the pedicel and peduncle; pedicel and ovary 0.5–0.6 mm subulate; sepals purple; dorsal sepal oblong-ovate to oblong, 6–7 × 1.5–2 mm, tip caudate, margins finely ciliate, 3-nerved, surface glabrous; lateral sepals free, 3-nerved, slightly recurved toward the tips, 7–8 × 3–3.5 mm, tips caudate, margins entire to very finely ciliate toward the base, base broadly attached; petals blackish purple with a whitish cream base, ovate, 5–5.2 × 2–2.2 mm, margins densely whitish long-ciliate, 1-nerved, surface finely papillose; lip blackish purple, recurved, elliptic to ovate-oblong in outline, tip rounded, margins over the entire length with seam-like lateral lobes that are densely ciliate, set apart from the median part of the lip by 2 ridges that alternate toward the tip, the median part with a very small slit continuing for 1/4 of the lip, surface glabrous; column white, from the base of the free part up to the tip of the stelidia 1.7–2 mm, with distinct, very short, truncate stelidia; column not winged, with a basal distinct tooth at its median margins; anther ca. 0.5 × 0.5 mm, with a median ridge, surface finely and slightly rugose; anther white; pollinia 4.

**Distribution and habitat.** The new species is only known from the type collection in wet montane forest between 600 and 1000 m in rather shady places at the base of trunks on Mount Anjanaharibe, northwest of Maroantsetra.

**IUCN Red List category.** The species seems to be very rare and restricted in distribution; it must be considered as Endangered (EN) following the IUCN (2001) criteria.

**Etymology.** The habit of the plant without flowers resembles the mat-like growth form of moss, and therefore this species is named *Bulbophyllum bryophytoides*.

**Taxonomic relationships.** This species is unique within section *Lichenophylax* because of the densely
long-ciliate petals and the ciliate, glabrous lip without a median callus.

II. Bulbophyllum sect. Calamaria Schlechter.

Schlechter (1924) first used the name Calamaria for a group of orchids that occur in Madagascar, the Comoros, the Mascarenes, and Africa. Section Calamaria is characterized by ovoid to orbicular, sometimes flattened, unifoliate or bifoliate pseudobulbs. The inflorescence is a many-flowered raceme with a rachis as thick as the peduncle or swollen, with the flowers inserted into dimples. The floral bracts cover the whole flower or at least the pedicel and ovary of the flowers, which are arranged in rows or spirally. The sepals are glabrous or verrucate, rarely fine hairy, with always entire margins. The lateral sepals are free. The lip is thick, recurved in the middle, with glabrous to long hairy margins. The stelidia are linear, falcate or recurved, and acute to acuminate. The anther has a protrusion that is often as long as or longer than the stelidia. All species are adapted to drought through succulent vegetative parts.

2. Bulbophyllum histrionicum Reichenbach f. ex G. A. Fischer & P. J. Cribb, sp. nov. TYPE: rocallieux, 30 Apr. 2004, P. Ranirison 733 (holotype, G; isotype, WU). Figure 2.

Affine Bulbophyllum perillei Rolfe sed pseudobulbis viridiibus rubro-suffusibus orbicularibus vel ovoidibus, 2-3 × 1.8-2.7 cm, foliis ovato-oblongis vel oblongo-lanceolatis, 3-4 cm longis, inflorescentia usque ad 35-flora, bracteis rubris, ca. 4 mm longis, sepalis ca. 7 mm longis, petalis anguste triangularibus et labello glabro satis differt.

Rhizome 2-3 mm diam., nodes not swollen, roots 0.4-0.7 mm diam.; rhizome sheaths tubular, covering the base of the pseudobulbs and the new growth, disintegrating when old; pseudobulbs green suffused with red, bifoliolate, orbicular to slightly ovoid, 1-2 mm apart at maximum, often touching each other or imbricate, arranged like in a mosaic, flattened, 2-3 × 1.8-2.7 cm, not angled. Leaves green yellowish sometimes suffused with red, ovate-oblong to oblong-lanceolate, 3-4 × 1-1.2 cm, tip obtuse to slightly oblique, very thick, coriaceous. Inflorescence 20-30 cm, up to 35 flowers; peduncle arising horizontally, red, not swollen, 8-12 cm long, 1 mm diam., with 4 to 5 sheaths; peduncle sheaths tubular, ca. 1 cm, tip acute, membranous, with nerves, glabrous; rachis red, pendulous, swollen at the nodes, subulate, 12-18 cm, glabrous to fine granulate; floral bracts red, triangular, ca. 4 × 1 mm, tip acute, base broadly attached, membranous, glabrous; flowers spiraling in a rather lax raceme, many flowers open simultaneously; pedicel and ovary glabrous, ca. 2.5 mm, jugae ending in a short tooth. Dorsal sepal fire red, ovate-lanceolate, ca. 7 × 2 mm, 1-nerved, tip ciliate, margins entire, glabrous, base broadly attached, slightly keeled, concave (cap-like) hiding the top part of the column; lateral sepals fire red, free, narrowly triangular with a broad base, ca. 7 × 3.5 mm, 1-nerved, tip ciliate, margins entire, glabrous, base broadly attached; petals white with red margins, not recurved, slightly falcate and narrowly triangular, 1-nerved, margins entire, glabrous, thin, base broadly attached; lip fire red, recurved, fleshy, glabrous, not ciliate, abaxially with a median furrow; column white with some red spots, 2-3 mm from the base of the free part up to the tip of the stelids, with rather short broad, triangular stelids, slightly winged below the base of the stelids; anther ca. 0.7 × 0.7 mm, papilllose; pollinia 4, the inner 2 very small.

Distribution and habitat. Bulbophyllum histrionicum is endemic to northern Madagascar in dry to subhumid lowland forests, between 100 and 350 m, including the Tsingys of Antsiranana.

ICUN Red List category. This species seems to be very rare and restricted in distribution; it must be considered as Endangered (EN) following the IUCN (2001) criteria.

Etymology. The reason Reichenbach chose the epithet formed from the Latin “histrionica,” meaning “the art of acting” or “dramatic,” is not known, but it probably refers to the showy habit of this species.

Notes. Reichenbach considered publishing Bulbophyllum histrionicum, as noted on the label of material examined by him (Herb. Mus. Palat. Vindob. Reichenbach: Herb Orchid. No. 9655), but never published a valid description. We therefore name this species B. histrionicum as proposed by Reichenbach.

Taxonomic relationships. Bulbophyllum histrionicum is related to B. perillei, which only occurs in eastern humid coastal forests. The elliptic leaves, the laxly flowered inflorescence, the yellowish ovate-oblong sepals with an acuminate tip, the ovate-oblong petals, and the strongly papilllose lip distinguish B. perillei from B. histrionicum.

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3. Bulbophyllum senghasii G. A. Fischer & Sieder, sp. nov. TYPE: Madagascar. 100 mi S of Antananarivo, in forest reserve, very local, fl. in cult., 30 Oct. 1961, Mason 78 (holotype, K 14850). Figure 3.

Affine Bulbophyllum sambiranense Junelle & H. Perrier sed pseudobulbis orbicularibus non-compressis, foliis ellipticis 2.5–3.5 × 1.5–2 cm, floribus flavo-viridibus atrobrunneoculatis, labello flavo in medio non-compresso margine erosio et stelidiis falcatis satis differt.

Rhizome ca. 2 mm diam., nodes not swollen, roots 0.4–0.6 mm diam.; rhizome sheaths tubular, membranous, covering the base of the pseudobulbs, disintegrating when old; pseudobulbs green, bifoliolate, orbicular, 1.5–2 × 1.5–2 cm, 0.5–1 cm apart, not flattened, not angled. Leaves green, elliptic, obtuse, 2.5–3.5 × 1.5–2 cm, tip retuse, coriaceous, very thick. Inflorescence 10–15 cm, up to 30 flowers; peduncle erect, swollen toward the rachis, apical drooping and torsion of the apex, with 5 to 6 sheaths; peduncle sheaths tubular, 5–6 mm, keeled, rounded to truncate, membranous with nerves; rachis swollen, spindle-shaped, 5–7 cm, 4 mm diam., subulate, with fine rugosities; floral bracts recurved, ovate, ca. 6 × 2 mm, membranous, central nerve keeled, with fine rugosities, tip acute, base broadly attached; flowers placed in 3 rows, in a rather dense raceme with dimples, giving a deltoid and imbricate impression at the apex where the floral bracts cover the flower buds, many flowers opening simultaneously; pedicel and ovary ca. 1 mm long, covered with fine rugosities; jugae ending in short acute tooth; sepals yellow adaxially, greenish yellow abaxially with some dark brown spots; dorsal sepal not recurved, ca. 4.5 × 1.5 mm, narrowly elliptic to oblong, concave, cap-like, suffused with small rugosities, margins entire, thick, base broadly attached, tip acute to acuminate; lateral sepals free, slightly recurved, falcate, ca. 3.5 × 2 mm, suffused with small rugosities, margins entire, base broadly attached, tips acuminate; petals white, linear acute, ca. 2 × 0.5 mm, margins entire, glabrous, base broadly attached; lip dark yellow, recurved, elliptic in outline, median part not compressed, ca. 2.5 × 1.3 mm, tip very thick, truncate, margins with a narrow seam with edges that are erose, surface glabrous, lateral sides finely papillose, abaxially with a central furrow; column white, ca. 2 mm long from the base of the free part up to the tip of the stelids, winged below the base of the stelids; stelids acutely acuminate, falcate, ca. 0.5 mm; anther ca. 0.5 × 0.6 mm, yellow, with a warty and papillose filament; pollinia 4.

Distribution and habitat. The distribution of Bulbophyllum senghasii is unknown because the species is known only from the type collection.

IUCN Red List category. The species seems to be very rare and restricted in distribution; it must be considered as Endangered (EN) following the IUCN (2001) criteria.

Etymology. The species is named in honor of the late Karlheinz Senghas, the former curator of the Heidelberg Botanic Garden, who collected the paratype on one of his trips to Madagascar together with Werner Rauh.

Taxonomic relationships. Bulbophyllum sambiranense Junelle & H. Perrier, which is closely related to B. senghasii, is clearly distinguishable by the compressed pseudobulbs and the ciliate margins of the lip.

Paratype. MADAGASCAR. K. Senghas & W. Rauh s.n., cult. HBV 099B60-1 (HU).


Affine Bulbophyllum cardiobulbo Bosser sed pseudobulbis 2–3.5 cm diam., infloroscentia laxa 15- ad 18-flora, sepals lancedolati vel linear-lancedolati 7–8 mm longis castenis, petalis cremeis rubro-marginitis et labello ca. 6 mm longo carmineo ad basin cremeo ad margines vermesco et columna alba ad basin rubroguttata satis differt.

Rhizomes 4–5 mm diam., completely hidden by the pseudobulbs; roots 0.5–1 mm diam., wiry, glabrous; rhizome sheaths membranous; pseudobulbs pale green-yellow, becoming yellow with age, bifoliolate, ovate to orbicular, with sharp edges, very strongly flattened, 2–3.5 cm diam., partly covering each other. Leaves pale green, oblong to ligulate, base very shortly petiolate, 2–4.5 × 1–2 cm, tip oblique, midrib obscure. Inflorescence up to 22 cm long, laxly 15- to 18-flowered, semi-erect; peduncle 13–15 × 0.2–0.3 cm, emerging from behind the pseudobulbs where the base is covered by a triangular sheath, slightly
compressed, brownish red, with 3 or 4 sheaths; peduncle sheaths tubular, 3–8 mm, membranous; rachis brownish red, 8–9 × 0.3–0.4 cm, surface slightly ridged and hollowed at the inset of the ovary; floral bracts 4–10 mm apart, lanceolate, acute, 4–6 mm long. Flowers ca. 8 × 8 mm, all approximately facing the same direction, in a lax raceme, mostly opening simultaneously; pedicel and ovary 2–3 × ca. 1.5 mm, subsessile, not resupinate; sepals chestnut with darker longitudinal marking; dorsal sepal not recurved, linear-lanceolate, 7–8 × 2–2.5 mm, base concave, tip acute, margins entire, glabrous; lateral sepals lanceolate, ca. 8 × 4 mm, concave, forming a ca. 2 mm mentum, tips acute; petals cream with red margins thin, narrowly triangular, ca. 2 × 0.75 mm, tip acute, margins entire; lip ca. 6 × 1.5 mm, crimson, cream at the base, articulate and mobile on the column foot, base recurved with a central fissure ca. 4 mm long from the base, glabrous but margins microscopically verrucose; column whitish yellow, foot spotted with red, ca. 1.5 mm from the base of the free part to the tips of the stelids, stelids slightly spreading, ca. 0.5 mm, with small rounded lobe along the upper margin; anther 0.9–1 mm diam., minutely verrucose; pollinia ca. 0.5 mm diam.

Distribution and habitat. Bulbophyllum urola- toides is endemic to northern Madagascar in montane humid forests and has been collected from 1050 m altitude.

IUCN Red List category. The species is very rare and restricted in distribution; it must be considered as Endangered (EN) following the IUCN (2001) criteria.

Etymology. The species epithet refers to the leaf-tailed geckos (Uroplatus Duméril) of Madagascar, which are also found flattened against trees.

Taxonomic relationships. Bulbophyllum cardiobul- lum, the closest relative of B. urolaoides, differs in its very narrowly triangular sepals and petals and the very papillose and elongated lip that is compressed in the median part. The vegetative parts of both species are very similar but can be distinguished because those of B. cardiobulum are larger in all parts.

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Literature Cited


A New Hybrid Bromeliad from Southernmost Brazil, *Tillandsia ×baptistana*

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**ABSTRACT.** A new putative natural hybrid bromeliad from southernmost Brazil, *Tillandsia ×baptistana* Gonçalves & Azevêdo-Gonçalves (Bromeliaceae), is here described. Its habit is very similar to *T. mallemontii* Glaziou ex Mez, but the floral characteristics are intermediate between the probable parental taxa (*T. recurvata* (L.) L. and *T. mallemontii*). A key to identify this hybrid and its parents on the basis of the floral characters is also presented.

**Resumo.** Uma nova bromélia, provável híbrida natural, *Tillandsia ×baptistana* Gonçalves & Azevêdo-Gonçalves (Bromeliaceae), é aqui descrita. Seu hábito é muito similar ao de *T. mallemontii* Glaziou ex Mez, enquanto suas características florais são intermediárias entre os táxons parentais (*T. recurvata* (L.) L. e *T. mallemontii*). Uma chave para identificar este híbrido e seus parentais, com base em caracteres florais, também é apresentada.

**Key words:** Brazil, Bromeliaceae, *Tillandsia*.

The genus *Tillandsia* L. has nearly 420 species and is widely distributed in the Neotropics (Smith & Downs, 1977; Winkler, 1982). However, few hybrids are known in the genus. During fieldwork in which we studied vascular epiphytes on the coastal plain of Rio Grande do Sul, the southernmost Brazilian state (Gonçalves & Waechter, 2002), we found a little *Tillandsia* that was further recognized as a previously unknown putative hybrid. We describe it herein, as follows:

**Tillandsia ×baptistana** Gonçalves & Azevêdo-Gonçalves, nothosp. nov. [= *Tillandsia mallemontii* Glaziou ex Mez × *T. recurvata* (L.) L.].

**TYPE:** Brazil. Rio Grande do Sul: Terra de Areia, epiphyte on a fallen branch near peat forest, 15 Dec. 1999 (fl., fr.), C. N. Gonçalves & C. F. de Azevêdo-Gonçalves 244 (holotype, ICN 120.704; isotype, HAS). Figure 1.

Haec nothospecies inter *Tillandsia mallemontii* Glaziou ex Mez et *T. recurvata* (L.) L. hybrid putata est; a hae floribus (et plenumque stature) majoribus atque petalis remiformibus, ab illa petalis brevioribus pallide azureis atque antheris ovarioque brevioribus distinguetur.

Epiphytic herb 16–20 cm, grayish. Roots present. Stem, leaves, inflorescence, and bracts covered by radial scales. Stem 4–6 cm, dichotomous from its base to its apex, turned near the roots and covered by leaf bases. Leaves 3–9 cm, lanceolate, without petioles, densely covered by scales in both faces. Terminal inflorescences 7–10 cm, with a thin rachis, and 1 bract per flower 14–19 mm. Flowers semisessile, trimerous, commonly as pairs open at same time, or a bud and one flower open. Sepals suborbicular to lanceolate, 10.4–12 mm, glabrous. Petals pale blue, 14.8–15.3 mm, with 11 laminar nerves, blade oar-shaped, suborbicular with suboblique apex, spreading at anthesis. Stamens 4.1–6.8 mm, exceeding the pistil; anthers 1.1–2.1 mm. Ovary cylindrical, 3.8–4.1 mm, with a short thick pistil 1–1.5 mm. Fruit capsular with 3 valves. Seeds absent or imperfectly developed.

**Etymology.** This taxon is named in honor of Luís Ríos de Moura Baptista, an eminent botanist from Rio Grande do Sul.

**Habitat and distribution.** *Tillandsia ×baptistana* is epiphytic on fig trees (*Ficus organensis* (Miquel) Miquel) near peat forest. To date, *T. ×baptistana* has been found only near the town of Terra de Areia (29°35'S, 50°06'W) in the coastal plain of Rio Grande do Sul, Brazil, where it is extremely rare (only three individuals found). However, it is to be expected wherever *T. recurvata* and *T. mallemontii* occur sympatrically, but it may be overlooked if not collected with flowers. In Rio Grande do Sul, 19 native species of *Tillandsia* were listed, but none of these was a natural hybrid (Winkler, 1980, 1982; Strehl, 2000). Therefore, *T. ×baptistana* is the first natural hybrid of *Tillandsia* found in this Brazilian state.

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hybrids of *Tillandsia* are relatively rare. They listed only 10 hybrid taxa of *Tillandsia* in their revision of Tillandsioidae. Few other hybrids have been described since then (Gardner, 1984; Luther, 1985), and some previously described species have been recognized as having a hybrid origin (Luther, 1989). However, Luther (1989) believes that many taxa described as species of *Tillandsia* are actually hybrids. In Brazil, only one natural hybrid (*T. ×donatoi* Leme) was previously described (Leme, 1987). The putative hybrid nature of *T. ×baptistana* is supported by the absence of viable seeds and by morphological characters intermediate between the two presumed parent taxa. Its phenology is also similar to *T. recurvata* and *T. mallemontii*.

Two individuals of *Tillandsia ×baptistana* were found as epiphytes on fig trees. One other was found on a fallen branch. Only this last individual was collected and partially vouched. Another part of this plant was cultivated, and its mature capsules were collected to test the seed germination. The plant was maintained on the branch where it was found to avoid damage. The locale where this individual was cultivated is only 3.5 km from the site collection and has the same climate. Mature capsules from the
other two individuals were also collected. A total of 15 capsules were open and 11 were empty. Four capsules had only imperfectly developed seeds that failed to germinate. Other capsules observed in the cultivated plant were also empty. It is important to note that individuals of *T. recurvata* and *T. mallemontii* were also cultivated at the same locale, side by side with *T. ×baptistana*, and they presented many viable seeds.

Gonçalves and Waechter (2002) found nine *Tillandsia* species on isolated fig trees near the area where *T. ×baptistana* was found, including species of the subgenera Anoplophytum (Beer) Baker (*T. aeranthos* (Loiseleur) L. B. Smith, *T. gardneri* Lindley, *T. geminiflora* Brongniart, *T. stricta* Solander, and *T. tenuifolia* L. var. *surinamensis* (Mez) L. B. Smith), Diaphoranthema (Beer) Baker (*T. recurvata*, *T. tricholepis* Baker, and *T. usneoides* (L.) L.), and Phytarrhiza (Visiani) Baker (*T. mallemontii*). Only one other *Tillandsia* species (*T. crocata* (E. Morren) Baker of subgenus *Phytarrhiza*) was found in the forests of the same area (C. N. Gonçalves & C. F. de Azevedo-Gonçalves, unpublished data).

The species belonging to subgenus Anoplophytum, as well as *Tillandsia usneoides* and *T. tricholepis*, are morphologically quite different from *T. ×baptistana* and may be promptly excluded as its parents. Although *T. crocata* occurs in the same geographic area and shares some morphological (leaves distichous-ranked, stem elongated) and floral characters (oar-shaped petals) with *T. ×baptistana*, it is rare and was not found in the immediate area where *T. ×baptistana* occurs. On the other hand, *T. recurvata* and *T. mallemontii* are extremely common in this area, especially the former species, and both were found growing with *T. ×baptistana* in the same trees. Of these three taxa, *T. recurvata* is the smallest. The maximum size of this species is 13.5 cm in the coastal plain of Rio Grande do Sul (to 23 cm in its whole occurrence area, according to Smith & Downs, 1977). However, it normally has an elongated stem and distichous-ranked leaves similar in aspect and dimensions to young individuals of *T. ×baptistana* and *T. mallemontii*. It is therefore somewhat difficult to distinguish one from another when they lack flowers. *Tillandsia ×baptistana* is very similar to *T. mallemontii* vegetatively, although individuals of *T. mallemontii* may have a more elongated stem (Table 1). The majority of the floral characters (sepals, stamens, anthers, and ovaries) of the three taxa are also similar in shape and form, but differ in size. Only the petals have a remarkable difference in shape: *T. recurvata* has sublinear to lanceolate petals and *T. mallemontii* has oar-shaped petals. In *T. ×baptistana*, the petals are also oar-shaped, but somewhat less defined than in *T. mallemontii*. The size of both the petals and sepals in *T. ×baptistana* is intermediate between *T. recurvata* and *T. mallemontii* (Fig. 2). The size of the stamens, ovaries, and pistils in *T. ×baptistana* overlaps the upper size range of these characters in *T. recurvata* (Table 1). The anthers of *T. recurvata* and *T. ×baptistana* are of equal size or slightly larger in *T. ×baptistana*, but are always smaller than in *T. mallemontii*.

Studies on floral biology and pollination, as well as species compatibility, are still lacking for *Tillandsia recurvata* and *T. mallemontii*. However, these two species flower in late spring to early summer (December to January) in the coastal plain of Rio Grande do Sul. Frequently, individuals of both species are found flowering at the same time in the same tree. So, it is not surprising that hybridization occurs between them. *Tillandsia ×baptistana* flowers at the same time, normally in December, but some flowers may occur occasionally in March or April.

*Tillandsia ×baptistana* is the first putative natural hybrid for species of *Tillandsia* from two different subgenera: *Phytarrhiza* (*T. mallemontii*) and *Diaphoranthera* (*T. recurvata*). It is possible that these two species will be better classified together (in a unique subgenus). Only future phylogenetic work in *Tillandsia*...
sia (including these two species) will resolve this question appropriately.

Following is a key to identify *Tillandsia ×baptistana*, *T. recurvata*, and *T. mallemontii* from Rio Grande do Sul, Brazil:

1a. Flowers inconspicuous; petals 8–10.4 mm long, white to pale blue; stamens 3.9–5 mm long; anthers 0.3–1.2 mm long; ovaries 2.8–4.5 mm long; pistils 0.9–1.3 mm long. *T. recurvata*

1b. Flowers larger.

2a. Petals 14.8–15.3 mm long, pale blue; stamens 4.1–6.8 mm long; anthers 1.2–2.1 mm long; ovaries 3.8–4.1 mm long; pistils 1–1.3 mm long. *T. ×baptistana*

2b. Petals 19–22.5 mm long, blue to violet; stamens 6.1–6.8 mm long; anthers 2.1–2.3 mm long; ovaries 3–5 mm long; pistils 1.8–2.2 mm long. *T. mallemontii*

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**Literature Cited**


A New Species of *Hoya* (Apocynaceae, Asclepiadoideae) from Hainan, China

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**Abstract.** A new species, *Hoya bawanglingensis* S. Y. He & P. T. Li (Apocynaceae, Asclepiadoideae), is described and illustrated from Hainan, China. The morphological characters of *H. bawanglingensis* and the related species *H. pottsii* Traill are compared. *Hoya bawanglingensis* differs in the pubescence of its young stems, both leaf surfaces, petioles, peduncles, pedicels, outer calyx lobes, and follicles. The corolla lobes are white with purple spots, and the corona is white with a purplish center.

**Key words:** Apocynaceae, Asclepiadoideae, China, Hainan, *Hoya*, IUCN Red List.

*Hoya* R. Brown (Apocynaceae, Asclepiadoideae) is a genus with at least 100 species distributed from Southeast Asia and Oceania. Thirty-two species are known from China (Li et al., 1995), most of which are found in Hainan, Yunnan, Guangdong, and Guangxi provinces. The genus is primarily distributed in Malaysia, where over 300 species are known, particularly from the Philippines, New Guinea, the western Pacific Islands, and Asia, including the Indian subcontinent. In Australia, there are six native species, among which are one endemic and one naturalized species (Forster & Liddle, 1996).

During our fieldwork on *Hoya* in Hainan Province, China, some unknown specimens of *Hoya* were collected that could not be placed in any of the previously described taxa from China (Tsiang & Li, 1974, 1977; Li et al., 1995) and Australia (Forster & Liddle, 1996), and this taxon is herein established as a new species.

*Hoya bawanglingensis* S. Y. He & P. T. Li, sp. nov. 

**TYPE:** China. Hainan Province: Bawangling, 19°07’N, 109°06’E, on tree in montane rainforest, 423 m, 8 Aug. 2007, S. Y. He & J. Y. Lin 0708081 (holotype, CANT, photo MO). Figure 1.

Species *Hoya pottsii* Traill affinis, sed caulibus juvenibus petolis foliis utrinque pedunculis pedicellis calyce extra et folliculis pubescentibus, lobis corollinis albis purpureo-maculatis atque corona alba mediano purpurea differt.

Plants epiphytic, scandent; stems and branches filiform, elongated, flexuose, terete, with purple maculae on young pubescent stems, aged stems glabrous. Leaves opposite, fleshy and leathery when dry, leaf blades ovate or elliptic, 7.5–10.5 × 3–4.5 cm, pubescent on both surfaces, green adaxially with some purple maculae, green abaxially with many purple maculae, apex acuminate or acute, base rounded or cordate, margin ciliate, 3-veined from base; petiole curved or twisted, terete, pubescent, dark purple or grayish green, ca. 1.2 cm long. Cymes subumbell-shaped with many flowers, ca. 12 to 25; rachis cylindrical; peduncle 7–10.5 cm, pubescent green with dark purple spots; pedicels filiform, slender, 2–2.2 cm, pubescent, white with purple spots. Calyx lobes overlapping at base, apex triangular, acuminate, outside scabrous; corolla rotate, reflexed, ca. 1 cm diam., lobes ovate, 4–7 × 4–5 mm, spreading, outside and inside white with purple spots, inside white pilose; corona raised in the center, lobes rhomboid, 3.5–4 × 2–2.5 mm, with side protrusions higher than inner, inner angles touching in center, white with purplish center, mucronate, outer angle acuminate, canaliculate on lower surface from base to apex; pollinia golden yellow, ca. 600 × 300 μm, germinating crested pellucid, extended to caudicle; caudicle wider toward pollinium, ca. 75 μm long; ovaries purplish white. Follicles fusiform, 8–10.5 × ca. 0.8 cm, dark purple; seeds linear-oblong, ca. 4 × 1 mm, brown or dark brown when dry, with white silky coma, ca. 3.5 cm.


**Distribution.** *Hoya bawanglingensis* is only known from the type collection, which was found in a small
area in Bawangling, Hainan Province, China. Other species of *Hoya* are found in the Bawangling area at altitudes from 270–1000 m.

**IUCN Red List category.** *Hoya bawanglingensis* is known only from Hainan. Despite its location in the Bawangling National Nature Reserve, its habitat has been degraded by deforestation resulting from human activities before the area was established as a nature reserve. The species is apparently rare and restricted in distribution, and is known only from one population with about 150 mature individuals. In addition to possible threats from unforeseen factors, *Hoya* has ornamental, medical, and economic value and is destructively collected in Hainan, which increases the risk of extinction. We therefore recommend that *H. bawanglingensis* be considered Vulnerable (VU C2b) according to IUCN Red List criteria (IUCN, 2001).
Table 1. Diagnostic characters of *Hoya bawanglingensis* and *H. pottsii*, two morphologically similar species.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>H. bawanglingensis</em></th>
<th><em>H. pottsii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Young stem</td>
<td>pubescent</td>
<td>glabrous</td>
</tr>
<tr>
<td>Indumentum</td>
<td>purple spots</td>
<td>not described</td>
</tr>
<tr>
<td>Leaves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shape</td>
<td>ovate or elliptic</td>
<td>ovate-oblong to oblong-lanceolate</td>
</tr>
<tr>
<td>Apex</td>
<td>acuminate or acute</td>
<td>acute</td>
</tr>
<tr>
<td>Base</td>
<td>rounded or cordate</td>
<td>rounded or subcordate</td>
</tr>
<tr>
<td>Length (cm)</td>
<td>7.5–10.5</td>
<td>6–12</td>
</tr>
<tr>
<td>Width (cm)</td>
<td>3–4.5</td>
<td>3–6</td>
</tr>
<tr>
<td>Indumentum</td>
<td>pubescent on both surfaces, base margin pilose</td>
<td>glabrous on both surfaces, base margin pilose</td>
</tr>
<tr>
<td>Color</td>
<td>green with purple maculae</td>
<td>not described</td>
</tr>
<tr>
<td>Basal veins</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Petiole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indumentum</td>
<td>pubescent</td>
<td>glabrous</td>
</tr>
<tr>
<td>Color</td>
<td>dark purple or grayish green</td>
<td>not described</td>
</tr>
<tr>
<td>Flower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peduncle</td>
<td>pubescent</td>
<td>glabrous</td>
</tr>
<tr>
<td>Pedicels</td>
<td>pubescent</td>
<td>glabrous</td>
</tr>
<tr>
<td>Calyx outside</td>
<td>outside scabrous</td>
<td>outside glabrous</td>
</tr>
<tr>
<td>Corolla lobe color</td>
<td>white with purple spots</td>
<td>white</td>
</tr>
<tr>
<td>Corolla diameter (cm)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Corolla inside</td>
<td>white pilose</td>
<td>white pilose</td>
</tr>
<tr>
<td>Corona lobe color</td>
<td>white with purplish center</td>
<td>white with reddish center</td>
</tr>
<tr>
<td>Ovaries</td>
<td>purplish white</td>
<td>not described</td>
</tr>
<tr>
<td>Habitat</td>
<td>mountain forests, on trees, alt. 270–430 m</td>
<td>mountain forests, on trees, alt. below 500 m</td>
</tr>
<tr>
<td>Distribution</td>
<td>China: Bawangling, Hainan</td>
<td>China: Guangdong, Guangxi, Hainan, Yunnan</td>
</tr>
</tbody>
</table>

**Phenology.** The new species was observed to flower from mid-April to August, with fruiting from August to September.

**Etymology.** The specific epithet refers to Bawangling, Hainan Province, China, the area in which the holotype specimen was collected.

**Discussion.** *Hoya bawanglingensis* closely resembles *H. pottsii* Traill, which was described in 1830, and is also distributed in China. The two species are similar in the shape and size of the leaves and in the three basal leaf veins. However, the new species differs from *H. pottsii* in the pubescence of its stems, leaf blades on both surfaces, petiole, peduncles, pedicels, outer calyx lobes, and follicles. The stems are slender, and purple spots distinguish the stems, leaf blades, petioles, outer calyx lobes, corolla lobes, and ovaries. Morphological characters of the two species are compared in Table 1.

**Paratypes.** CHINA. Hainan: Bawangling, 19°07′N, 109°06′E, on tree in montane rainforest, 423 m, 8 Aug. 2007, S. Y. He & J. Y. Lin 0708082, 0708083 (CANT).

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**Literature Cited**


Brongniartia balsensis (Leguminosae, Papilionoideae), una Especie Nueva de la Depresión del Río Balsas, México

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Resumen. Se describe e ilustra a Brongniartia balsensis J. Jiménez Ramírez & K. Vega (Leguminosae, Papilionoideae), una especie nueva y endémica de la Depresión del Balsas. El nuevo taxón es similar a B. guerrerensis J. Jiménez Ramírez & J. L. Contreras, pero difiere de ésta especie por tener un mayor número de folíolos y por presentar pedicelos, bractéolás, cálix, estandarte, alas y quilla de mayor tamaño, además de tener diferencias en la forma del estandarte, el color de la quilla (verde) y poseer una legumbre ligeramente alada.

Abstract. Brongniartia balsensis J. Jiménez Ramírez & K. Vega (Leguminosae, Papilionoideae), a new and endemic species from the Balsas Depression, is described and illustrated. This species is similar to B. guerrerensis J. Jiménez Ramírez & J. L. Contreras, but differs from it by having a greater number of leaflets and larger pedicels, bracteoles, calyx, standard, wings, and keel; there are also differences in the form of the standard, the color of the keel (green), and the possession of a lightly winged legume.

Key words: Balsas Depression, Brongniartia, IUCN Red List, Leguminosae, Mexico, Papilionoideae.

El género Brongniartia Kunth con distribución desde Texas, México y Centroamérica hasta los Andes (McVaugh, 1987) incluye alrededor de 65 especies (Dorado, 1999; Dorado & Arias, 2006), casi todas endémicas de México.

Rydberg (1923) ubica a Brongniartia en la subtribu Brongniartianae, en tanto McVaugh (1987) la incluye en la tribu Brongniartieae. El género está constituido por árboles o arbustos con hojas imparipinnadas, estípulas pronto caedizas, flores generalmente axilares, solitarias o en grupos de dos a siete, o en racimos terminales o paniculas, cálix brevemente bilabiado con bracteolas, estandarte oblicuo u obovado, el estambre superior libre, estilo filiforme, incurvado, fruto aplanado, en ocasiones con margen alado en la parte vexilar (McVaugh, 1987).

En el “Estudio florístico de la porción guerrerense de la cuenca del río Balsas”, que se desarrolla en el Herbario de la Facultad de Ciencias (FCME), Universidad Nacional Autónoma de México (UNAM), se detectó una especie del género Brongniartia afín al grupo Sericeae de Rydberg (1923). Esta especie tiene parecido morfológico con B. guerrerensis J. Jiménez Ramírez & J. L. Contreras, que fue ubicada por Jiménez y Contreras (1989) en el grupo Sericeae de Rydberg (1923).

Brongniartia balsensis J. Jiménez Ramírez & K. Vega, sp. nov. TIPO: México, Guerrero: Mpio. Copalillo, 1 km antes de intersección entre el poblado y balneario de Papaluitla, 30 abr. 2007, J. Jiménez 1668 (holotipo, FCME; isotipos, MEXU, MO). Figura 1.

Haec species Brongniartiae guerrerensis J. Jiménez Ramírez & J. L. Contreras affinis, a qua imprimis cortice brunneo rubroce, stipulis oblongis, pedicello et calyce majoribus, vexillo orbiculari majore brunneo, carina viridi majore et legumine alato differt.

Arbustos (1–)3–3.5(–4.5) m de alto, generalmente con 3–12 ejes principales o árboles hasta 4 m; corteza

café a rojiza con abundantes lenticelas blancas, exfoliante en grandes fragmentos (en individuos jóvenes la corteza es blanca y corchosa, generalmente en la parte basal del tallo); ramillas blanco-seríceas. Hojas (9–)12.5–16–(19) cm, imparipinnadas, con 11 a 15(17) foliolos; estípulas ca. 5 × 1.5 mm, oblóngas, envés blanco-seríceo, pronto caedizas; pecíolos (1.3–)1.5–3.3(–5) cm, blanco-seríceos; raquis seríceo; foliolos 2.4–3.5(–4) × 1.1–2(–2.3) cm, elípticos, pubescentes, blanco-seríceos cuando jóvenes, al madurar verdes en el haz, ápice con mucron de hasta 1 mm, base obtusa, pecíolos 3–4 mm, blanco-seríceos; estipelas hasta 1 mm, seríceas en el envés, anaranjadas. Flores axilares, 2 por axila, opuestas (generalmente se fecunda una); pedicelos (1–)1.4–1.9(–2.6) cm, blanco-seríceos; cáliz 19.1–20.9 mm, blanco-seríceo, tubo 6.7–7.3 mm; bractéolas (2.5–)4–8.2 mm, filiformes, blanco-seríceas; corola marrón; estandarte marrón con mácula verde, 19.2–19.6 × 18.5–19.5 mm, orbicular, ápice emarginado con un a 3.4–3.7 mm, ala (21.5–)22.1 × (8.2–)9.1–11 mm y un a 3.5–4.4 mm, quilla verde, 21.8–23.2 × 9.4–11.1 mm, parte unida hasta 1/4 de su longitud, ca. 7.5 mm, un a 3.2–3.4 mm, presenta una aurícula en la base 2–3.1 mm, androceo ca. 22 mm, parte unida 15.5–17.4 mm; pistilo 26.1–26.7 mm, glabro, ovario 12–12.6 mm, óvulos 4 a 6, estilo 14–15.8 mm. Legumbre (5–)6–6.7 × 1.8–2.2 mm, aplanada, sutura carinal en forma de ala de hasta 2 mm de ancho; semillas 4 a 5 por fruto.

**Distribución.** Brongniartia balensis restringe su distribución a la porción oriental de la Depresión del Balzas en el estado de Guerrero, en altitudes de (699–)762–809 m y solamente se conocen dos poblaciones, una en Papaluta de unos 100 individuos y otra en las cercanías de Tlacozotlán con unos 40 individuos, por ello es una especie en peligro crítico (Critically Endangered o CR), según los criterios de la UICN (2001).

** Hábitat y fenología.** Esta especie se presenta en bosque tropical caducifolio en laderas con substratos kársticos. Se le encuentra asociada con Pseudomolinia grammipennis (Kunth) Engler, Bursera jacquinii ex L., Plumeria rubra L., Neobuxbaumia baeckebergii, Mimosa L., Croton L., Ceiba pentaphylla Rose, Manihot Miller, Opuntia Miller, Cnidoscolus pulch., Senna visilizeni (A. Gray) H. S. Irwin & Barneby, Dalenbergia papalifolia Baillon, Steedemenia pubescens Bentham, Lonchocarpus kunth, Jatropha elaeol J. Jiménez Ramírez, Randia L., Acacia caulteri Bentham y Nysimelie leigynae Sandwith. La floración se presenta desde finales de abril hasta mediados de mayo (aunque en un individuo, se formaron flores en fechas posteriores en algunas ramas donde se cortaron previamente, en el mes de abril, las ramillas para herborizar), mientras las hojas inician su desarrollo, en tanto que la fructificación ocurre de mayo a julio.

**Etimología.** El epíteto específico hace alusión a la depresión del Balzas, una zona rica en endemismos, en particular en la porción que incluye el estado de Guerrero.

**Discusión.** Las flores axilares, la pubescencia blanco-seríceo abundante en las ramillas, los foliolos y el cáliz, los 11 a 15(17) foliolos elípticos y los frutos glabros y alados del nuevo taxón, conducen a ubicarlo en el grupo Sericeae de Rydberg (1923) que incluye a Brongniartia argentea Rydberg, B. benthamiana Hemsley, B. lupinoides (Kunth) Taubert, B. magnibracteata Schlechtendal, B. mollis Kunth, B. princeps Rydberg, B. sericea Schlechtendal y a B. vicioides M. Martens & Galeotti, posteriormente Jiménez y Contreras (1989) agregan a B. guerrerensis. Sin embargo, McVauh (1987) señala que existen problemas para delimitar a casi todas las especies del grupo, a excepción de B. lupinoides, aunque no menciona nada alrededor de B. magnibracteata y B. mollis, mientras que Calderón y Rzedowski (2001) apuntan que posiblemente B. benthamiana y B. mollis sean sinónimos de B. intermedia Moricand. A pesar de los problemas señalados, la especie nueva presenta una morfología muy diferente a las especies incluidas por Rydberg (1923) en el grupo Sericeae, pues ninguna de ellas, tiene corteza exfoliante como la que se presenta en muchas especies del género Bursera, asimismo carecen de hábito arbóreo en su madurez, de corcho en la base del tallo de las plántulas, de estípulas glabros, de bractéolas filiformes y de flores color marrón. Ahora, es importante aclarar que B. guerrerensis fue incluida recientemente en el grupo Sericeae de Rydberg (1923), tiene corteza exfoliante y habito arbóreo, por lo que será examinada cuidadosamente en los párrafos siguientes.

En el género, solamente se han reportado seis especies arbóreas, Brongniartia glabrata Hooker & Arnol, B. goldmani Rose, B. guerrerensis, B. guingolensis Dorado & L. Torres, B. montalvoana Dorado & D. M. Arias y B. parryi Hemsley, de modo que B. balensis es la séptima. Entre ellas, B. guerrerensis que tiene corteza exfoliante y corcho en sus ramas, fue ubicada en el grupo Sericeae de Rydberg (1923) por Jiménez y Contreras (1989), por presentar flores axilares, legumbre glabra, ramas, ramillas, foliolos (oblongo-ovados a elípticos) y cálices seríceos, por lo que su comparación con la especie nueva es incluible, sobre todo porque sus foliolos son similares en el tamaño y forma, así como la de sus pecíolos y pecíolos. Sin embargo, B. guerrerensis
tiene corteza anaranjada que exfolia en tiras como en Bursera schlechtendalii Engler, estípulas lanceoladas de 2–4 mm, pecíolo de (0.8–)1.8–2.5–(3.1) cm, foliolos 5 a 11(13), (0.9–)2.3–3(–4.5) × (0.5–)1–2 (–3.6) cm, ovados, oblongo-ovados a elípticos, pedícelos 0.8–1.2 cm, bractéolas lanceoladas de 3–5 mm, cáliz de 1–1.5 cm, corola púrpura, estandarte ovado de ca. 15 mm, alas 10–11 mm, quilla púrpura de 11–13 mm, legumbre 6–8 × 2.5–3 cm, sin ala, en cambio, B. balsensis tiene corteza pardo-rojiza que exfolia en placas como en B. papyracea Dorado & D. M. Arias, estípulas oblongas de 5 mm, pecíolo (1.3–)1.5–3.3(–5) cm, foliolos 11 a 15(17), 2.4–3.5–(–4) × 1.1–2(–2.3) cm, elípticos, pedícelos (1–)1.4–1.9(–2) cm, bractéolas filiformes de (2.5–)4–8.2 mm, cáliz 19.1–20.9 mm, corola marrón, estandarte orbicular de 19.2–19.6 mm, alas (21.5–)22.1 mm, quilla verde de 21.8–23.2 mm y legumbre (5.5–)6–6.7 × 1.8–2.2 cm, con una ala. Es evidente que difieren en el color de la corteza y en el número de foliolos (a pesar de un pequeño traslape), en el tamaño de pedícelos, bractéolas, cáliz, estandarte, alas, quilla, sin olvidar las diferencias en la forma del estandarte, en el color de la quilla y en la legumbre (una especie con ala y otra carente de ella). Además, el período de floración de ambas especies es diferente, B. guerrerensis tiene flores en julio mientras que B. balsensis las presenta a finales de abril y en la primera mitad de mayo. El punto no deja de ser importante porque ambas especies se han hallado en localidades cercanas (Tlálocotiitlán, Guerrero), sin embargo, la especie nueva solamente se halla en calizas rozadas y la otra especie parece no tener una afinidad tan específica a un sustrato determinado.

Brongniartia papyracea es la tercera especie del género que presenta tallos exfoliantes, pero se trata de un arbusto de 1–4 m de alto, con corcho en las ramas, que pertenece al grupo Podalyrioides de Rydberg (1923) de acuerdo con Dorado y Arias (2006), por tener estípulas hemicordadas o cordadas y bractéolas lineares y diminutas, por lo que aparentemente no tiene relación cercana con la especie nueva.

**Paratipos.** MEXICO. **Guerrero:** Mpio. Copalillo, 1 km antes de intersección entre el poblado y balneario de Papalulua, J. Jiménez 1669, 1670, 1671, 1672, 1673, 1674 (FCME), K. Vega 1104, 1105, 1106, 1114, 1115, 1116, 1117, 1138, 1139, 1140 (FCME); Papalulua, 1.8 km al NO, R. Cruz, C. Fuentes, L. Céspedes y O. Sánchez 689, 6891, 6898 (FCME); Atingo, 1 km al SE, R. Cruz, C. Fuentes, L. Céspedes y O. Sánchez 7033, 7035 (FCME).

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**Literatura Citada**


Nomenclatural Notes on *Callitriche* (Callitrichaceae) in North America

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**Key words:** Callitrichaceae, *Callitriche*, North America.

Taxa in *Callitriche* L. (Callitrichaceae) are monococious, or in a single case (*C. petrii* R. Mason subsp. *petrii*), dioecious, the flowers are axillary and usually solitary, but may occur in various combinations in the same axil; the perianth is absent, but a subtending pair of bracts may be present in some species. The fruits are schizocarps, separating into four mericarps that are dry, winged or not, with wings from the inner fruit layer. Due to their small size and reduced nature, it can be difficult to find reliable characters by which to distinguish *Callitriche* taxa. The presence or absence of a wing on the outer margins of the fruit is the most important character used both taxonomically and in identification. Work on the European members of the genus (e.g., Schotsman, 1967; Lansdown, 2006) has shown that while the outer layer of cells may at times resemble a wing, the wing is actually formed of processes arising from the testa; these processes usually define the walls of cells and may be linked to complex fibrils crossing the faces of the cells (Lansdown, 2008). The wing has played such a significant role in *Callitriche* taxonomy that a number of taxa, such as the subspecies of *C. truncata* Gussone, are defined largely by the presence or absence of a wing. As employed here, therefore, the term wing applies only to a structure arising from and of a clearly different structure to the testa.

Taxonomic work on North American *Callitriche* has been based almost exclusively on herbarium material. The study of dried fruit in *Callitriche* is complicated, at least in part, because of the response of fruit to preparation as herbarium specimens. Immature fruit are usually soft and tend to compress, and there is a stage at which fruit that have reached their full size but not hardened will distort on pressing and appear larger than mature fruit. In most cases, this distortion also makes it impossible to study details of the wing. In addition, until fruit are absolutely mature, the drying process can make up to quite a broad band of marginal cells appear translucent in contrast to the cells of the testa and can give the appearance of a wing. A further problem arises when fresh fruits are swollen (as is the case in *C. peploides* Nuttall), but this is reduced on drying to a strumose base to each mericarp. Dried material of *C. peploides* var. *peploides* can resemble *C. palustris* L., but the confusion would be unlikely to occur in relation to fresh material as the latter does not have swollen fruit. The styles and bracts associated with immature fruit are fragile and, depending on the quality of pressing and the age and degree of use of a specimen, can either remain attached or be lost, making it difficult to establish whether or not these characters are naturally persistent or caducous. Most herbarium specimens of *Callitriche* worldwide, not just in North America, are more than 100 years old and few are in good enough condition to provide reliable taxonomic data.

In preparing the treatment of *Callitriche* for the *Flora of North America*, more than 1000 herbarium specimens were studied from an area in the Americas extending from Alaska east to Greenland and south to Mexico from the following herbaria: ALA, BM, F, JEPS, K, LE, MICH, MO, ORE, PE, TAMU, UBC, UC, V, and WTU. Fresh material from 103 live populations of 12 taxa was studied in Alaska, California, Missouri, Oregon, Texas, Washington, and British Columbia. All descriptive and biometric data employed here are based on specimens collected in North America. One new species was identified: *C. stenoptera* Lansdown, occurring in the western United States and throughout southern Canada, but previously overlooked as *C. hermaphrodita* L.

**KEY TO THE *CALLITRICHE* SPECIES FOUND IN NORTH AMERICA**

1a. Fruit unwinged, i.e., lacking processes arising from the testa ........................................... 2

1b. Fruit winged, even if only narrowly at the apex ... 5
2a. Mericarps swollen or (in dried material) with the bases swollen at the point where they meet, such
that there is no evident flat face... C. peplus Nuttall
2b. Mericarps without swollen bases, at least one face
± flat ......................................................... 3
3a. Fruits longer than wide; mericarps not divergent at
apex ................................................................... C. palustris L.
3b. Fruits as wide as or wider than long; mericarps
divergent at apex ............................................. 4
4a. Fruits (0.6–0.7–0.8–1) mm wide ...................... C. heterophylla Pursh var. heterophylla
4b. Fruits (0.3–0.8–1) mm wide .......................... C. heterophylla Pursh var. bolanderi
(Hegelmaier) Fassett
5a. Fruit winged only at apex ................................. 6
5b. Fruit winged throughout ................................ 9
6a. Fruits pedunculate with peduncles ± 0.2 mm long;
fruits much wider than long... C. terrestris Rafinesque
6b. Fruits sessile or sub sessile; fruits longer than or as
long as wide ................................................. 7
7a. Fruits longer than wide; mericarps not divergent at
apex ................................................................... C. palustris L.
7b. Fruits as wide as or wider than long; mericarps
divergent at apex ............................................. 8
8a. Fruits (0.6–0.7–0.8–1) mm wide ...................... C. heterophylla Pursh var. heterophylla
8b. Fruits (0.3–0.9–1–1.2) mm wide ........................ C. heterophylla Pursh var. bolanderi
(Hegelmaier) Fassett
9a. Leaf bases not joined; pollen and anthers translucent
or appearing pale; no peltate scales on stem
and leaves; bracts absent; leaves with a primary
vein but not with secondary veins ......................... 10
9b. Leaf bases joined by a ridge of tissue extending
across the node; pollen and anthers yellow or
translucent; peltate scales on stem and leaves;
bracts present or caducous; leaves with a primary
vein and often with secondary veins ....................... 12
10a. Wing narrower than seed width... C. stenoptera Lansdown
10b. Wing as wide as or wider than seed width ........ 11
11a. Fruit pedunculate, wider than long .......... C. fassettii Schotsman
11b. Fruit sessile, as wide as long... C. hermaphroditica L.
12a. At least some fruit on peduncles > 2 mm long .... 13
12b. Fruit sessile or on peduncles < 2 mm long ....... 15
13a. Fruits longer than wide; bracts present; most
filaments > 2 mm long... C. longipedunculata Morong
13b. Fruits wider than long; bracts lacking; filaments <
1 mm long ....................................................... 14
14a. Fruits appearing flat ended because wing curved
outward, with no notch between the margins of the
mericarps ...................................................... C. nutallii Torrey
14b. Fruits with a distinct notch between the margins of
the mericarps ................................................... C. marginata Torrey
15a. Stigma 1.5–4.5 mm long, reflexed and appressed
to side of fruit; pollen (and therefore anthers)
colorless ....................................................... C. braunii Petagna var. hamulata
(Kützing ex W. D. J. Koch) Lansdown
15b. Stigma erect or if reflexed, then < 1 mm, not
appressed to side of fruit; pollen (and therefore
anthers) yellow .............................. 16
16a. Fruit < 1 mm long, wider than long .......... C. terrestris Rafinesque
16b. Fruit > 1 mm long, ± as wide as long ...... 17
17a. Ripe fruit brown or grayish brown; bracts
persistent; wing wide ................................. C. stagnalis Scopoli
17b. Ripe fruit blackish; bracts caducous; wing nar-
row .......................................................... C. trochleatis Fassett

1908. TYPE: Canada. [Quebec] W base of
Table topped Mtn., “Lac des Americains,”
670 m, 1 Aug. 1906, M. L. Fernald & J. F. Collins
234 (lectotype, designated here, GH
48916; isotypes, K, NY 248728, NY 248729,
above water, margin of the uppermost lake at head
of E Fork of R. Ste. Anne des Monts,” 1050 m, 8
Aug. 1906, M. L. Fernald & J. F. Collins 638
(epitype, designated here, GH 48916).

Fernald cited Fernald & Collins 234, from “Lac des
Americains, western base of Table topped Mountain, 1
August 1906,” as the type of his name Callitriche
anceps. I have seen five sheets holding part of this
collection and none has any mature fruit. Similarly,
the scanned image of the type material in US clearly
shows very small plants lacking mature fruit, although
there may be mature material in the packet. Included
in the holotype sheet GH 48916 as well as type material of
anceps, there is material from two other collections:
Fernald & Collins 637 that also bears no mature fruit
and Fernald & Collins 638 that has mature fruits.
This material was evidently considered by Fernald to be
of the same taxon as the type material of C. anceps
and agrees with the concept of C. anceps Fernald given
by Fassett (1951: 187) and as applied by most American
authors. Therefore, although it will not be possible to
clarify the taxonomic status of C. anceps without
detailed study of live populations, I have designated
Fernald & Collins 638 at GH as an epitype because of
the representative presence of mature fruits.

ponds near Dalles City, Oregon,” 4 May 1898, W.
M. Sucksdorff 2746 (holotype, L 910185605 not
seen; isotypes, DS not seen, GH, MO, US not
seen, WTU).

Callitriche hermaphroditica L. var. baccarollars (Penoy ex
C. autumnalis L. var. baccarollars Penoy ex
California: San Joaquin Co., 4 mi. N of Clements, 3
May 1923, H. Mason 4445 (lectotype, designated here,
UC 570781; isotype, GH 48919).

Callitriche autumnalis var. baccarollars was de-
scribed by Jeffson in 1936 (based on an unpublished
manuscript account of 1932 by Kittie Penoy), who
cited three collections from California, the type as
cited above and two that Penoy collected herself west
of Santa Rosa (Fenley 561 and 562). Apparently unfamiliar with this material, in 1966 Schotsman named C. fassettii based on material from pools near The Dalles, on the northern border of Oregon. Comparison of material from both types shows clearly that C. autumnalis var. bicarpellaris and C. fassettii represent the same taxon and that although they are closely related to C. hermaphrodita L., they also show consistent and striking differences from it. Inaccurately listed as a synonym of C. hermaphrodita in Lansdown (2006), the name C. fassettii is retained for this taxon and the name C. autumnalis var. bicarpellaris is reduced to synonymy of this name.


Callitrichie longipedunculata was described by Thomas Morong (1891) based on material sent to him by C. R. Orcutt. The letter written in response to receipt of the material is included with the isotype in UC. In it, Morong states “It is not C. marginata Torrey, which is a very different species, but one not hitherto described and which I have named C. longipedunculata and expect soon to publish under that name. Its nearest ally is C. musoides Goldbach found at Constantinople. I return by mail the specimen and label as you desired.” However, the UC material is entirely composed of C. marginata Torrey. Similarly, a sheet in US bears the note “This is not C. marginata Torrey but an undescribed species which I have named, M,” which I presume to be by Morong; however, this, too, is entirely composed of C. marginata Torrey. The only one of eight isotypes of C. longipedunculata cited by Morong in 1891 that includes any of that species as it is currently interpreted is NY 248733, which bears three collections of C. longipedunculata and one of C. marginata. In consideration of the mixed status of the type, according to Articles 9.2 and 9.12 of the International Code of Botanical Nomenclature (ICBN; McNeill et al., 2006), I therefore designate above three of the four samples of this species on this sheet as the lectotype.


Most sheets representing parts of the type of Callitrichie marginata have parts of two collections mounted on them, one by Bigelow from “muddy places along Mark West’s Creek, California” with a printed label saying “Liet. A. W. Whipple’s Exploration for a Railway Route, from the Mississippi River to the Pacific Ocean, near the 35th parallel of latitude in 1853–4. Collected by Dr. J. M. Bigelow, Surgeon and botanist to the expedition,” the other simply labeled “Rev. Mr. Fitch, California,” Torrey (1857) cited “Muddy places along Mark West’s creek, California; April 30. Upper California; Rev. A. Fitch,” combing text from both collections and causing confusion. The MO 1913618 sheet is a mixed specimen that includes material collected by Fitch that is ex. herb. Torrey as well as material collected by J. M. Bigelow annotated “co-type” by N. C. Fassett. According to Art. 9.12 of the ICBN (McNeill et al., 2006), the material collected by J. M. Bigelow on sheet MO 1913618 is designated here as the lectotype.


From his description, it is clear that by his Callitrichie pedunculosa, Nuttall intended a terrestrial Callitrichie with pedunculate fruit that occurred in Arkansas. This could equally refer to C. terrestris Rafinesque, which is more abundant and widespread than C. nuttallii Torrey in the state. Nuttall (1835) did not list any specimens in his description, nor did Torrey (1857). Regelmaier (1867) listed “Arkansas, Nuttall 1835; Louisiana, J. Hale, comm. Engelm.,” the former not associated with any specimen that I have been able to locate, but the latter represented by specimens in GH, MO, and NY. Of these specimens, only NY 465074 is not part of a mixed collection and includes “Louisiana” and “J. Hale” on the label. The lectotype chosen above maintains C. nuttallii in its current interpretation.

Torrey (1857) described Callitrichie marginata as “A well characterized species, resembling C. nuttallii; nob. [us, presumably referring to himself and Nuttall] (C. pedunculosa, Nutt. in Trans. Amer. Phil. Soc. n. ser. 5, p. 140; not of Arnott, nor C. pedunculata DC.).”
He correctly considered *C. pedunculosa* to be a homonym of *C. pedunculata DC.*

   TYPE: [Europe.] “Habitat in Europae fossis paludibus” (lectotype, designated by Lansdown & Jarvis, 2004: 169, LINN 13.1 [lowermost 3 specimens on sheet]).


Fassett (1951: 210) stated that “Individuals with fruits nearly sessile or with some of them so have been treated as *Callitrich e stemocarpa* Hegelm.” and noted that the two collections cited by Hegelmaier (1868) represent a “sorbus mixture of *C. verna*, *C. heterophylla*, and *C. marginata*.” Fassett went on to assign *C. stemocarpa* to the synonymy of *C. verna* (= *C. palustris* L.). Hegelmaier (1868: 114) had earlier referred to two collections in relation to this name. The first is the type material cited above for *C. stemocarpa* and the second collection was listed as “Russian River, Ukiah, Bolander 3870,” which I have not seen. Bolander 78 is a mixed collection, accurately identified by N. C. Fassett (1951: 210) as including *C. palustris* (as “*C. verna* L. emend. Kitz.” and “*C. palustris* Am. Auct.”), *C. heterophylla*, and *C. marginata*, as well as fragments of *Ranunculus* L. The different taxa cannot be separated, being in a single mass, but *C. palustris* represents the majority of the collection and I therefore designate this material as the lectotype for the name *C. stemocarpa* Hegelmaier, reducing it to synonymy with *C. palustris* L.


7a. *Callitrich e pelopoides* Nuttall var. *pelopoides*.

*Callitrich e drummondi* Hegelmaier, Monogr. *Callitrich e* 60. 1864, TYPE: U.S.A. Louisiana: Orleans Parish, New Orleans, [1832], T. Drummond s.n. (lectotype, designated here, NY 248737; isotypes, GH 48917, GH 48918).

Specimens of *Callitrich e pelopoides* by Drummond labeled New Orleans appear to be represented by three collections: one unnumbered, one numbered 115 (and dated 1832), and the other numbered 108. In his account of *C. drummondi*, Hegelmaier did not cite a collection number, and therefore I interpret the type as being only those sheets without a collection number. The GH sheet has material from more than one collection of the same taxon, and I have designated the NY material as the lectotype accordingly.

Two additional varieties were described by Fassett (1951) for *Callitrich e pelopoides*, with variety *media* and variety *semilandata* from Guatemala and Mexico, respectively. Neither taxon occurs in the North American flora.

8. *Callitrich e stemoptera* Lansdown, sp. nov.

Ab omnibus *Callitrich e* [species] borealiamericans, *C. hemaphroditica* L. et *C. fassetti* Schotsman excerptis, folii uniminni, caule et folii esquisamis et polline diaphano, a *C. hemaphroditica* et *C. fassetti* fructu maturo peranguste alato differt.

Flowering plants submerged. White stems contrasting strongly with dark green of leaves. Internodes decreasing gradually from base to apex, nodes bearing flowers with short internodes appearing congested. Leaves ≥ indisclate, 5.9–11.3 × 0.3–1.1 mm; all leaves with only 1 central vein. Flowers usually solitary or 1 pistillate and 1 staminate flower or occasionally 2 pistillate flowers in an axil; bracts absent. Filaments very short, up to 0.2 mm, ± straight; anthers ca. 0.2 × 0.2 mm; pollen colorless; styles reflexed or strongly curved downward, eventually broken off and the stump arising below the fruit apex and appressed to the side of the fruit, 0.6–1 mm. Fruits 0.8–1.2 × 0.9–1.3 mm, as long as or slightly narrower than wide, grayish brown; subsessile or on peduncle < 1 mm; wing narrow, up to 0.1 mm at the apex and side.

*Distribution and habitat. Callitrich e stemoptera* occurs in Alaska, in Canada from British Columbia to Ontario and Newfoundland, from Oregon and the central states from Montana south to Arizona and east to New Mexico and north to Minnesota, but with no records known from the Dakotas.

*ICUN Red List category. According to IUCN Red List criteria (IUCN, 2001), *Callitrich e stemoptera* should be classified as Least Concern (LC).
Etymology. The epithet *stenoptera* (from the Greek “stenos,” meaning “narrow,” and “pteron,” meaning “wing”) refers to the narrower wing compared to that of similar species, i.e., *Callitriche hermaphrodita* and *C. fassettii*.

Discussion. *Callitriche stenoptera* can be distinguished from all species of *Callitriche* in North America except *C. hermaphrodita* and *C. fassettii* by the colorless pollen and the lack of scales on the stem and leaves, combined with all the leaves being single-veined, relatively uniform in shape, and often tapering from the base (Fig. 1). The new species can be distinguished from *C. hermaphrodita* and *C. fassettii* by the fruit on which the wing is less than 0.1 mm wide, even at the fruit apex. The fibrils of *C. stenoptera* in no way resemble those of *C. hermaphrodita* or *C. fassettii*, being extremely simple.

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Literature Cited


Aristolochia wuana, a New Name in Chinese
Aristolochia (Aristolochiaceae)

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ABSTRACT. A new name, Aristolochia wuana Zhen W. Liu & Y. F. Deng, is proposed to replace the later homonym Aristolochia macrocarpa C. Y. Wu & S. K. Wu ex D. D. Tao, not A. macrocarpa Duchartre. The species may be closely related to Aristolochia griffithii Hooker f. & Thomson ex Duchartre but differs in its retuse or rounded leaf apex (vs. acute or shortly acuminate), oblong capsule (vs. narrowly cylindrical), and the smooth upper surface of the seeds (vs. rugose).

Key words: Aristolochia, Aristolochiaceae, China.

In 1983, a new species of Aristolochia L. (Aristolochiaceae) was described from Xizang, China, as Aristolochia macrocarpa C. Y. Wu & S. K. Wu ex D. D. Tao (Tao, 1983). The species did not appear in the recently published Volume 5 of Flora of China (Huang et al., 2003). Furthermore, this name is a later homonym of Aristolochia macrocarpa Duchartre from West Africa (Duchartre, 1864; Ma, 1992). After studying the specimens of both Aristolochia macrocarpa Duchartre and Aristolochia macrocarpa C. Y. Wu & S. K. Wu ex D. D. Tao, it was apparent that the specimens represent two distinct species. According to the classification of Schmidt (1935) and Gonzalez (1999), Aristolochia macrocarpa Duchartre belongs to subgenus Pararistolochia (Hutchinson & Dalziel) O. C. Schmidt and Aristolochia macrocarpa C. Y. Wu & S. K. Wu ex D. D. Tao belongs to subgenus Siphisia (Rafinesque) Duchartre. Subgenus Siphisia differs from subgenus Pararistolochia in having six anthers (vs. eight to 10), a 3-lobed gymnostemium (vs. 8- to 10-lobed), and fruit flesh that is decihiscent (vs. woody indehiscent). Subgenera Siphisia and Pararistolochia were treated at generic rank as Isotrema Rafinesque and Pararistolochia Hutchinson & Dalziel, respectively, by some authors (Klotzsch, 1859; Huber, 1960, 1985, 1993; Poncey, 1978; Mahberley, 1987). However, the broad circumscription of Aristolochia was widely accepted by others (Hou, 1984; Phuphatanaphong, 1985; Hwang, 1988; Ma, 1989, 1992; Gonzalez, 1999; Murata et al., 2001; Huang et al., 2003) and supported by recent molecular studies (Wanke et al., 2006). According to Article 53.1 of the International Code of Botanical Nomenclature (McNeil et al., 2006), Aristolochia macrocarpa C. Y. Wu & S. K. Wu ex D. D. Tao must be replaced, and the following new name is proposed here.


The species has not yet been described in English. The emended full description is provided as follows.

Shrub climbing; stems terete, strigate, sparsely gray villous; buds densely grayish brown villous. Petioles 8–18 cm, sparsely gray villous; leaf blade cordate, 18–24 × 16–20 cm, thick papery, adaxially sparsely pubescent along the veins, abaxially reddish brown or white villous, basally palmate, with primary veins 3 to 5, lateral veins in 3 to 4 pairs, tertiary veins prominent abaxially, base cordate to auriculate, margin entire, apex retuse or rounded. Flowers not seen; pedicels 6–7 cm in fruit. Capsule solitary, oblong, ca. 11 × 6 cm,
6-ribbed, dehiscing at tip; seeds ovoid, upper surface plano-convex, smooth, lower surface deeply concave.

**Distribution and habitat.** *Aristolochia wuana* is known from northern Gaoligong Shan, occurring in southeastern Xizang and northeastern Yunnan in China. The plants were noted from mixed conifer and broad-leaved forest at altitudes from 2000 to 2300 m.

**Phenology.** The species has been collected in fruit from August to September. No flowering specimens have been seen.

**Etymology.** The species epithet honors Wu Zheng-yi (Wu Chengyi) (13 June 1916–) of the Kunming Institute of Botany, Chinese Academy of Sciences, who first found *Aristolochia wuana* during the expedition to Qinghai-Xizang Plateau led by him in 1970–80s. Prof. Wu is a great expert on the flora of China and has devoted 70 years to the study of the flora and vegetation of China. He has organized several large-scale surveys of plant resources in southwestern China. He is currently the co-chair of the editorial committee of the *Flora of China*, a joint project between the Chinese Academy of Sciences and Missouri Botanical Garden that aims to revise the Chinese vascular plants. In 2007, he won the State Preeminent Science and Technology Award of China for his outstanding achievements in the fields of systematic botany and plant geography, as well as plant diversity, conservation, and sustainable use of plant resources.

**Relationships.** In the protologue, *Aristolochia wuana* was regarded as similar to *A. monopetala* Franchet, differing in its leaves 18–24 × 16–20 cm (vs. 6–16 × 5–12 cm), retuse apex (vs. acute or acuminate), and larger fruits ca. 11 × 6 cm (vs. 6–8 × 2–3.5 cm) (Tao, 1983; Huang et al., 2003). Ma (1989) placed *A. macrocarpa C. Y. Wu & S. K. Wu* ex D. D. Tao in synonymy with *A. griffithii* Hooker f. & Thomson ex Duchartre. In fact, it differs from the latter in its retuse or rounded leaf apex (vs. acute or shortly acuminate), oblong capsule (vs. narrowly cylindrical), and the smooth upper surface of the seeds (vs. rugose).

**Additional specimens examined.** *CHINA.* **Xizang:** Mêdog Xian, near Beibeng, 9 Aug. 1974, Qinghai-Xizang (Tibet) Complex Expedition 74-4304 (KUN); Zayhi Xián, Xia Zay, 3 Sep. 1976, C. Y. Wu et al. 5430 (KUN). **Yunnan:** Gongshan Xian, the trail from the Dulong Township to Zay, 6 Sep. 1982, Qinghai-Xizang (Tibet) Complex Expedition 9974 (KUN).

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**Literature Cited**


Three New Species of *Salacia* from Mesoamerica
(Celastraceae, Salacioideae)

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**ABSTRACT.** Three new species of *Salacia* L. from Mesoamerica (Celastraceae, Salacioideae) are described from Panama. *Salacia macrocremastra* Lombardi is characterized by its very long pedicels to 50 mm, large flowers to 19 mm diam., and slightly bullate, elliptic leaves with a rounded base. *Salacia mexicana* Lombardi is distinguished by its buds with the calyx initially truncate and lobes that grow as the flower expands during anthesis, open inflorescences, annular disk, and ellipsoid fruits. *Salacia panamensis* Lombardi can be recognized by its closed calyx with lobes that are irregular in bud and that tear apart as the flower opens, and its annular-pulvinate, slightly pentagonal disk with outer margin flattened.

**RESUMO.** São descritas para a região Mesoamericana três novas espécies de *Salacia* L. do Panamá (Celastraceae, Salacioideae). *Salacia macrocremastra* Lombardi é caracterizada pelos seus pedicelos muito longos de até 50 mm, flores grandes de até 19 mm diâm., e folhas elípticas, levemente buladas e de base arredondada. *Salacia mexicana* Lombardi distinguida pelos botões com cálice inicialmente truncado e lobos que crescem conforme a flor se expande na antèse, inflorescências laxas, disco anular e frutos elipsoides. *Salacia panamensis* Lombardi que pode ser reconhecida pelo cálice fechado no botão, com lobos irregulares que se separam conforme a flor abre, e pelo disco anular-pulviniforme, levemente pentágono e de margem externa achatada.

**Key words:** Celastraceae, IUCN Red List, Mesoamerica, *Salacia*, Salacioideae.

Celastraceae currently include the former family Hippocrateaceae divided in two subfamilies, the Hippocrateoideae, with 19 genera and ca. 100 species, and the Salacioideae, with six genera and ca. 260 species (Simmons, 2004) distributed worldwide in tropical and subtropical areas.


*Salacia* is a genus with ca. 200 species (Mennega, 1997), with Smith (1940) recognizing 29 species from the Neotropics. Mennega (1984, 1991) later described four other species and Lombardi (2007) another four. The last comprehensive taxonomic study of the genus, although unpublished, is by Hedin (1999), who recognized 38 species in the Neotropics, 20 with fasciculate inflorescences, including two new taxa from Ecuador and Peru.

The probable paraphyly of *Salacia* s. str. was pointed out by recent molecular studies (Simmons et al., 2001a, b). Worldwide analyses of representative species from both the Old and New Worlds are still needed before any generic realignment can be proposed.

While working on the monographic treatment of Hippocrateaceae for the Flora Mesoamericana Project, I encountered all 12 genera, with at least 28 species, and here recognize three new *Salacia* species.

1. **Salacia macrocremastra** Lombardi, sp. nov.
   **TYPE:** Panama. Darién: Parque Nat. Darién, ridge betw. Río Topalisa & Río Pucuro, ca. 17 km E of Pucuro, La Laguna area, 08°03’N, 77°17’W, 750–850 m, 18 Oct. 1987, B. Hammel, G. de Nevers, H. Cuadros & H. Herrera 16285 (holotype, MO; isotype, PMA). Figure 1.

Haec species *Salacia grandifolia* (Martius ex Schultes) G. Don, *S. jauanana* Loesener et *S. macrostachys* A. C. Smith folis magnis (22–43.5 × 5.6–13.4 cm) et inflorescentis fasciculatis affinis, sed a his duobus floribus majoribus (ca. 19 mm diam. sub anthesi), ab omnibus pedicellis longioribus (40–50 mm longis) et foliis bullatis ad basin rotundatis differt. Etiam ab eis omnibus distributione geographica ad Panamam endemic a distincta.
Figure 1. *Salacia macrocormastra* Lombardi. —A. Apical view of flower, with one stamen missing. —B. Branch with leaves. —C. Adaxial and abaxial view of stamen. A–C drawn from the holotype *Hummel et al. 16285* (MO). Drawings by the author.

Lianas, glabrous, branches subterete, new growth ones flattened, smooth to sparsely lenticellate, drying light brown to yellowish, surface rigid, fissured in irregular plates, old ones cylindric, sparsely lenticellate, fissured, drying brown. Leaves opposite to subopposite; stipules 0.4–0.7 mm, triangular, caducous; petioles 10–29 mm, obscurely canaliculate, drying wrinkled and brown; blades 22–43.5 × 5.6–
13.4 cm, elliptic, with rounded or reniform base, apex acute or rarely acuminate or emarginate, margin entire, thickened, slightly revolute, slightly bullate, chartaceous, drying olive-green or light brown on both sides. venation brochidodromous with veins immersed on adaxial side, prominent on abaxial side, secondary veins immersed or plane on abaxial side, plane or slightly prominent on adaxial side, tertiary veins invisible on both sides. Inflorescence fasciculate, with 2 to 4 flowers, ramiflorous on leafless nodes or trichoflorous; bracts inconspicuous, scalelike, fimbriolate; pedicels 40–50 mm, terete. Flower bud unknown; open flowers cream, tannish pink, or dull green with brown center, ca. 19 mm wide at anthesis; sepals 5, 2.6–2.8(–3.7) × 3.1–3.3(–4.2) mm, elliptic, cucullate, margin entire; petals 5, 7.5–7.7 × (7–) 8.6–8.8 mm, widely elliptic, unguiculate, spreading at anthesis; petals dull green at tip, grading to brownish purple at base, margin entire; disk ca. 0.5 × 2–2.2 mm, patelliform, carnosis, outer margin wrinkled, internal margin raised, drying brown; stamens 3, 2.6–2.8 mm, filaments 1.9–2 mm, flattened, slightly larger at the apex; anthers 0.65–0.75 × 0.85–0.9 mm, oblong, basifixed, bilocular, dehiscence by apical slits bent at ca. 90°, connective apex triangular, conspicuous; pistil pyramid-shaped, ovary ca. 1.8 mm wide, 3-angled, 3-locular, with 6 ovules in each locule, style obsolete, stigmas obscure, punctiform, orange. Berries not seen; seeds not seen.

Distribution and habitat. Salacia macrocremastra is apparently restricted to Panama, where it occurs at altitudes of 650–850 m and was reported in disturbed remnants of premontane wet forest and in forest along ridges and streams. This species is reported to occur inside the Parque Nacional del Darién (Hammel et al. 16285) and is protected, at least to a certain extent. Nonetheless, it is considered Endangered (EN) according to IUCN Red List criteria because its area of occurrence is less than 5000 km², it is known to occur at only three locations, and a continuing decline of its area of occupancy is inferred for habitat fragmentation (IUCN, 2001).

Phenology. The new species has been collected with flowers in January, April, and October; fruits not seen.

Etymology. The specific epithet refers to the very long pedicels, which are unique among Salacia species in the New World.

Discussion. Salacia macrocremastra strongly resembles S. grandifolia, S. jarauna, S. gigantea Loesener, S. macrantha, and the here-described S. panamensis Lombardi because of its large leaves, and S. macrantha because of its large flowers. Nevertheless, S. grandifolia is restricted to Brazilian Atlantic rainforests and has smaller flowers (14.5–16.3 mm) with shorter pedicels (3–11 mm); S. jarauna and S. gigantea are restricted to the rainforests of the Amazon Basin and have smaller flowers (9–18 mm) with shorter pedicels (1–19 mm); S. macrantha is restricted to the rainforests of the Amazon Basin and has larger, yellow-green flowers (18–24 mm) with shorter pedicels (6–22 mm); and S. panamensis has smaller flowers (11–13 mm) with shorter pedicels (9–10 mm) and a peculiar calyx with fused sepals. None of the above species have bullate leaves with a rounded or reniform base, as seen in the new species.

The frequency of browsed stamen apices, which are probably eaten by insects, suggests that the filament apex or the connective itself may be nectariferous.

Among the Neotropical Salacia species, this species is notable for having the longest pedicels (to 50 mm), followed by S. kanakuaensis A.C. Smith (19–27 mm) and S. odorata Lombardi (20–24 mm).


2. Salacia menemega J. Hedex Lombardi, sp. nov. TYPE: Panama. Darién: S of El Real, Alturas de Nique, near Cana mine, along trail following old Camino Real toward Colombia, 07°45′N, 77°40′W, 24 Aug. 1987, G. McPherson 11577 (holotype, MO; isotypes, MEXU, PMA). Figure 2.

Hae species quad inflorescentiam ramosam Salacicee opacifolii (J. F. Mackrady) A.C. Smith et S. insignii A.C. Smith similis, sed a haec foliis in sicco brunneis et pistillis brevioribus, ab illa inflorosetam laxiorem, ab ambabus calycis ganosepalis differt. Etiam ab ambabus distributione in Colombia Panama et Costa Rica (sec in sylva amazonicis) differt.

Liana, glabrous, branches terete to subterete, new growth ones conspicuously flattened, sparsely or minutely lenticellate, drying grayish brown, old ones cylindric or subcylindric, fissured, dense or sparsely minutely lenticellate, drying brown. Leaves opposite to subopposite; stipules 0.4–0.5 mm, triangular, caducous; petioles 2–3 mm, obscurely canaliculate, drying black; blades (3.8–) 8.1–14.8 × (0.9–) 2.7–6.2 cm, elliptic, with rounded base, apex long acuminate to acuminate, margin entire, thickened, and cream colored, chartaceous, drying dark brown on the adaxial side, light brown on the abaxial side, venation brochidodromous with veins plane on adaxial side, secondary veins raised on abaxial side, prominent on abaxial side, tertiary veins plane or
invisible. Inflorescence (2.6–)4.7–8(–10.9) × 5.2–9 (–19.9) cm, a slender compound dichasia, with 24 to 56 flowers, sometimes on leafless nodes; peduncles 1–2(–15) mm, terminal aggregated inflorescences with peduncles up to 51 mm, flattened, lenticellate, branches opposite; bracts 0.8–1.1 mm, triangular, margin scarious, minutely erose; pedicels (5.5–)8–10.3 mm, terete. Flower bud spherical; open flowers orange to pale brown, 4–6.5 mm wide at anthesis; calyx in bud tubular, truncate, ca. 1.3 × 2.3 mm, lobes 5, growing at anthesis, 0.8–1.1 × 1.1–1.3 mm, elliptic, margin minutely papillose; petals 5, 2.3–3.1 × (2.2–)2.7–3.8 mm, widely elliptic to transverse elliptic, unguiculate, ± carnose, spreading at anthesis, brown to orange, drying brown, margin minutely denticulate; disk 0.2–0.3 × 0.4–0.6 mm, annular, slightly pentagonous, carnose, outer margin rounded, orange-brown to dark orange; stamens 3, 0.8–1.1 mm, filaments 0.5–0.9 mm, flattened, anthers 0.25–0.5 × 0.6–0.7 mm, reniform, basified, bilocular, dehiscence by apical slits bent at ca. 120°, pistil pyramid-shaped, ovary ca. 0.8 mm wide, 3-angled, 3-locular, with (4)5 ovules in each locule, style obsolete, stigmas obscure, punctiform. Mature herries
Distribution and habitat. *Salacia menegana* is apparently restricted to Colombia, Panama, and Costa Rica, where it occurs at altitudes of 100–3850–1100 m and has been reported in tall, selectively logged forest and forested slopes. This species is not reported inside any official conservation unit and is thus unprotected. It is considered Vulnerable (VU) according to IUCN Red List criteria because its area of occurrence is less than 5000 km², it is known to occur at fewer than 10 locations, and a continuing decline of its area of occupancy is inferred for habitat fragmentation (IUCN, 2001).

Phenology. The new species has been collected with buds and flowers in February, August, and November, and with mature fruits in April.

Etymology. The specific epithet honors Albert Maria Wilhelmina Menegna, wood anatomist and distinguished taxonomist of New World Hippocrataceae.

Discussion. *Salacia menegana* resembles *S. opacifolia* and *Peritassa prainosa* (Seemmann) A.C. Smith because of its leaf shape, small petioles, and the color of the dried leaf blade; it is difficult to distinguish with only vegetative material. Nevertheless, *S. menegana* can be recognized by its looser inflorescences (vs. inflorescences 0.8–3.1 cm in *P. prainosa* and 0.3–4.6 cm in *S. opacifolia*), and fused sepals (vs. typical *Salacia* species with free sepals in the other two species).

*Salacia menegana* differs from *S. insignis*, which also has loose branched inflorescences, by its leaves that dry brown (vs. green), its shorter petioles (vs. 4–18 mm), and its fused sepals.

Jennifer Hedin recognized this species in her dissertation and intended to name it in honor of Dr. Menegna (as “menegae”); Hedin, 1999: 176), but this name has remained unpublished to date. Hedin (1999) noted that this species is closely related to *Salacia insignis* and *S. opacifolia* because of their similar branched inflorescences and floral morphology.


Tree species quad folia magna et inflorescentiam fasciculatum *Salacia grandifolia* (Martius ex Schultes) G. Don et S. jaruanae Loesener similis, sed a haec habitu not scandenti, ab ambabus calycy in alabastro clusto sub anthesi in lobos 5 irrugares diviso et florae apici atque pallide-violidi centro brunnneo differt. Etiam distributione geographica distincta ad Panamam endemicam differt.

Trees 4–10 m high or treelets 2–4 m high, glabrous, branches subterete, new growths cylindrical, compressed in the nodes, not lenticellate or sparsely lenticellate, shiny, drying ochre or brown, minutely wrinkled, old ones cylindrical, fissured, lenticellate, shiny, drying brown-red. Leaves opposite to subopposite; stipules not seen, caducous; petioles 10–27 mm, obscurely canaliculate, drying wrinkled and black; blades 17.2–30.7(–39.5) × (7.9–)10–18 (–19.3) cm, elliptic, base rounded or cuneate, apex acute, rarely obtuse, margin entire, thickened, slightly revolute, chartaceous, yellow-green on abaxial side, drying brown or olive-brown on both sides, venation brochidodromous with veins prominent on both sides, secondary veins plane or immersed on abaxial side, invisible on adaxial side, tertiary veins invisible on both sides. Inflorescence a contracted brachyblast and apparently fasciculate, with 2 to 4 flowers, ramiflorous on leafless nodes or truncioclorous; bracts inconspicuous, scalelike, fimbriolate; pedicels 9–10 mm, terete. Flower bud spherical; open flowers pale green with brown center, 11–13 mm wide at anthesis; calyx closed in very young buds that grow tearing into 5 irregular lobes, lobes (1.8–)2.3–3.1 × (2–)2.3–2.4 (–3.4) mm, triangular, margin minutely irregular, dried and black; petals 5, 4.4–4.8(–6.3) × 3.4–4.4 (–5.4) mm, obovate, carnose, spreading at anthesis, pale green with brown at its base, base probably nectariferous, margin entire; disk 1.3–1.8 × ca. 0.9 mm, annular-pulvinate, slightly pentagonal, carnose, orange, brown, or pale red, outer margin flattened, drying dark brown; stamens 3, 1.4–1.8 mm, filaments 1.1–1.4 mm, flattened, anthers 0.3–0.45 × 0.5–0.6 mm, reniform, orange, basifixed, bilocular, dehiscence by apical slits bent at ca. 120°; pistil pyramid-shaped, ovary ca. 1.5 mm wide, 3-angled, white or pink-white, 3-locular, with 5 ovules in each
locule, style obsolete, stigmas obscure, punctiform. Entire mature berries not seen, immature berries 3.6–4.8 × 2.2–4.4 cm, spherical, exocarp coriaceous, immature green with grayish striations, mature yellow, drying brown; seeds ca. 1.1 × 0.9 cm, ellipsoid, orange, enclosed in white and translucent pulp.

**Distribution and habitat.** _Salacia panamensis_ is apparently restricted to Panama, where it occurs at altitudes of 200–300 to 800–1000 m and was reported in cloud forests, premontane wet forests, secondary forest, and riverbank lowland rainforests, in transition to premontane forests. This species is reported to

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Figure 3. _Salacia panamensis_ Lombardi. —A. Branch with leaves. —B. Apical view of flower. —C. Lateral view of disk, stamens, and pistil. —D. Mature fruit. —E. Adaxial and abaxial view of stamen. A drawn from Galdames 4149 (MO); B, C, E drawn from the holotype McPherson 10018 (MO); D drawn from Mori & Kallunki 5482 (MO). Drawings by the author.
occur inside the Parque Nacional Altos de Campana (Galdames 4149 and 4380) and has a protected status, nonetheless it is considered Vulnerable (VU) according to IUCN Red List criteria because its area of occurrence is less than 5000 km², it is known to occur at no more than 10 locations, and a continuing decline of its area of occupancy is inferred for habitat fragmentation (IUCN, 2001).

Phenology. The new species has been collected with buds and flowers from December to February, and in April, August, and September; it has been collected with mature fruits in April, August, and November and with immature ones in December.

Etymology. The specific epithet refers to the country where this species is apparently endemic.

Discussion. The inflorescence of Salacia panamensis is not a true fascicle, but a very contracted brachyblast with successive flowerings, the oldest being bigger and higher than the newest, which was presumably produced in the year of specimen collection. Hedin (1999: 72) describes this inflorescence type as a “highly contracted cyme.”

Salacia panamensis strongly resembles S. grandifolia because of its large leaves (blades [10.4–25.8–29–32] × [5.1–5.5–7.9–15] cm in S. grandifolia) and habit and S. juruana because of its large leaves (blades [10.1–17.6–25.6–46.5] × [3.8–4.8–7.5–14.7] cm in S. juruana). However, S. grandifolia is restricted to Brazilian Atlantic rainforests, and S. juruana is restricted to rainforests of the Amazon Basin. In addition, both species have sepals that are not initially connate, but developmentally free with finnibrilolate margins.

The base of the petals is probably nectariferous, and copious nectar was reported on the flowers (Knapp 1354). In studied specimens, the petal bases were often scraped by insects.

Hedin (1999: 59) recognized the peculiar calyx of both Salacia mene negana and S. panamensis in her dissertation and associated it with the calyptra-like calyx of the Malaysian species of Salacia L. Loesener. She described the calyx of Salacia mene negana as “...a smooth sheath over the bud, but as the flower expands, this sheath turns into five or sometimes more unequal to subequal parts” and the calyx of S. panamensis (not named by her) as a “...three-parted calyx in which the segments are valvate...” In my interpretation, the calyx segments of S. mene negana do not tear apart but grow into separate lobes, which is strongly suggested by the papillose margins. In addition, the lobes of S. panamensis do not start as free valvate parts, but as a closed bud in which the growing flower center bursts the segments apart. This is supported by the irregular and dried black margins of the calyx lobes.


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Literature Cited


Two New Species of Orchidaceae from Brazil: Bulbophyllum carassense and Lepanthopsis vellozicola

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ABSTRACT. Two new species of Orchidaceae from the Serra do Caraça, state of Minas Gerais, Brazil, are described and illustrated. Bulbophyllum carassense R. C. Mota, F. Barros & Stehmann is endemic to the Serra do Caraça and is epiphytic on trees or sometimes rupicolous. It is related to B. bidentatum (Barbosa Rodrigues) Cogniaux, B. filifolium Borba & Smidt, and B. pluinosum (Barbosa Rodrigues) Cogniaux, all belonging to section Xiphiza (Reichenbach f.) Cogniaux. A table comparing diagnostic characters for B. carassense with morphologically related species is presented. The second new species is Lepanthopsis vellozicola R. C. Mota, F. Barros & Stehmann, which is also rare and endemic to this region as an epiphyte on Vellozia compacta Martius, in campos rupestres vegetation. This is the only species in Lepanthopsis (Cogniaux) Ames following the combination of characters: the secondary stems show only two evident internodes and are subtended by two leaf sheaths with smooth margins, and the lateral sepals are completely connate. A taxonomic key to identify the Brazilian species of Lepanthopsis is presented.


Key words: Brazil, Bulbophyllum, IUCN Red List, Lepanthopsis, Minas Gerais, Orchidaceae, Serra do Caraça.

In Brazil, the Serra do Caraça is located in the municipalities of Catas Altas, Mariana, and Santa Bárbara in Minas Gerais and is part of the Quadrilátero Ferrífero (the Iron Quadrangle), the southermost portion of the Serra do Espinhaco. The climate is characterized by mild and rainy summers and dry winters, with a mean annual precipitation of 1500 mm (Brandão et al., 1994). Mild temperatures prevail throughout the year, with maximum temperatures seldom exceeding 30°C and minimum temperatures sometimes reaching below zero, mainly at high altitudes. The Serra do Caraça includes rocks of the
Two New Species of Brazilian Orchidaceae

Minas Supergroup and Cenozoic period (Dutra et al., 2002), and the altitude ranges from 750–2072 m. The elongated amphitheater shape of the range is formed by many peaks, and the north-facing opening harbors the Caraça Sanctuary, at about 1300 m (Silveira, 1924). This is the headquarters of the Reserva Particular do Patrimônio Natural do Caraça, the largest private preservation area in the range. Rainwater flows into the Piracicaba river basin, which is part of the Doce river basin.

The Serra do Caraça is located in the Atlantic Forest biome, comprising mainly grasslands that are surrounded and interspersed with forests. The dominant phytosociological community is campos rupestres (rocky fields or rocky grasslands) and semideciduous forests. Campos rupestres vegetation is characterized by a variety of herbaceous plants or shrubs growing directly on rocks, in rock crevices, or on the flat sandy dark soil accumulated on top. The semideciduous forests are often located on slopes and/or associated with the rocky fields.

Two new species of the genera Bulbophyllum Thouars and Lepanthopsis (Cogniaux) Ames were found during the inventory of the family Orchidaceae in the Serra do Caraça. Both are described and illustrated here: B. carassense R. C. Mota, F. Barros & Stehmann belongs to section Xiphizusa (Reichenbach f.) Cogniaux, and L. vellozicola R. C. Mota, F. Barros & Stehmann belongs to section Lepanthopsis.

The genus Bulbophyllum is pantropical and is composed of almost 1000 species (Dressler, 1993). Almost 60 species are known in Brazil (Smidt & Borba, 2007), in five sections (Pabst & Dungs, 1975): Bulbophyllaria (Reichenbach) Grisebach, Didactyle (Lindley) Cogniaux, Micrantha Barbosa Rodrigues, Napeltii Reichenbach, and Xiphizusa. Bulbophyllum carassense is assigned to section Xiphizusa, which currently includes 13 Brazilian species, most of which are epiphytic in southeastern Brazil forests, with a few that are terrestrial in rocky fields (Borba & Smidt, 2004). This section is distinguished by its slender and nongeniculate inflorescences, long lateral sepals fused to each other up to the apex forming a synsepal, columns with two long stelidia close to the apex and two small ventral teeth, and an aggregate and corrugated secondary stem.

The genus Lepanthopsis currently comprises 43 species and is widespread in tropical rainforests from Mexico through Central America and the West Indies, to southern Brazil, mainly in areas higher than 1000 m, with the highest species concentration in the West Indies (Luer, 1991). Lepanthopsis densiflorus (Barbosa Rodrigues) Ames and L. floripesten (Reichenbach f.) Ames, the two species of the genus known from Brazil, are found in southern and southeastern Brazil.

1. Bulbophyllum carassense R. C. Mota, F. Barros & Stehmann, sp. nov. TYPE: Brazil. Minas Gerais: Catas Altas, Serra do Caraça, 20°04'55.2"S, 43°29'11.7"W, 1200 m, 20 Mar. 2005 (fl.), R. C. Mota 2819 (holotype, BHCB; isotypes, RB, SP). Figure 1.

Affine Bulbophyllum bidentato (Barbosa Rodrigues) Cogniaux, B. filifolio Borba & Smidt et B. plumoso (Barbosa Rodrigues) Cogniaux sectionis Xiphizusa (Reichenbach f.) Cogniaux, sed habitui pulchro epiphytico, pseudobulbis fortior corrugatis dorsali compressis, foliis lineari-oblongis usque lineari-ellipticos atque labello in dimidio distali vinaceo reliqui et flavo et vinaceo-punctato, fascia longitudinali atropurpureo e basi usque ad apicem ornato differt.

Epiphytic or rupicolous herbs; roots cylindrical, branched or not, white to light green, to 10 × 0.1 cm; rhizome 3–7 mm between successive pseudobulbs; secondary stems modified into pseudobulbs, conspicuously corrugate, glossy, ovoid, slightly to conspicuously dorsally compressed, 1-leafed, dark green to brownish green, aggregate, 4–8.5 × 6–13 mm. Leaves chartaceous to subchartaceous, flat to slightly conduplicate, narrowly oblong to linear-elliptic, dark green, slightly bicolor, 15–65 × 2.5–6 mm, apex acute to mucronate. Inflorescence a raeeme, slightly nutant, basal, 1 per pseudobulb; peduncle 24–60 mm; rachis 15–55 mm; peduncular bracts with coalescent margins to the apex, scarious at anthesis, 4–6 mm, the free part imbricate, apex obtuse; floral bracts triangular, scarious at anthesis, 1.5–4 mm, apex acute. Flowers resupinate, 4 to 14 simultaneously opening per inflorescence, facing downward; pedicel and ovary glabrous, brownish green with some vinaceous spots, 1.2–1 × 1.5 mm; dorsal sepals glabrous, membranous, lanceolate to narrowly ovate, erect to patent, cream colored to light green, covered with vinaceous spots, concentrated basally, 6.5–8.5 × 1.8–2.5 mm, concave at base, apex slightly canaliculate, straight to recurved, margin entire to shortly and sparsely ciliate, apex mucronate to acute, lateral sepals glabrous, subcoriaceous, fused to apex, erect to patent, cream colored to light green, vinaceous spotted, especially basally, synsepal 7.8–3.5 × 2.5–3.5 mm, canaliculate, lanceolate, symmetrical, margin entire, apex acute to acuminate; petals membranous, flat to almost flat, lanceolate to erect to patent, almost entirely vinaceous, 2.5–3.5 × 1–1.4 mm, base asymmetrical, margin long-ciliate, cilia vinaceo to yellowish, apex acute to obtuse; lip glabrous, fleshy, obovate-lanceolate, erect, flat to slightly undulate, sulcate in basal 1/3, flat to slightly canaliculate in apical 2/3, 5.5–7.5
× 0.8–1.2 mm, with a central, longitudinal, salient stripe, which gradually thins apically, the lateral lobes reduced, semilunate, restricted to the basal 1/4 of the lip, projected upward, margin ciliate in basal 1/3 and entire above, apex obtuse, distal half of lip vinaceous with a longitudinal, central, darker vinaceous stripe to the apex, the remaining cream colored to light yellow with some vinaceous spots; column glabrous, slightly curved, erect to patent, cream colored with some vinaceous spotting, 1.3–1.8 × 0.7–0.9 mm, apex apiculate, stelidia laminate, projected upward, with or without 2 small ventral teeth near the median region, teeth, when present, projected upward forming an acute angle with the column axis, column foot fleshy, ovate, frontally compressed, 1–2 mm long; anther cap verrucose, cordate, vinaceous, 0.7–0.8 × 0.5–0.7 mm, apex mucronate, incurved; pollinia 2, subspherical to reniform, hard, yellow, 0.3–0.4 mm; rostellum membranaceous, lamar, apex truncate; stigma hollow. Fruit spherical, ribbed, glabrous to sparsely tomentose, 4–5 × 3.5–4 mm.

**Distribution and habitat.** *Bulbophyllum carassense* has only been found in and near the Serra do Caraça. The species occurs as an epiphyte on riverbanks and in semideciduous forests, and sometimes as a rupicolous plant in semideciduous forests between 900 and 1200 m (pers. obs.). It is a rare species and only a few populations have been found so far. Individual groups are found in isolated tufts of varied sizes, growing upright or hanging on trunks and rocks.

**IUCN Red List category.** According to the current knowledge of the species and using IUCN Red List categories and criteria (IUCN, 2001), *Bulbophyllum carassense* can be classified as Endangered (EN A2: B1b) (CI). A few known populations are protected in the Reserva Particular do Patrimônio Natural do Caraça. The endangered populations occur over canga vegetation in the Iron Quadrangle, the most important mining region of southeastern Brazil (Jacobi et al., 2007).

**Phenology.** *Bulbophyllum carassense* was observed in flower from February to April.

**Etymology.** The specific epithet refers to the type locality, in the Serra do Caraça in Minas Gerais, Brazil.

**Diagnostic features.** The flowers of *Bulbophyllum carassense* resemble those of *B. bidentatum*, *B. filifolium*, and *B. plasannum*, which all belong to section *Xihiphiza*. Table 1 presents the diagnostic characters for these species.

2. **Lepanthopsis vellozicola** R. C. Mota, F. Barros & Stehmann, sp. nov. **TYPE:** Brazil. Minas Gerais: Catas Altas, Serra do Caraça, 20°06'S, 45°27'W, 1850 m, 29 Apr. 2004 (fl.), R. C. Mota 2437 (holotype, BHCB; isotypes, RB, SP). Figure 2.

Species haec habitu ad *Velloziam* epiphytoico, caulibus secundariis internodis duobus tantum instructis, vaginis foliariis marginibus laevibus et floribus sepalis lateraliibus usque ad apicem coalescentibus ab omnibus congenерibus recedet.

*Hepher epiphyticus, caesiptosus, 5–30 mm tall; roots unbranched, cylindrical to slightly compressed, white to light green, to 40 mm, 1.3 mm diam.; rhizome 0.4–1.5 mm between successive secondary stems; secondary stem glabrous, with basal internodes reduced and covered with imbricate prophylls and 2 evident internodes, cylindrical, not thickened, light green to reddish brown, 0.8–4 × 0.3–0.5 mm; sheaths of the secondary stem 2, glabrous, ribbed, membranous, tubular to crateriform, brownish green, imbricate, unequal, the larger 1.2–4.5 mm, the smaller 0.8–2.5 mm, margins smooth, slightly thickened, apex shortly cuspitate. Leaves glabrous, fleshy, convex on both faces or only the abaxial face, usually sulcate at the median vein, widely elliptic, ovate, or orbicular, light green to reddish brown, slightly bicolored, 1 per secondary stem, 2.7–9 × 2.5–6 mm, margin entire, apex obtuse, mucronate, base attenuate. Inflorescence a raceme, apical, slightly bending, 1 per secondary stem, longer than the secondary stem and leaf; peduncle glabrous, filiform, brownish green to vinaceous, 4–12 mm; rachis brownish green to vinaceous, 5–25 mm; peduncular bracts glabrous, membranous, infundibular to truncate, 0.8–2.5 mm, the basal bract twice as long as the others, margin entire, apex shortly cuspitate to acute; floral bracts glabrous, membranous, crateriform, 0.7–1.3 mm, margins fused to midlpetal, free portion triangular to rounded, margin entire, apex acute to obtuse. Flowers resupinate, 4 to 8 per inflorescence, simultaneously opening, in 2 opposite ranks, with a pectinate appearance along the rachis; pedicel glabrous, slightly ribbed, brownish yellow to vinaceous, 0.6–1 × 0.2–0.3 mm; ovary glabrous, slightly ribbed, brownish yellow to vinaceous, 0.3–0.4 × 0.2–0.3 mm; dorsal sepal glabrous, membranous, ovate to lanceolate, straight to slightly recurved, greenish yellow to vinaceous, sometimes with a darker longitudinal, central stripe, 1.2–2 × 0.6–0.9 mm, margin entire, apex acute, slightly to conspicuously recurved; lateral sepals glabrous, membranous, navelicular, fused to each other forming a cone-like, ovate, erect to patent synsepal, greenish yellow to vinaceous, 1.2–1.7 × 0.8–1.3 mm, margin entire, apex shortly acuminate; petals glabrous, membranous, concave,
Table 1. Comparative morphological traits of *Bulbophyllum carassense* and related species.

<table>
<thead>
<tr>
<th></th>
<th><em>B. carassense</em></th>
<th><em>B. bidentatum</em></th>
<th><em>B. filifolium</em></th>
<th><em>B. plumosum</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Habit and habitat</strong></td>
<td>epiphyte or rupicolous in semideciduous and gallery forests</td>
<td>rupicolous, in rocky fields in Minas Gerais</td>
<td>rupicolous, in rocky fields in Minas Gerais</td>
<td>rupicolous in rocky fields or epiphyte in semideciduous and gallery forests; widely distributed in Brazil</td>
</tr>
<tr>
<td><strong>Pseudobulbs</strong></td>
<td>ovoid, markedly corrugated and slightly to conspicuously compressed dorsally</td>
<td>conical to subspherical, not compressed dorsally</td>
<td>smooth to only slightly corrugated, not compressed dorsally</td>
<td>conical to subspherical, angled, smooth to slightly corrugated, sometimes slightly compressed dorsally</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td>chartaceous to subcoriaceous, flat to slightly conuplicate, narrowly oblong to linear-elliptic, 15–65 × 2.5–6 mm</td>
<td>coriaceous, navicular to conuplicate at the base and slightly conuplicate upward, elliptic to oblong-elliptic, 10–40 × 7–10 mm</td>
<td>coriaceous, flat to slightly conuplicate, linear, 25–40 × ca. 1 mm</td>
<td>coriaceous, flat, oblong-elliptic to oblong, 25–50 × 8–15 mm</td>
</tr>
<tr>
<td><strong>No. of flowers per inflorescence</strong></td>
<td>4 to 14</td>
<td>4 to 6</td>
<td>1</td>
<td>5 to 12</td>
</tr>
<tr>
<td><strong>Sepals</strong></td>
<td>cream colored to light green, covered by vinaceous spots; dorsal sepal 6.5–8.5 × 1.8–2.5 mm, lateral sepals 7.8–5.5 × 2.5–3.5 mm</td>
<td>vinaceous; dorsal sepal 4.5–7 × 1.7–2 mm, lateral sepals 4.5–7 × 2–2.5 mm</td>
<td>purple with chestnut-colored spots; dorsal sepal ca. 14 × 3 mm, lateral sepals 13–15 × 4–6 mm</td>
<td>chestnut colored; dorsal sepal 15–20 × 3–4 mm, lateral sepals 15–20 × 4–5 mm</td>
</tr>
<tr>
<td><strong>Dorsal petals</strong></td>
<td>margin ciliate, vinaceous, 2.5–3.5 × 1–1.4 mm</td>
<td>margin pilose, vinaceous with purple central vein, 1.2–2.2 × ca. 1.5 mm</td>
<td>margin pilose, vinaceous with purple central vein, ca. 4 × 3 mm</td>
<td>margin pilose, white with purple central vein, 5–7 × 2–2.5 mm</td>
</tr>
<tr>
<td><strong>Lip</strong></td>
<td>fleshy, obovate-lanceolate, 5.5–7.5 × 0.8–1.2 mm</td>
<td>margin entire, purple, fleshy, lineate, 4.5–6 × 1.3–1.5 mm</td>
<td>margin pilose in basal portion, short hairs, purple, fleshy, oval, ca. 9 × 1.7 mm</td>
<td>margin pilose in basal portion, short hairs, chestnut colored with purple stripes, membranous in apical 2/3, spatulate, 14–18 × 1.5–2 mm</td>
</tr>
</tbody>
</table>
broadly obovate to subspherical, slightly asymmetric, erect to patent, greenish yellow to brownish yellow, 0.5–0.7 × 0.4–0.7 mm, margin entire, apex obtuse to rounded; lip glabrous at the abaxial face, papilllose at the adaxial face, fleshy, concave, ovate, erect to patent, 0.6–0.9 × 0.5–0.7 mm, yellow, greenish yellow, or brownish yellow, margin papilllose, apex acute to obtuse, column glabrous, erect to patent,
curved at the dorsal region, straight at the ventral region, apical portion larger than the basal portion, yellow to yellowish green, sometimes with some vinaceous spots, 0.4–0.6 × 0.3–0.5 mm, apex obtuse, column foot 0.1–0.2 mm; another slightly papillose, white to cream colored, ca. 0.2 × 0.3 mm; pollinia 2, subspherical to obovoid, hard, yellow, 0.1–0.15 × 0.05–0.08 mm; rostellum oblong to triangular, apex rounded, stigmatic cavity flat. Fruit spherical to widely ellipsoid, ribbed, 1.9–2.1 × 1.5–1.7 mm.

Distribution and habitat. Lepanthopsis vellozicola is currently known to occur only in the Serra do Caraça, state of Minas Gerais, Brazil. The species grows exclusively as an epiphyte on Vellozia compacta Martius in rocky fields between 1750 and 1900 m (pers. obs.). It is a very rare species and only a few populations have been encountered so far. Individuals of this species form tufts of varied sizes that are usually isolated from one another, but many individuals can often be found on a single host plant.

IUCN Red List category. According to the current knowledge of the species and using IUCN Red List categories and criteria (IUCN, 2001), Lepanthopsis vellozicola can be classified as Critically Endangered (CR B2ab[iii]). The only known population grows along the trail leading to Pico do Sol, a popular spot for hikers and climbers in the Serra do Caraça.

Phenology. Lepanthopsis vellozicola was observed in flower from February to May.

Etymology. The specific epithet refers to the observation that the species is epiphytic on Vellozia Vandelli.

Diagnostic features. The new species is unique in the genus by the smooth margins of the two leaf sheaths of its secondary stem, the presence of only two evident internodes on each secondary stem, the lateral sepals that are fused to the apex, and by appearing as an epiphyte exclusively on Vellozia. Its vegetative habit somewhat resembles that of Lepanthopsis microlepanthes (Grisebach) Ames, since both are minute plants. Both possess the smallest leaves and secondary stems within the genus and both have leaves longer than or equaling the respective secondary stem. In all other characteristics, however, the two species are distinct and belong to different subgenera, with L. microlepanthes belonging to subgenus Microlepanthes Luer. Lepanthopsis vellozicola belongs to section Lepanthopsis, which is characterized by the strict, dense, and simultaneously many-flowered racemes with flowers in two opposing ranks (Luer, 1991). The only other species in the genus occurring in Brazil, L. densiflora and L. floripecten, also belong to section Lepanthopsis and share the characteristic raceme pattern. Lepanthopsis vellozicola also shares this general raceme pattern with the other species of section Lepanthopsis, but differs otherwise.

The secondary stem of Lepanthopsis vellozicola shows only two evident internodes, subtended by two leaf sheaths. The basal internodes are reduced and covered with imbricate prophylls. These prophylls are smaller and morphologically distinct from the leaf sheaths. The first leaf sheath is distal, larger, and covers almost all the secondary stem, from near its base to the leaf base, while the second one is imbricate and arises from the basal portion of the secondary stem to reach approximately the midpoint of the first sheath. In the new species, inflorescences can arise successively from the apex of the same secondary stem for several years, but only one inflorescence is produced each year.

The species of Lepanthopsis known to occur in Brazil can be recognized by the following key.

**Key to the Species of Lepanthopsis in Brazil**

1a. Plant epiphytic exclusively on Vellozia; margins of leaf sheaths of the secondary stem smooth; secondary stem to 4 mm long, with only two internodes evident; lateral sepals completely connate.......................... L. vellozicola

1b. Plant epiphytic but not observed on Vellozia; margins of leaf sheaths of the secondary stem scabrous or ciliate; secondary stem 4 mm long or longer, with at least three internodes evident; lateral sepals connate to near the apex.

2a. Sheath margins of the secondary stem scabrous; leaves narrowly elliptic; lateral sepals to 1.5 mm long, ovate, connate to the midpoint or nearly so; apex of the lateral sepals acute; corolla lip ovate. . . . L. densiflora

2b. Sheath margins of the secondary stem ciliate; leaves oblong to elliptic; lateral sepals at least 3.5 mm long, oblong, connate nearly to the apex; apex of the lateral sepals obtuse; corolla lip suborbicular .................. L. floripecten

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Literature Cited


Una Nueva Combinación en Hofmeisterella (Orchidaceae) para la Flora de Colombia

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Resumen. En el presente trabajo, proponemos la nueva combinación Hofmeisterella falcata (Linden & Reichenbach f.) Nauray & A. Galán para la flora colombiana. Esta especie difiere de H. eumicroscopica (Reichenbach f.) Reichenbach f. por sus flores con sépalos y pétalos más anchos y por el ginostemo y el labello con cerdas conspicuas. En consecuencia, el género Hofmeisterella Reichenbach f. está formado por dos especies, y no es un género monoespecífico. Además, se designa formalmente el lectotipo de Telipogon falcatus Linden & Reichenbach f.

Abstract. In this work, we propose the new combination Hofmeisterella falcata (Linden & Reichenbach f.) Nauray & A. Galán for use in the Colombian flora. This species differs from H. eumicroscopica Reichenbach f. by its flowers with wider sepals and petals and by its column and labellum with conspicuous bristles. Consequently, the genus Hofmeisterella Reichenbach f. consists of two species and is no longer a monospecific genus. Moreover, the lectotype of Telipogon falcatus Linden & Reichenbach f. is formally designated.

Key words: Colombia, Hofmeisterella, Orchidaceae, Telipogon.

Hofmeisterella Reichenbach f. es un género sudamericano que se caracteriza por sus hojas en forma de abanico, equitantes, ensiformes, y el pedúnculo anepical, angostamente biaxlado; las flores presentan los pétalos y sépalos similares, reflejos, el labello triangular-lanceolado, cordiforme, acuminado, y el ginostemo en una larga columna que finaliza en un rostelo recurvado (Schweinfurth, 1960; Foldats, 1970; Dodson & Bennett, 1989). Hasta el momento se consideraba formada por una sola especie, H. eumicroscopica Reichenbach f., de amplia distribución en los bosques montanos húmedos de América del Sur (Brako & Zansochi, 1993; Jürgensen & León-Yañez, 1999).

Durante el estudio del género Telipogon Kunth en el Perú (Nauray Huari & Galán de Mera, 2008), y tras la revisión de los pliegos del género conservados en W, hemos encontrado un ejemplar procedente de Colombia etiquetado como T. falcatus Linden & Reichenbach f. (Fig. 1), acompañado de un pliego (H. G. Reichenbach 30500, W) con los dibujos

Tabla 1. Comparación entre Hofmeisterella (H. eumicroscopica, H. falcata) y Telipogon.

<table>
<thead>
<tr>
<th>Hofmeisterella</th>
<th>Telipogon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hojas</td>
<td>ensiformes; equitantes, formando un abanico</td>
</tr>
<tr>
<td>Pedúnculo</td>
<td>anepical en toda su longitud</td>
</tr>
<tr>
<td>Pétalos</td>
<td>lineales o lanceolados, falcados</td>
</tr>
<tr>
<td>Labelo</td>
<td>triangular-lanceolado; cordiforme</td>
</tr>
</tbody>
</table>

Tabla 2. Comparación entre Hofmeisterella eumicroscopica y H. falcata.

<table>
<thead>
<tr>
<th>H. eumicroscopica</th>
<th>H. falcata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sépalos</td>
<td>0.6-0.8 mm ancho; lineales</td>
</tr>
<tr>
<td>Pétalos</td>
<td>0.6-0.8 mm ancho; lineales; 1 nervio</td>
</tr>
<tr>
<td>Labelo</td>
<td>glabro</td>
</tr>
<tr>
<td>Ginostemo</td>
<td>glabro</td>
</tr>
</tbody>
</table>

utilizados por los autores para la descripción de la especie (Fig. 2). Además, en el pliego con el ejemplar figura una etiqueta manuscrita por Dodson en 1991 indicando el lecctotipo de *T. falcatus*, aunque no lo designó formalmente (Dodson, in litt.).

El ejemplar presenta el pedúnculo anepicarpal, las flores con sépalos y pétalos lanceolados y muy agudos, el labelo triangular-lanceolado y acuminado, y el ginoestemo alargado, ambos con cerdas. Estos caracteres coinciden con el protótipo (Reichenbach, 1854) y vuelven a aparecer en el pliego ilustrado, donde además se puede observar la disposición y forma de las hojas, y una gran cantidad de cerdas agudas en el labelo y el ginoestemo. La morfología tanto de las partes vegetativas como de la flor y la disposición de sus piezas, nos lleva a separar esta planta de *Telipogon* (Tabla 1) y proponer una combinación dentro del género *Hofmeisterella*. Por tanto, *Hofmeisterella* deja de ser monoespecífico y consta de dos especies, las cuales se diferencian por la forma de los pétalos y sépalos, y la presencia de cerdas en el labelo y ginoestemo (Tabla 2).


**Cusco:** Paucartambo, alrededores de Pillahuata, 2400 m, D. Moscosa Z. & Y. M. B. 922 (CUZ).


jan. 1846 à 1852 (fl.), J. Linden 1192 (lectotipo, designado aquí, W [H. G. Reichenbach 30500]).

Specimenes examinados. COLOMBIA. Sep. 1974, K. Senghas s.n. (RENZ [fotos 601819, 601820]).

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Literatura Citada


Two New Combinations in *Arisaema* (Araceae) from India

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K. S. Patil & Bachulkar var. *ghaticum* Sardesai, S. P. Gaikwad & S. R. Yadav, a recently described variety in 2006, is treated here at the species level as *A. ghaticum* Punekar & Kumaran. *Arisaema sivadasanii* S. R. Yadav, K. S. Patil & Janarthanan, previously considered as a synonym of *A. tortuosum* (Wallich) Schott, is recognized here as the subspecies *A. tortuosum* subsp. *sivadasanii* (S. R. Yadav, K. S. Patil & Janarthanan) Punekar & Kumaran. Taxonomic implications are discussed and a key to the *Arisaema* taxa of the North Western Ghats is provided.

Key words: Araceae, *Arisaema*, India, IUCN Red List, pollen morphology.

The genus *Arisaema* Martius (Araceae) comprises ca. 170 species (Mayo et al., 1997), 210 species (Govaerts & Frodin, 2002), or ca. 150 species (Gusman & Gusman, 2002). In addition, Govaerts and Frodin (2002) recognized nine subspecies and 24 varieties, while Gusman and Gusman (2002) recognized 12 subspecies, eight varieties, and two forms. The genus extends from Central and East Africa to Southeast Asia, including Yemen, Oman, Pakistan, Afghanistan, the Himalayan ranges, and India, as well as China, Korea, Japan, Siberia, and into North America. In India, the genus has 44 species and nine varieties (Karthikeyan et al., 1989), 38 species and six varieties (Govaerts & Frodin, 2002), or 36 species, one subspecies, one variety, and one form (Gusman & Gusman, 2002). At present, the North Western Ghats in India have six species, one subspecies, and two varieties (including the combinations herein), of which three taxa are endemic to this area, i.e., *A. ghaticum* Punekar & Kumaran, *A. murrayi* (J. Graham) Hooker var. *sonubeniae* P. Tetal, Punekar & Lakshminarasimhan, and *A. sahyadricum* S. R. Yadav, K. S. Patil & Bachulkar (Punekar & Kumaran, 2005). During floristic studies on the genus *Arisaema* of the North Western Ghats, an interesting *Arisaema* was collected, which, after study of relevant literature (Engler, 1920; Sivadasan, 1982; Yadav et al., 1993, 1997; Lakshminarasimhan, 1996; Sasikala, 2000; Mishra & Singh, 2001; Gusman & Gusman, 2002; Tetal et al., 2004; Sardesai et al., 2006), comparison with herbarium collections at BSI and CAL, and our own field observations, was identified as the recently described *A. sahyadricum* var. *ghaticum* Sardesai, S. P. Gaikwad & S. R. Yadav (2006). However, these plants that are referable to *A. sahyadricum* var. *ghaticum* should be recognized at the specific level, as the taxon differs from the allied species *A. murrayi* and *A. sahyadricum* (Figs. 1C, D; 2C, D) in many characters, including spathic color, the slender appendage that is well exerted and curved downward and back again, and pollen morphology. Comparison of morphological and pollen characters of *A. ghaticum* with its allied species is provided in Table 1.

Materials used in the present study were collected from the Sinhagad, Mahabaleshwar, and Amboli areas in the North Western Ghats. Voucher specimens are deposited at the Herbarium of the Agharkar Research Institute, Pune, India (AHMA). Voucher material for pollen studies may be found at the repository of the Paleobiology Group, Agharkar Research Institute, Pune, India (Palaeo. Agharkar Res. Inst.).

Pollen grains for SEM study were collected from fresh anthers and prepared by the method proposed by Juniper et al. (1970) with slight modifications. Pollen grains were fixed with 2% glutaraldehyde, rinsed in distilled water, and then dehydrated through an acetone series. This was followed by critical-point drying, gold coating (JFC-1600 Auto Fine Coater; JEOI Datum Ltd., Tokyo, Japan), and examination under a JEOL-6360A analytical scanning electron microscope (JEOL Datum Ltd.) in the Department of Physics, University of Pune. The terminology applied for pollen grains generally follows that of Erdtmann (1966) and Kremp (1968).

**NEW COMBINATIONS IN ARISAEMA**


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### Table 1. Comparative morphological characters of *Arisaema ghaticum* with its allied species.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>A. ghaticum</em></th>
<th><em>A. sahyadricum</em></th>
<th><em>A. murrayi</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflorescence</td>
<td>emergence before the leaves unfold</td>
<td>emergence along with leaf</td>
<td>emergence before the leaves unfold</td>
</tr>
<tr>
<td>Spathe</td>
<td>≤ 6 cm</td>
<td>7–13 cm</td>
<td>6.5–15 cm</td>
</tr>
<tr>
<td>Spathe tube</td>
<td>mauve to greenish brown, without any vertical white striations</td>
<td>reddish purple, with white vertical striations</td>
<td>green entirely or in lower half, white or purple in upper half, with paler longitudinal stripes</td>
</tr>
<tr>
<td>Spathe limb</td>
<td>curved downward, mauve to greenish brown, without any vertical white stripes</td>
<td>curved downward, reddish purple with pale stripes</td>
<td>almost at right angles to spathe tube, white, light purple, or lavender with translucent veins and a cherry-red cross band at the base inside</td>
</tr>
<tr>
<td>Appendix</td>
<td>well exerted from spathe, curved downward and back again</td>
<td>included in spathe, curved</td>
<td>included in spathe, curved, S-shaped</td>
</tr>
<tr>
<td>Anther</td>
<td>anther connectives with 2 to 4 elongated, conical processes</td>
<td>anther connectives with 2 to 4 elongated, conical processes</td>
<td>anther connectives without any processes</td>
</tr>
<tr>
<td>Pollen</td>
<td>echiniae or spinules comparatively dense, ca. 8 per 5 μm², pollen surface psilate, undulating</td>
<td>echiniae or spinules sparse, ca. 6 per 5 μm², pollen surface psilate</td>
<td>echiniae or spinules sparse, ca. 4 to 6 per 5 μm², pollen surface psilate or perforate</td>
</tr>
</tbody>
</table>


**Distribution and habitat.** At Sinhagad, the plants grow at altitudes of 1200–1400 m in rock crevices, near boulders, on steep grassy hillsides, and also in well-exposed soil-covered basaltic plateaus in association with *Arisaema murrayi*, *Begonia concanensis* A. DC., *Curculigo orchioides* Gaertner, *Heracleum grande* (Dalzell & A. Gibson) P. K. Mukhopadhyay, *Hyposis aurea* Loureiro, *Impatiens dalzellii* Hooker f. & Thomson, *Sonerila scapigera* Dalzell, and *Typhonium venosum* (Dryander ex Aiton) Hetterscheid & P. C. Boyce. It has been observed in Sinhagad that an unidentified snail species forages only on reproductive parts like the spathe, spadix, and appendage, causing a natural threat to the population of *A. ghaticum*. At the Kas Plateau, it grows in association with *A. murrayi*, *Ceropegia jainii* Ansari & B. G. Kulkarni, *Curculigo orchioides*, *Curcuma neilgherrensis* Wight, *Hyposis aurea*, *Iphigenia stellata* Blatter, *Ledebouria revoluta* (L. f.) Jessop, and *Peristylus densus* (Lindley) Santapau & Kapadia. The population at Mahabaleshwar grows at an altitude of 1100–1200 m in shady roadside trenches on the outskirts of semi-evergreen forests dominated by *Catunaregam spinosa* (Thunberg) Tirvengadum, *Memecylon umbellatum* Burman f., and *Syzygium cumini* (L.) Skeels.

**Phytogeography and endemism.** The species is locally endemic in the North Western Ghats from Sinhagad to the Mahabaleshwar region.

**IUCN Red List category.** The population size is estimated to be fewer than 250 mature individuals, while the population at each location mentioned above is likely to contain fewer than 50 mature individuals. This population is currently under severe threat due to decline in quality of habitat (habitat conversion, construction of windmills on lateritic plateau, road widening, and landslides) and herbivores. If such threats continue, the population size may be reduced to less than 80% within the next 10 years. Therefore, after applying IUCN (2001) criteria, the species is categorized as Critically Endangered (CR).

**Phenology.** Flowering starts usually in mid-May or in the first week of June (as soon as the mist sets on the hills during the pre-monsoon showers); fruiting extends from June to July.

**Relationships.** *Arisaema ghaticum* is allied to *A. murrayi* and *A. sahyadricum* and clearly belongs to section *Tortuos* Engler (sensu Murata, 1984, 1990) because of its lamellate spadix appendix and 5-carpellate ovaries. A comparative account of morphological and pollen characters is given in Table 1.


### Table 2. Comparative morphological characters of Arisaema tortuosum subsp. sivadasanii with its allied taxa.

<table>
<thead>
<tr>
<th></th>
<th>A. tortuosum subsp. sivadasanii</th>
<th>A. tortuosum var. tortuosum</th>
<th>A. tortuosum var. neglectum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf</td>
<td>solitary</td>
<td>2</td>
<td>solitary</td>
</tr>
<tr>
<td>Inflorescence</td>
<td>emergence after the leaf, not</td>
<td>emergence after the leaf,</td>
<td>emergence along with leaf,</td>
</tr>
<tr>
<td></td>
<td>overtopping the leaf</td>
<td>overtopping the leaf</td>
<td>not overtopping the leaf</td>
</tr>
<tr>
<td>Appendix</td>
<td>short, thick, projects only</td>
<td>longer and long-exserted out</td>
<td></td>
</tr>
<tr>
<td></td>
<td>slightly out of the spathe</td>
<td>of the spathe limb tapering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>limb</td>
<td>like a sigmoidally curved</td>
<td></td>
</tr>
<tr>
<td>Pollen</td>
<td>echinulate or spinulose</td>
<td>echinulate or spinulose</td>
<td>echinulate or spinulose</td>
</tr>
<tr>
<td></td>
<td>comparatively dense, ca. 20 per</td>
<td>sparse, ca. 6 per 5 μm²,</td>
<td>sparse, ca. 4 to 6 per 3 μm²,</td>
</tr>
<tr>
<td></td>
<td>5 μm², having bulbous base</td>
<td>having bulbous base</td>
<td>without bulbous base</td>
</tr>
</tbody>
</table>


Gusman and Gusman (2002) treated Arisaema sivadasanii as a synonym of A. tortuosum and considered it a late-flowering (from August to October) South Indian form of the polymorphic species A. tortuosum. Although morphological characters generally show that A. tortuosum subsp. sivadasanii is similar to A. tortuosum var. tortuosum and A. tortuosum var. neglectum (Schott) Fischer, it differs in having a short thick appendage that projects only slightly from the spathe limb (Fig. 1E) and by its late, prolonged flowering. It also differs from A. tortuosum var. tortuosum in possessing a usually solitary leaf. In varieties tortuosum and neglectum, the appendage is longer and long-exserted tapering like a sigmoidally curved spathe limb (Fig. 1F). Palynologically, too, there are differences in the pollen exine structure and sculpture (Fig. 2E-J).

**Distribution and habitat.** This subspecies grows along roadsides in the shade of semi-evergreen forests in association with Allophyllus coffe (L.) Raueschel, Arisaema sayyadicum, A. tortuosum, Dimorphocalyx ramiflorus (J. Graham) M. R. Almeida, Gynura bijora (Burman f.) Merrill, Luwanga elusurandria Dalzell, and Mallotus stenanthus Müller-Argovienis.

**Phytogeography and endemism.** This subspecies is so far known to be endemic to the North Western Ghats, from Chandoli Wildlife Sanctuary in Maharashtra to Molem National Park in Goa State.

**IUCN Red List category.** This subspecies has an area of occupancy estimated to be less than 20,000 km², with a severely fragmented population at fewer than 10 locations. The population size is estimated to be fewer than 10,000 mature individuals, and no subpopulation is estimated to contain more than 1000 mature individuals. This population is currently under severe threat due to decline in quality of habitat (habitat conversion and road widening) and forest management operations like weeding. If such threats continue, the population size may be reduced to a greater extent in the near future. Therefore, after applying IUCN (2001) criteria, the subspecies is categorized as Vulnerable (VU).

**Phenology.** Flowering season ranges from August to October; fruiting extends from late October to November.

**Relationships.** Arisaema tortuosum subsp. sivadasanii is allied to A. tortuosum var. tortuosum and A. tortuosum var. neglectum (all belong to section Tortuos). A comparative account of morphological and pollen characters is given in Table 2.


---

**Table 2.**

<table>
<thead>
<tr>
<th>Key to the Taxa of Arisaema of the North Western Ghats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Appendage well exserted from the spathe.</td>
</tr>
<tr>
<td>2a. Flowering commences before leaves appear; appendage curved downward and back again</td>
</tr>
<tr>
<td>2b. Flowering commences only after leaves appear; appendage sigmoidally curved upward or S-curved</td>
</tr>
<tr>
<td>3a. Leaves usually 2; inflorescence overtopping the leaves</td>
</tr>
<tr>
<td>3b. Leaf solitary; inflorescence not overtopping the leaf</td>
</tr>
<tr>
<td>4a. Appendage long (17–19.5 cm), thinner (0.4–0.5 cm), far exserted beyond the spathe limb, tapered sigmoidally</td>
</tr>
<tr>
<td>4b. Appendage short (10–15 cm), thicker (0.8–1.0 cm), slightly projecting out of the spathe limb, S-shaped</td>
</tr>
<tr>
<td>1b. Appendage included within the spathe.</td>
</tr>
</tbody>
</table>

---
5a. Leaflets radiate; appendage included in spathe tube, rounded at apex.
5b. Leaflets pedate; appendage exerted from spathe tube, tapering at apex.
6a. Inflorescence not overtopping the leaf; spathe without white or purple stripes; appendage smooth at apex
6b. Inflorescence overtopping the leaf; spathe striped externally with white or purple; appendage rugose at apex

A. caudatum Engler
A. leschenaultii Blume

7a. Appendage thick (0.4–1 cm); anther connectives with 2 to 4 elongated, conical processes . . . A. sahyadicum
7b. Appendage thin (0.3–0.5 cm); anther connectives without processes.

A. murrayi var. murrayi
A. murrayi var. sombeniae

Acknowledgments. The authors are grateful to V. S. Rao, Director, Agarkar Research Institute, Pune, for providing research facilities. We express our deep gratitude to P. Lakshminarasimhan, Central National Herbarium, Botanical Survey of India, Howrah, and to Dan H. Nicolson, Department of Botany, Smithsonian Institution, Washington, D.C., for critical comments on an earlier version of manuscript. We thank Michael Grayum and an anonymous reviewer for reviewing the manuscript and providing helpful suggestions. We also thank Victoria C. Hollowell, Scientific Editor and Head, Missouri Botanical Garden Press, for her critical review of the manuscript and suggestions. Sachin Punekar acknowledges the Council for Scientific and Industrial Research (CSIR), New Delhi, for providing fellowship support.

Literature Cited


New Combinations in North American Rosulabryum (Bryopsida, Bryaceae)

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ABSTRACT. For the Flora of North America Project, five species are transferred to Rosulabryum J. R. Spence (Bryaceae). Two weedy European species, Bryum bornholmeense Winkelm. & R. Ruthe and B. rubens Mitten, are transferred based on morphology and recent molecular results, as R. bornholmeense (Winkelm. & R. Ruthe) J. R. Spence and R. rubens (Mitten) J. R. Spence. The western North American endemics B. erythroloma (Kindberg) Syed and B. gemmascens Kindberg are also transferred to Rosulabryum, as R. erythroloma (Kindberg) J. R. Spence and R. gemmascens (Kindberg) J. R. Spence. Finally, the rare eastern North American Brachyneniun andersonii H. A. Crum is transferred to Rosulabryum as R. andersonii (H. A. Crum) J. R. Spence. In all, 13 species of Rosulabryum are found in North America north of Mexico. A key to the species is included.

Key words: Brachyneniun, Bryaceae, Bryum, mosses, North America, Rosulabryum.

The genus Rosulabryum J. R. Spence was described to accommodate those species of Bryum Hedwig in sections Rosulata Muller Hallenski and Trichophora Kindberg (Spence, 1996). The type species is the Australian endemic R. albohirtatum (Hampe) J. R. Spence, a close relative of R. andicola (Hooker in Kunth) Ochya, which is widely distributed in the Southern Hemisphere, extending north through South America to the mountains of the American Southwest. These species are characterized by rosulate gametophytes, leaves that are mostly obovate with upper margins serrate, rhizoidal tubers, and peristomes that are unreduced. Superficially, the larger species of Rosulabryum are similar to species of Rhodobryum (Schimper) Limpricht. However, there are many differences between the two genera, including among others the abaxial stipe band (well developed in Rosulabryum, reduced or absent in Rhodobryum) and stolons (absent in Rosulabryum, present in Rhodobryum). Recent phylogenetic work using DNA sequence data suggests that they are not closely related (e.g., Cox & Hederson, 2003) and has for the most part supported the concept of Rosulabryum. The most recent treatment of Rosulabryum is that for the Australian species (Spence & Ramsay, 1999, 2005). Ochya et al. (2003) transferred 19 species of Bryum to Rosulabryum, including five known from North America. The genus is a large one, with ca. 75 to 80 species, and is especially well represented in the Southern Hemisphere.

In this paper, the species of Rosulabryum found in North America north of Mexico are discussed, with five additional species transferred here for the Flora of North America Project. Most Bryum species transferred to Rosulabryum have been previously monographed by Syed (1973) and Mohamed (1979) and are for the most part well accepted. Because the types of most of those found in North America have already been carefully examined by Crundwell and Nyholm (1964), Syed (1973), Mohamed (1979), Demaret and Wilczek (1982), and Wilczek and Demaret (1982), there is no need to re-examine them for the purposes of this study. Types for two poorly known western North American species, however, have been studied. Two species, R. capillare (Hedwig) J. R. Spence and R. aquaescens (Bruch ex De Notaris) J. R. Spence, have already been transferred to the genus by Spence (1996) as part of the Flora of Australia Project (Spence & Ramsay, 2006). Recent molecular research has shown that B. bornholmeense Winkelm. & R. Ruthe and B. rubens Mitten are apparently related to R. capillare (Holyoak & Pedersen, 2007) rather than to the species of the Gemmabryum subapiculatum (Hampe) J. R. Spence & H. P. Ramsay complex where they have recently been placed (Crundwell & Nyholm, 1964; Spence & Ramsay, 2005). This seemingly surprising result can be understood as the gametophytes of these two species are rather similar to some members of the R. capillare complex. Finally, the species known as Brachyneniun andersonii H. A. Crum is transferred to Rosulabryum as its ecology, morphology, and distribution fit better there than in Brachyneniun Schwagerchen.

The following transfers bring the number of species in Rosulabryum in North America north of Mexico to 13. In addition to the five transferred here, the following eight species are also found in the study area: R. andicola, R. canariense (Bridel) Ochya, R.

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capillare, R. elegans (Nees) Ochyra, R. flaccidum (Bridel) J. R. Spence, R. laevifilum (Syed) Ochyra, R. pseudocapillare (Bescherelle) Ochyra, and R. torquesens.


Although most species in Rosulabryum are distinctly rosulate, a few have evenly foliate stems. These include among others the Neotropical R. densifolium (Bridel) Ochyra, the Paleotropical-Australian R. wightii (Mitten) J. R. Spence, and the Australian-New Caledonian R. subfuscilatum (Hampe) J. R. Spence. Brachynemium andersonii, which also has evenly foliate stems, was described from material collected in North Carolina and has not been re-located since it was first found. It is sterile, and hence its placement in the traditional genera Bryum and Brachynemium cannot be completely resolved. Crum (1971) considered the species to be related to the evenly foliate Brachynemium speciosum (Hooker & Wilson) Steere of Mexico and Central America, while L. E. Anderson (in Crum, 1971) considered the species to be related to Bryum densifolium Bridel (= R. densifolium (Bridel) Ochyra). I agree with L. E. Anderson, and in fact R. andersonii is morphologically very similar to R. densifolium, including details of the leaves and stems. Future work may ultimately show them to be conspecific. All other species in Brachynemium are tropical and subtropical epiphytes, typically found in montane cloud forests in the Paleotropics. They are also all rosulate. The evenly foliate stems, temperate distribution, and ecology (growing on soil) of R. andersonii are not found elsewhere in Brachynemium, but are common in Rosulabryum. Hence this species is transferred to Rosulabryum.


The recent molecular work by Holyoak and Pedersen (2007) shows that Bryum bornholmense and its close relative R. rubens are apparently closely related to Rosulabryum capillare. They place these and many other species in a morphologically highly variable Psychostomum clade defined by molecular data only, including relatively few taxa from several different traditional genera. This clade can be interpreted as a group of genera, however; thus I have moved these species to the morphologically defined Rosulabryum rather than placing them in a molecularly defined Psychostomum Hornschuch. Although traditionally placed in the Bryum erythrocarpum complex of Crundwell and Nyholm (1964), these two species are somewhat anomalous as they have serratate upper laminal margins, broad laminal cells, fairly distinct limbidia, and large tubers, all features of Rosulabryum. Crundwell and Whitehouse (2001) have provided several diagnostic criteria that distinguish the two species. The presence of true R. bornholmense in North America needs to be confirmed, as most specimens appear to be misidentified R. rubens, according to Crundell and Whitehouse (2001).


This species is distributed in western North America from British Columbia to Central America. A report from Bolivia (Allen, 2002) needs to be re-evaluated, as several similar species of Rosulabryum occur in South America. The taxon was raised to species rank by Syed (1973). Rosulabryum erythroloba is easily distinguished from R. capillare by several characters of the leaf and tubers, including its
overall red coloration, short stout leaf hairpoint, decurrent leaves, and red tubers. It generally grows at low elevations near coastlines (Syed, 1973; Spence, unpublished), although it has been found in montane areas in Central America.


This species is closely related to Rosulabryum capillare, but it differs in its orange-red tuber color (vs. brown) and the elongate even foliate innovations with small, somewhat imbricate leaves (vs. short rosulate innovations with contorted leaves). Rosulabryum gemmascens is a western North American endemic distributed from British Columbia to California.


Rosulabryum rubens and R. bornholmense are closely related to R. capillare according to the recent molecular work of Holooyk and Pedersen (2007). Most North American material can probably be referred to R. rubens, based on the revisions of Crudwell and Whitehouse (2001).

KEY TO ROSULABRYUM OF NORTH AMERICA NORTH OF MEXICO

1a. Filiform gemmae present in axes of upper innovation leaves ........................................ 2
1b. Filiform gemmae absent ................................................................. 5
2a. Innovations short, rosulate, leaves large, mostly > 3 mm long, distal lamina margins strongly serrate, limbidium strong .......................................................... R. anidica
2b. Innovations rosulate or elongate and evenly foliate, leaves small, mostly < 2 mm long, distal lamina margins serrulate to almost smooth, limbidium weak or absent ........................................ 3

3a. Innovations rosulate, leaves obovate, flat, rhizoidal tubers red, filiform gemmae brown ....... R. lanceolatum
3b. Innovations evenly foliate, leaves ovate, concave, rhizoidal tubers various colors, filiform gemmae red, red-brown, or brown .................................................... 4
4a. Rhizoidal tubers orange to pink-orange, brighter than rhizoids, filiform gemmae red .......... R. pseuđopestilare
4b. Rhizoidal tubers and filiform gemmae brown .......................................................... R. flaccidum
5a. Plants with elongate evenly foliate stems, leaves large, 2–4 mm long, distinctly decurrent, margins sharply serrate distally .................................................. R. Andersonii
5b. Plants rosulate or if evenly foliate then leaves small, < 2 mm long, and distal margins mostly smooth or only weakly serrulate; leaves decurrent or not ........................................... 6
6a. Leaves medium-sized to large, 2–4 mm long, often in 2 or more interrupted tufts, margins serrate, limbidium strong or absent distally, costa excurrent in short stout hairpoint, lamina cells incrassate, distinctly porose ........................................ 7
6b. Leaves mostly < 2 mm long, usually not in interrupted tufts, variously contorted, twisted, or imbricate, margins smooth to serrulate, limbidium present or nearly absent, costa various, not reaching apex to long excurrent in long hairpoint, lamina cells thin to firm-walled, not or weakly porose ..... 8
7a. Distal margins of leaves lacking limbidium, leaves often in 2 or more interrupted conical tufts, hairpoint recurved when dry ................................................. R. canariense
7b. Distal margins of leaves with strong limbidium, leaves usually in single tufts, hairpoint variously straight to curved but not distinctly recurved .................................................. R. adicola
8a. Stems ± evenly foliate, julaceous, leaves not much contorted when dry, distal margins of leaves with weak or absent limbidium, rhizoidal tubers absent .................................................. R. elegans
8b. Stems rosulate, although innovations sometimes evenly foliate, leaves variously contorted or twisted, rarely innovations or leaves imbricate, distal margin of leaf with strong to nearly absent limbidium, rhizoidal tubers present ........................................ 9
9a. Plants with strong reddish tints, leaves distinctly decurrent, costa strong in short hairpoint .......................................................... R. erythroloina
9b. Plants green, brown-green to red-green, leaves not decurrent, hairpoint excurrent in short, medium, or long hairpoint .................................................. 10
10a. Plants polyoicoic (syncoicous, some shoots unisexual, others with unisexual lateral gametangia), rhizoidal tubers amber, orange, orange-red to crimson, generally lighter than rhizoids, distal leaf margins distinctly serrate, capsule often strongly nodding, red at maturity .......................................... 11
10b. Plants dioicoic, rhizoidal tubers red, orange-red, red-brown to brown, mostly same color as rhizoids, if brighter then tubers distinctly wary with puberulent cells, distal leaf margins serrate, serrulate to almost smooth, capsule often inclined, red-brown to brown .................................................. 12
11a. Tubers orange to amber, becoming brown with age, limbidium weak, leaves ovate ........ R. bornholmense
11b. Tubers bright red-orange to crimson, limbidium strong, leaves obovate ....................... R. torquesens
12a. Tubers with distinctly puberulent cells, dark red to red-crimson, clustered at base of stem on short

Una Nueva Especie Leñosa de *Cryptantha* (Boraginaceae) para la Flora de Chile

Sebastián Teillier

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RESUMEN. Se describe una nueva especie de *Cryptantha* Lehmann ex Fischer & C. A. Meyer (Boraginaceae), *C. marioricardiana* Teillier. Ésta tiene la particularidad de ser un arbusto caméfita, un carácter muy poco frecuente en el género. La especie crece en Chile, en la costa del desierto de Atacama (28°S), en la Región de Atacama (III).

ABSTRACT. A new species of *Cryptantha* Lehmann ex Fischer & C. A. Meyer (Boraginaceae), *C. marioricardiana* Teillier, is described. The new species is a chamaephytic shrub, a very infrequent character in the genus. This species grows in Chile, in the coastal Atacama Desert (III Region de Atacama, 28°S).

Key words: Atacama Desert, Boraginaceae, Chile, *Cryptantha*, IUCN Red List.

Se considera actualmente que *Cryptantha* Lehmann ex Fischer & C. A. Meyer (Boraginaceae), posee unas 100 especies distribuidas en Norteamérica y Sudamérica (Mabberley, 1987). Para Chile se citan unas 40 especies (Marticorena & Quezada, 1983). Plantas del género crecen además en países vecinos como Perú (unas 15 especies; Brako & Zurechii, 1993), Bolivia y Argentina (13 especies; Zuloaga & Morrone, 1999).

*Cryptantha* reúne especies de hierbas anuales o perennes, hasta ahora sólo se conocía una de hábito arbustivo: *C. gnaphalioides* (A. DC.) Reiche del norte de Chile.

Las flores pueden ser cosmógamas o cleistógamas, pudiendo encontrarse en un individuo sólo un tipo de ellas o ambos; cálix unido sólo en la base; corola blanca con un tubo basal cilíndrico, corte, con o sin escamas en la garganta, lóbulos casi imbricados. Fruto, una núcule con una cicatriz ventral característica, se forman 1 a 4 por flor.

Las especies del género en Chile crecen en ambientes áridos y semi-áridos. En el norte, desde la costa del desierto de Atacama hasta la parte baja del altiplano, en el centro en ambientes de matorral y bosque esclerofilo inclusive en la estepa andina, en el sur del país son escasas y se encuentran sólo en la estepa de la Patagonia. La mayor parte de ellas son endémicas de Chile.


Hae specie quaod habitum lignosum etiam nuculam laevem nitidam ad *Cryptanthum gnaphalioides* (A. DC.) Reiche maxime accedit, sed ab ea caulisibus juvenilibus ac folis viridibus (nec griseargenteis), his subsucculentis facile distinguetur.

Especie caméfita, subarbustiva, ramificada desde cerca de la base, ramas erectas, leñosas, de hasta 20 cm de altura (Fig. 1A). Corteza de los tallos más antiguos algo cenicenta; la de los nuevos, marrón, suave e irregularmente estriada, con tricomas apegados al tallo que nacen en una base algo ensanchada. Hojas alternas, en su mayoría divergentes del tallo, con yemas o pequeños fascículos de hojas en las axilas; sésiles; láminas lineares, de ca. 10 × 2 mm, menores hacia el extremo de las ramas (ca. 5 × 2 mm), algo scculentas y cilíndricas en vivo, base poco ensanchada, tricomas en ambas caras, nacen de una pústula blanca de ca. 0.5 mm que persiste después de su caída (Fig. 1B). Inflorescencias cimosas: monocasios o ripidos, ramas de hasta 5 cm, con brácteas lineares de base ensanchada, de ca. 5 mm. Flores con pedicelos de hasta 1 mm, base densamente cubierta por tricomas híspidos, no pustulados; todas cosmógamas; cáliz 5-loblulado, dividido hasta la base del tubo, sépalos híspidos, lineares, de hasta 2.5 mm, acrescentes hacia la madurez del fruto, alcanzan 4–5 mm; corola blanca, cortamente rotácea, 5-lobluada, de ca. 4(–5) × 6 mm, tubo de 2–2.5 mm, lóbulos redondeados con la base algo imbricada; garganta de la corola con un anillo de 5 glándulas amarillas ≥ hemisféricas y una pequeña depresión en el centro (fornículos); estambres 5, filamentos muy cortos, no sobresalen del tubo; ovario con 4 primordios seminales, estilo muy alargado y por lo menos el doble del largo que los primordios; sólo se desarrolla una núcleo por ovario. Frutos triangulares, ápice agudo, base ensanchada, dorso liso, brillante y jaspeado (Fig. 1C, D); la cara ventral que

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da hacia el estilo con una cicatriz larga y abierta que en la parte inferior forma una cavidad de ámbito triangular; bordes algo resaltados.

**Distribución geográfica.** Hasta ahora la especie ha sido colectada en dos localidades del litoral de la provincia de Huasco, en la costa del desierto de Atacama (Fig. 2). Crece en sitios arenosos cercanos al mar. A pesar de tener flores relativamente conspicuas comparadas con otras del género, su detección en terreno es complicada dado que probablemente desarrolla hojas y flores sólo en las temporadas en que dispone de suficiente humedad.

Desde el punto de vista de la fitogeografía, la especie participa en las asociaciones de la formación conocida como Desierto Costero del Huasco (Gajardo, 1994), que se extiende en la franja del litoral desde Caldera (27°S) hasta poco más al sur de Huasco (28°S). La fisonomía de la vegetación es de tipo matorral con arbustos frecuentemente caducífolios en verano, como Ballisia peduncularis (Lindley) D. Don (Ledoearpaceae), Oxalis gigantea Barneoud (Oxalidaceae) y Heliotropium floridum (A. DC.) Clos var. latifolium Philippi (Boraginaceae), siempreverdes como Atriplex clivicola I. M. Johnston, y suculentas como Copiapoa dealbata F. Ritter y Eulychnia breviflora Philippi (Cactaceae). Luebert y Pliscoff (2006) incluyen la vegetación del área en el piso del Matorral Desértico Mediterráneo Costero de O. gigantea y E. breviflora.

**Conservación.** De acuerdo con los criterios de conservación de la UICN (2001), Cryptantha marioricardiana podría ser considerada como Vulnerable (VU) debido a que apenas se la conoce en dos localidades, y debido al estrecho rango de distribu-
ción geográfica donde crece: una franja de litoral de unos 20 km. La distribución potencial de acuerdo con la superficie del piso de vegetación propuesto por Luebert y Pliscoff (2006) sería de unos 500 km². Es importante consignar que al menos una de las poblaciones conocidas se encuentra protegida en el Parque Nacional Llanos de Challe, localidad de donde proviene el paratipo; la localidad del tipo se encuentra próxima a un área en curso de urbanización.

**Etimología.** Dedico esta especie al Eminente Botánico Mario Ricardi Salinas (1921-2005), fundador de la revista *Gayaná Botánica* (1961) y director del Instituto Central de Biología de la Universidad de Concepción (Chile) entre 1968 y 1973. Exiliado en Venezuela, trabajó en la Universidad de Mérida hasta su retiro. A lo largo de su vida realizó numerosos aportes al conocimiento de la sistemática de las plantas vasculares y la fitogeografía de Chile.

**Posición sistemática.** *Cryptantha* pertenece a las Boraginaceae, tribu Eritrichieae. Johnston (1927) reconoce tres secciones: *Cryptantha*, *Geocarya* I. M. Johnston y *Krynitzkia* Lehmann ex Fischer & C. A. Meyer). I. M. Johnston, dado que la nueva especie no produce flores cleistógamas, deberá ubicarse en la primera sección. En el marco de la sección, el autor propone la serie *Gnaphalioides* I. M. Johnston para aquellas especies que tengan un hábito leñoso y núcules lisas y brillantes; señala como único integrante de ella a *C. gnaphalioides*. En relación con ello, la nueva especie, al poseer ambas características, se podría incorporar a la misma serie. Ambas son, sin embargo, de aspecto notablemente diferente: *C. gnaphalioides* es una planta gris-argéntea debido a que presenta una cubierta densa de tricomas en los tallos nuevos y en las hojas, en tanto que *C. marioricardiana* es de tallos y hojas verdes; éstas, además, son algo suculentas.


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A New Genus and New Combinations in Australian Villarsia (Menyanthaceae)

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Key words: Australia, Liparophyllum, Menyanthaceae, Omduffia, Villarsia.

Menyanthaceae are a morphologically diverse family of aquatic and wetland plants in the order Asterales, consisting of 60 to 70 species that are distributed worldwide (Tippery et al., 2008). Two of the five genera, Menyanthes L. and Nymphophyllum Gilg (= Fauria Franchet), are monotypic and restricted to the Northern Hemisphere. Liparophyllum Hooker f. (also monotypic) and Villarsia Ventenat (18 species) are found only in the Southern Hemisphere, and Nymphoides Séguier (40 to 50 species) is cosmopolitan in distribution.

Tournefort (1700) had recognized two genera (Menyanthes and Nymphoides) that Linnaeus (1753) combined under Menyanthes to include the emergent wetland species M. trifoliata L. and two floating-leaved species that currently are circumscribed within Nymphoides: N. indica (L.) Kuntze and N. pelata (S. G. Gmelin) Kuntze. Séguier (1754) validly published Nymphoides subsequently; however, the later synonym Limnanthemum S. G. Gmelin (1769) remained the accepted genus name for over 100 years (Grisebach, 1845; Mueller, 1875; Bentham & Hooker, 1876). Ventenat (1803) later segregated another genus, Villarsia, to accommodate the distinct South African species V. capensis (Houttuyn) Merrill.

Over the next century, many species were transferred between Limnanthemum and Villarsia, particularly in Australia, where taxa with either floating-leaved or emergent habit occur. Menyanthaceae species in Australia initially were designated under Villarsia (Brown, 1810; Don, 1837; Endlicher et al., 1837; Lehmann, 1845), although some were included under Menyanthes (Sims, 1807, 1810) or the gentianaceous genus Swertia L. (Labillardière, 1804—1805). In a comprehensive treatment of Menyanthaceae, Grisebach (1845) listed species of both Limnanthemum and Villarsia in Australia and provided morphological characters to distinguish the genera, including epigetal glands, capsule dehiscence, floating leaves, and inflorescence architecture. However, Grisebach recognized only two species of Menyanthaceae in Australia, L. geminatum (R. Brown) Grisebach (= Nymphoides geminata (R. Brown) Kuntze) and V. parnasifolia (Labillardière) R. Brown. Many additional Australian species were designated subsequently by Mueller, under both Limnanthemum (Mueller, 1854, 1858) and Villarsia (Mueller, 1860, 1865, 1868). After noting that few characters could distinguish the genera, Mueller eventually transferred every menyanthaceous species in Australia to Limnanthemum (Mueller, 1875), including Liparophyllum gymnus Hooker f., an anomalous species for which Hooker (1847) had established a separate genus.

Other authors, however, maintained the independence of Liparophyllum and established the boundary between Limnanthemum and Villarsia out of which current generic circumscriptions developed (Bentham & Mueller, 1869; Bentham & Hooker, 1876). The few characters that were used to distinguish between Limnanthemum and Villarsia included capsule dehiscence and inflorescence morphology, and Liparophyllum was differentiated by linear leaves and a lack of carpellary glands. Later, Kuntze (1891) further codified the assignment of species to genera when he transferred nearly all currently recognized species

in Australia to either *Nymphoides* or *Renealmia* Houttuyn (a *Villarsia* synonym and later homonym of *Renealmia* L. f.). Recent authors have maintained the separation of *Nymphoides* and *Villarsia* on morphological grounds that include vegetative habit and inflorescence architecture, and have supported the independence of *Liparophyllum*, which is unique among Menyanthaceae in having solitary flowers and linear leaves (Aston, 1973; Chuang & Ornduff, 1992; Cook, 1996).

Divisions among Menyanthaceae genera have been upheld in part because of their relatively discrete geographic ranges. Although *Nymphoides* species are found worldwide and *Villarsia* are relatively abundant in the Southern Hemisphere, there are few areas where both genera co-occur. Species of *Nymphoides* are absent from southwestern Australia, where over half of *Villarsia* species are endemic (Aston, 1973). In addition, *Menyanthes* and *Nephrophyllum* are restricted to the Northern Hemisphere, which precludes any overlap in range with the Southern Hemisphere genera *Liparophyllum* and *Villarsia* (Cook, 1996).

Despite the general geographic and morphological distinctness of Menyanthaceae genera, several species of different genera are remarkably similar in their floral and seed morphology, which often have been considered as diagnostic (Grisebach, 1845; Aston, 1969; Chuang & Ornduff, 1992). Flowers in Menyanthaceae are yellow or white (rarely tinged with purple) and have either a dense covering of hair, e.g., *Menyanthes trifoliata*, *Nymphoides indica*, *Villarsia submersa* Aston, or lateral petal wings, e.g., *Nephrophyllum cristata-galli* (Menzies ex Hooker) Gilg, *Nymphoides cristata* (Roxburgh) Kunze, *Villarsia capensis* (Tippery et al., 2008). Large seeds with smooth, elongate epidermal cells distinguish *Menyanthes* and *Nephrophyllum* from the other genera, which have smooth to tuberculate seed surfaces that may be ornamented with trichomes, e.g., *Nymphoides peltata*, *Villarsia exaltata* (Solander ex Sims) G. Don, or a nutritive caruncle, e.g., *Nymphoides subacuta* Aston, *Villarsia latifolia* Bentham (Chuang & Ornduff, 1992). Although the distinctness of *Menyanthes* and *Nephrophyllum* from the remainder of Menyanthaceae has been confirmed repeatedly (e.g., Nilsson, 1973; Chuang & Ornduff, 1992), morphological boundaries among the other genera have been obscured by a number of overlapping character states.

Phylogenetic analyses of the Asterales, conducted using both morphological and molecular data, have consistently resolved Menyanthaceae as monophyletic, within which *Menyanthes* and *Nephrophyllum* are the sister clade to the remainder of the family (Olmstead et al., 2000; Soltis et al., 2000; Lundberg & Bremer, 2003). An analysis of Menyanthaceae taxa using only morphological data (including pollen, seed, and flavonoid data) resolved the floating-leaved genus *Nymphoides* as monophyletic, except for *N. exigua* (F. Mueller) Kunze, which lacks floating leaves (Tippery et al., 2008). In the same study, *Villarsia* resolved as a paraphyletic grade toward *Nymphoides*, and *Liparophyllum* was unresolved as either the sister taxon of *Nymphoides* or a lineage within the *Villarsia* grade. Phylogenetic analysis of morphological characters thus indicated that although *Nymphoides* is monophyletic, *Villarsia* does not comprise a morphologically coherent group (Tippery et al., 2008).

We have conducted an updated phylogenetic analysis of combined nucleotide (nuclear ribosomal ITS [nrITS], rbcL, matK, and trnK introns) and structural (encoded matK/rnl and mtDNA secondary structure) molecular data, using the methods outlined in Tippery and Les (2008) and Tippery et al. (2008). In addition to previously reported sequences (Tippery et al., 2008), we obtained new molecular data for one *Villarsia* specimen from South Africa: *V. goldblatii* (Ornduff 2008113001, NBG), and two specimens from Western Australia: *V. submersa* (Hort & Crawford 1845, PERTH) and *V. violifolia* F. Mueller (Ornduff 9342, UC; GenBank accession numbers EU342366–EU342370, FJ546980–FJ546982). The resulting phylogeny (Fig. 1) produced a congruent topology but showed better-resolved interspecific relationships than the tree generated strictly from morphological data (Tippery et al., 2008). *Nymphoides* was strongly supported as monophyletic, whereas *Villarsia* resolved as three separate clades, one of which also contained *Liparophyllum* (Fig. 1). The two larger *Villarsia* clades consisted entirely of Australian taxa, and the other clade contained only the three South African species. Each of the Australian clades included taxa from both the eastern and western floristic regions of that continent (Takhtajan, 1986). The phylogeny depicted here (Fig. 1) represents a complete sampling of *Villarsia* species worldwide. It should be noted that separate analyses have resolved another species, *Nymphoides*, from the remaining clades of *Villarsia* and *Nymphoides*, where we recommend its transfer (Tippery et al., 2010).

Although the clades of *Villarsia* that were resolved in the combined data analysis have never been suggested on the basis of morphology alone, several morphological characters nonetheless support them as separate, internally cohesive groups. Species within the clade that includes the anomalous, floating-leaved species *V. submersa* are united by their remarkably similar seeds that are ellipsoidal with a subterminal hilum (Chuang & Ornduff, 1992). Seeds of most
Figure 1. Phylogenetic relationships in Menyanthaceae, reconstructed using molecular data (nrITS, matK, rbcL, trnK introns, and nrITS secondary structure), with analyses as described by Tippery and Les (2008) and Tippery et al. (2008). Topology represents the single most-parsimonious tree; nodal values indicate parsimony bootstrap and Bayesian posterior probability support, above and below each branch, respectively. Names shown represent previously circumscribed Villarsia taxa. Revised generic circumscriptions proposed in this paper are depicted at right.
species in the clade are smooth, although some taxa (e.g., V. albiflora F. Mueller, V. calthifolia F. Mueller) have seeds that are densely covered with acuminate trichomes. In addition, species in the clade all have substantially more ovules per placenta than other Villarsia species (Tippery et al., 2008). The South African species, which form a second clade, are characterized by the most deeply fimbriate petal margins and the fewest seeds per capsule of any Villarsia (Ornduff, 2001; Tippery et al., 2008).

The third clade resolved by the combined data analysis is quite heterogeneous taxonomically and consists of species with varied growth habit, inflorescence architecture, and seed morphology (i.e., Liparophyllum gunnii, Nymphoides exigua, several Villarsia species). Nonetheless, subsets of the taxa within this clade share a number of distinctive traits that are found nowhere else in Menyanthaceae. Among the traits are inflorescences that are few flowered (L. gunnii, N. exigua, V. violifolia) or congested (V. capitata Nees ex Lehmann, V. congestiflora F. Mueller) and various distinguishing seed features that include sparse trichomes (V. exaltata, V. lasiosperma F. Mueller), a smooth testa with indistinct epidermal cells (N. exigua, V. capitata, V. latifolia, V. violifolia), or a nutritive caruncle (V. congestiflora, V. exaltata, V. latifolia, V. violifolia). None of these features occurs in the other Villarsia clades (Aston, 1969; Chuang & Ornduff, 1992; Tippery et al., 2008).

Furthermore, all taxa in this otherwise diverse clade are distinct from other Villarsia in having between five and 10 ovules per placenta (Tippery et al., 2008).

Analyses of molecular data clearly indicate that Villarsia is paraphyletic as currently circumscribed (Fig. 1; Tippery et al., 2008). Consequently, in order to recognize groups that are meaningful phylogenetically, it will be necessary to revise the current taxonomy to reflect monophyletic genera. This objective can be achieved either by expanding Nymphoides to include all of Villarsia and Liparophyllum, or by subdividing Villarsia among the three clades that resolve in phylogenetic analyses (Fig. 1). Under the former scenario, the defining morphological features of Nymphoides, namely floating leaves that support a lax inflorescence, would no longer be diagnostic for the genus. In addition, the inclusion of morphologically diverse species under Nymphoides could precipitate a concomitant condensation of Menyanthes and Nephrophyllum into a single genus so that Menyanthaceae genera would remain equivalently diverse. Alternatively, the latter scenario of subdividing Villarsia would preserve the distinctness of Nymphoides as well as provide unifying morphological traits for the separate Villarsia clades. Under neither scenario would the genus name Villarsia apply to any taxon in Australia, because the type species V. capensis belongs to the isolated South African clade (Fig. 1). In our opinion, optimal clarity would be achieved by retaining Nymphoides as currently circumscribed (except for N. exigua), while subdividing Villarsia among the clades that were identified by the molecular and morphological data analyses.

Here we revise the nomenclature for species that formerly belonged to Villarsia. The genus name remains associated with V. capensis and the other two South African species, V. goldblattiana and V. manningiana Ornduff. For the morphologically diverse group that includes Liparophyllum gunnii, Nymphoides exigua, and several Villarsia species, the genus Liparophyllum is expanded to include all species resolving within the clade. Lastly, we establish a new genus to accommodate the third group of Villarsia species, which is separated from other taxa in the phylogenetic analysis by a well-defined, strongly supported branch (Fig. 1; Tippery et al., 2008). The appropriate taxonomic combinations, including emended descriptions of the genera Liparophyllum and Villarsia, are provided below.

Taxonomic Treatment


Aquatic or wetland annual or perennial herbs. Radical leaves erect, with sheathing bases; sessile and linear (Liparophyllum gunnii) or petiolate with ovate or elliptoid laminae, margins entire to crenate-dentate. Inflorescence paniculate; flowers 1 to 3 per node or congested into dense, sessile or subsessile capitula (L. capitatum (Nees ex Lehmann) Tippery & Les, L. congestiflorum (F. Mueller) Tippery & Les), or the whole inflorescence consisting of 1 to 5 flowers (L. exiguum (F. Mueller) Tippery & Les, L. gunnii, L. violifolium (F. Mueller) Tippery & Les). Calyx persistent, divided into 5 lobes; corolla yellow or white, gamopetalous, 5-lobed, rotate, throat fimbriate, margins entire or serrulate; stamens 5, alternate with corolla lobes, inserted on the corolla tube at the junction of the lobes; anthers 2-celled, sagittate, intorse; ovary unilocular with 2 parietal placentae; base surrounded by 5 glands (absent in L. gunnii); style solitary with 2 stigmas; ovules 5 to 10 per placenta. Capsule dehiscent into 4 valves, adnate to calyx at the base only (L. gunnii, L. lasiospernum (F. Mueller) Tippery & Les) or for more than 1/4 of length, of equal length or longer than the calyx; seeds 0.7–3 mm diam., orbicular or elliptoid, smooth or sparsely covered with trichomes (< 1 trichome per
epidermal cell; *L. exaltatum* (Solander ex Sims) Tippery & Les, *L. lasiospermum*, hilum terminal (angle between major axis and hilum with vertex at seed center < 30°; angle approaches 30° in *L. exaltatum* and *L. latifolium*), caruncle present (*L. congestiflorum*, *L. exaltatum*, *L. latifolium*, *L. violifolium* (Bentham) Tippery & Les) or lacking.


**Typification.** Mueller (1868) listed several of his own collections in the description of *Villarsia lasiosperma*: “In paludibus aqua pura repletis prope urbem Albany, ad bases montium Willoung et montes Porongorup versus. F.M.” Three specimens at MEL were interpreted by Aston (1969) to represent syntypes, although curiously none of their labels matches the published text exactly: “Forest swamps north of Albany, Oct. 1867,” with an apparently later label “Swamps at King George’s Sound, Oct. 67” (MEL 875); “Swamps in the rear of Mt. McVillo, Oct. 67,” two packets apparently containing seeds, with a later label “Swamps at King George’s Sound (fresh water), Oct. 67” (MEL 16493); “Heath swamps north of Albany, Oct. 1867,” with the same text reproduced on a later label (MEL 16494). We have selected the first of these (MEL 875) to be the lectotype, because it is the most morphologically complete specimen and
its locality description most closely matches the text of the original publication.


Typification. Mueller (1868) listed several localities and collectors in the original description of Villarsia violifolia: “Ad fluvios Tweed et Don’s River; Oldf. Maxw. Prope urbem Hamden, Clarke.” Three specimens at MEL, clarified by Aston (1969), conform to the description: “S. W. Aust.” collected by Clarke (label in Mueller’s hand; MEL 16489); “Plts. matted, fl. yellow, Tweed R. W. Aust.” collected by Oldfield (MEL 16490); “Don River, S. W. Aust.” collected by Maxwell (labels written by Mueller; MEL 16491 and 16492). Of these, the most complete specimen is the collection by Maxwell, specifically MEL 16491, which we designate as the lectotype.


Genus folius simplicibus, in florescentia diffusa paniculataque, lobo corollino quoque alam medianam carenti, capsula fundo solum ad calycem adnata, seminibus non carunculatis Villarsiae Ventenat simile, sed ab eo marginibus loborum corollinorum integris serrulatis, ovulis ad quamque placentam plus quam 10, seminibus ellipticis hilo subterminali differt.

Aquatic or wetland perennial herbs. Radical leaves erect or floating, petiolate, with sheathing bases; laminae simple, ovate or elliptoid, margins entire to crenate-dentate. Inflorescence paniculate; flowers 1 to 3 per node. Calyx persistent, divided into 5 lobes; corolla yellow or white, gamopetalous, 5-lobed, rotate, throat fimbriate, margins entire or serrulate; stamens 5, alternate with corolla lobes, inserted on the corolla tube at the junction of the lobes; anthers 2-celled, sagittate, introrse; ovary unilocular with 2 parietal placenta; base surrounded by 5 glands; style solitary with 2 stigmas; ovules 11 or more per placenta. Capsule dehiscing into 4 valves, adnate to calyx only at the base; seeds 0.5–1.9 mm diam., ellipsoid, smooth or densely covered with trichomes (one per epidermal cell; O. albiflora (F. Mueller) Tippery & Les, O. calthifolia (F. Mueller) Tippery & Les, O. marchantii (Ornduff) Tippery & Les, O. umbriocola var. beaugleholi (Aston) Tippery & Les), hilum subterminal (angle between major axis and hilum with vertex at seed center > 30°), without a conspicuous caruncle.

Etymology. We have chosen the generic name Ornduffia to honor the late Robert Ornduff (1932–2000), who contributed immensely to the study of reproductive system ecology and evolution in Menyanthaceae, and Villarsia in particular.


Typification. Mueller (1860) indicated two collections in the description of Villarsia albiflora: “In stagnis proprie oppida Perth et Hampden. Clarke et Oldfield.” Aston (1969) located two corresponding Oldfield specimens at MEL: “Fl. white, Hampden, W. A.” (MEL 16430) and “Perth, W. Aust.” (MEL 16447). We designate the latter specimen (MEL 16447), which has more leaves and flowers, as the lectotype.


Typification. The original description of Villarsia calthifolia (Mueller, 1868) listed the locality “In rivulis et in summumatis rupestris montium Porongurup. F. M.” Aston (1969) identified three Mueller specimens that she considered syntypes: “Porongurup” (MEL 16480); “Summit of the Porongurup. Cor. yellow. Oct. 67” (MEL 16481); and “Porongurup” (NSW 90574). None of the specimens
represents an entire plant, but the most complete combination of leaf and inflorescence occurs on one of the Melbourne sheets (MEL 16481), which we designate as the lectotype.


Aquatic or wetland perennial herbs. Radical leaves erect, with sheathing bases; petiolate with ovate or ellipsoid laminae, margins entire to crenate-dentate. Inflorescence paniculate; flowers 1 to 3 per node. Calyx persistent, divided into 5 lobes; corolla yellow, gamopetalous, 5-lobed, rotate, throat fimbriate, margins deeply fimbriate; stamens 5, alternate with corolla lobes, inserted on the corolla tube at the junction of the lobes; anthers 2-celled, sagittate, introrse; ovary unilocular with 2 parietal placenta; base surrounded by 5 glands; style solitary with 2 stigmas; ovoid 1 to 4 per placenta. Capsule dehiscent into 4 valves, adnate to calyx only at the base; of equal length or shorter than the calyx; seeds 1.5–2.5 mm diam., orbicular, smooth or with bulliform protuberances, hilum terminal (angle between major axis and hilum with vertex at seed center > 30°), without a conspicuous caruncle.

**Key to Genera of Menyanthaceae Worldwide**

1a. Leaves trifoliolate; inflorescence an erect raceme with > 10 flowers.......................... *Menyanthes*

1b. Leaves simple; inflorescence lax, or if erect, then capitate, paniculate, or consisting of < 5 flowers. . . . 2

2a. Leaves erect, their margins distinctly crenate; pollen grains subprolate to prolate; seeds with distinct, narrowly elongate epidermal cells, their surface smooth............................. *Nephrophyllidium*

2b. Leaves floating, or if erect then margins entire, dentate, or indistinctly crenate; pollen grains prolate to subprolate; seeds with indistinct or orbicular epidermal cells, their surface smooth, roughened, tuberculate, or possessing trichomes . . . .3

3a. Plants submersed with floating leaves (emergent in mudflat forms or when crowded); inflorescence lax, the flowers in pairs or umbellate, supported by 1 or more floating leaves, or erect and paniculate with > 10 flowers occurring in pairs ............ *Nymphoides*

3b. Plants submersed (*O. submersa*) or emergent, with erect and/or floating leaves; inflorescence erect or lax; if erect, then either capitate, paniculate with flowers arising singly (rarely paired), or consisting of < 5 flowers; if lax, then never supported by a floating leaf (*O. submersa*)................................................. 4

4a. Corolla lobe margins fimbriate; each placenta with 1 to 4 ovules; seeds orbicular, > 1.5 mm diam. . . . *Villarsia*

4b. Corolla lobe margins entire or serrulate; each placenta with ≤ 5 ovules; seeds ellipsoid, or < 1.4 mm diam. if orbicular .................................... 5

5a. Each placenta with 5 to 10 ovules; inflorescence capitate, paniculate, or reduced to < 5 flowers; seeds lacking trichomes on some or all epidermal cells; if trichomes absent, then either margins of
epidermal cells inconspicuous (under 100× magnification) or seed carnate present. Liparophyllum.

5b. Each placenta with ≥ 11 ovules; inflorescence always paniculate with > 10 flowers; seeds bearing a trichome on each epidermal cell or, if trichomes absent, then margins of epidermal cells conspicuous; seed carnate absent. Omduffia

Acknowledgments. The authors are indebted to the directors and staff of the following herbaria for providing access to specimens and type material: A, B, BM, BRI, CAL, CONN, FL, G, GH, GOET, K, L, LD, MEL, MO, NSW, NT, NY, PERTH, PRE, S, STR, UC, US, W, in particular Arne Anderberg (S), Peter Audiffred (L), Frances Crawford (K), Andrew Duran (UC), Mia Ehn (S), Holly Forbes (UC), Patrik Frödén (LD), Laurent Gautier (G), Jochen Heinrichs (GOET), Michel Hoff (STR), Nimal Karunajeeva (MEL), Karina Knight (PERTH), Egildo Luecchi (FL), Pina Milne (MEL), John Strother (UC), Christine Taylor (BM), Kevin Thiele (PERTH), Roy Vickery (BM), Ernst Vitek (W), Robert Vogt (B), and Häkan Wittzell (LD). We also thank Don Padgett for his contributions to understanding phylogenetic relationships in Menyanthaceae, Tony Rebelo for collecting live material, Victoria C. Hollowell for helpful comments on the manuscript, and Helen Aston and Surrey Jacobs for their valuable insights on the Australasian taxa.

Literature Cited


Ventenat, É. 1803. Choix de Plantes.... Grapelet, Paris.
Paepalanthus bonsai, a New Species of Eriocaulaceae from Minas Gerais, Brazil

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ABSTRACT. We describe and illustrate the new species Paepalanthus bonsai Trovo & Sano (Eriocaulaceae, Paepalanthoideae) from the Espinhaço Range in Minas Gerais, Brazil. This species is placed in Paepalanthus Martius subsect. Dichoelodus Ruhland due to its dichotomously branched stem with rigid linear leaves. The new species is compared with the sympatric and morphologically similar species P. glaziovii Ruhland.


Key words: Brazil, Eriocaulaceae, Espinhaço Range, IUCN Red List, Minas Gerais, Paepalanthus.

Paepalanthus Martius is the largest Neotropical genus of Eriocaulaceae, with approximately 450 species; its taxonomic and species diversity is concentrated in the Espinhaço Range, Brazil, and the tepuis of Venezuela. The Brazilian center is the more diverse of the two areas, and indeed a further distinction can be seen with a greater number of species in the Minas Gerais portion of the Espinhaço Range. Paepalanthus occurs predominantly on rocky outcrops and less frequently in open savannas (Giulietti & Hensold, 1990; Hensold, 1991, 1999; Stüttzel, 1990).

Ruhland (1903) divided the genus into 28 categories based on floral and especially vegetative features. One distinctive group is Paepalanthus subsect. Dichoelodus Ruhland, which is distinguished by the elongate and dichotomously branched stems and by the rigid leaves no more than 2 cm long. Körnicke (1863) previously recognized the affinity of P. dichoelodus Klotzsch ex Koernicke, P. guyanensis Klotzsch ex Koernicke, and P. muscosus Koernicke from northern South America based on the habit of these species. Later, Ruhland (1903) described P. glaziovii Ruhland from Minas Gerais and placed all four taxa in Paepalanthus subsect. Dichoelodus. Finally, Hensold (1991) synonymized P. guyanensis into P. dichoelodus. In addition, Harold Moldenke described several species of Paepalanthus without assigning them to infra-generic levels. Some of these species (e.g., P. aristatus Moldenke) have similar habitat and floral morphology to species of Paepalanthus subsect. Dichoelodus and may be merged within this category (Hensold, 1991, 1999).


Hace species a Paepalanthus glaziovii Ruhland habitu humiliori (usque ad 9 cm vs. 20 cm), caule breviore (usque ad 7.5 cm vs. 18 cm), crassiusculo vaginae foliarum inducto et laminis foliaribus non nisi in apice caudis persistentibus differt.

Perennial herbs forming small dense cushions, 6.5–9 cm tall, stem elongate, 5–7.5 cm, branched, covered by leaf sheaths. Leaves rigid, falciform, 0.4–1.2 × 0.1–0.2 mm, adaxial surface glabrous, abaxial surface glabrescent, apex acute, margins ciliate, densely ciliate at base, restricted only to stem apex. Spathe 2–5 mm, glabrescent, apex truncate, long ciliate; scapes 2 to 6 per branch, 5–15 mm, glabrescent with simple trichomes; capitula 2–4 mm diam., urceolate; involucral bracts brown, arranged in 3 to 4 series, bracts of the inner series triangular, ca. 3 mm, with trichomes on the abaxial surface, apex obtuse, ciliate in the upper margin, those from the outer series oblong, ca. 2 mm, glabrous, apex acute, glabrous margins; receptacle hemispheric, pubescent. Flowers 3-merous, ca. 35 per capitula: 33 staminate, 2

pistillate; floral bracts narrowly oblong, ca. 3 mm, glabrous, apex acute, ciliate in the upper margin. Staminate flowers ca. 3 mm; pedicel ca. 1 mm, with trichomes; sepals oblanceolate, ca. 3 mm, glabrous, apex obtuse, ciliate in the upper margin; corolla tubular, ca. 1.5 mm, membranaceous, hyaline, glabrous, 3-lobed; stamens ca. 2 mm; pistillode 3, papillose. Pistillate flowers ca. 3 mm, sessile; sepals oblong, ca. 3 mm, glabrous, apex obtuse, ciliate in the upper margin; petals obovate, ca. 3 mm, glabrous, apex acute, ciliate in the upper margin; gynoecium ca. 3 mm, stigmatic portions bifid, twice the length of the
nectariferous portion; staminodes 3, scale-like. Fruit a loculicidal capsule.

**Habitat and distribution.** The species occurs in the Rio Preto State Park, in the Espinhago Range in Minas Gerais State. The species was collected at an altitude of approximately 1400 m, in an area of a rocky outcrop dominated by montane meadows (an open, grass-dominated area).

**IUCN Red List category.** *Paepalanthus bonsai* is known from a single locality within a conservation unit.
According to IUCN Red List criteria (IUCN, 2001), the species is considered Critically Endangered (CR B1a).

Etymology. The epithet bonsai refers to the general habit of the species. Although it forms small dense cushions in rocky crevices, the branched habit and deciduous leaves give the appearance of a miniaturized tree. The epithet is used as a noun in apposition, as supported by Art. 23.1 of the International Code of Botanical Nomenclature (McNeill et al., 2006).

Discussion. We place Paepalanthus bonsai in Paepalanthus subsect. Dichoedimus based on its trimerous flowers, elongated dichotomously branched stem, and small rigid leaves. This group consists now formally of four species, excluding the species described by Harold Moldenke. Paepalanthus bonsai and P. glaziovii occur in Minas Gerais State, and P. muscosus and P. dichotomus occur in northern South America. Two types of floral morphology can be detected in Paepalanthus subsect. Dichoedimus. The stigmatic portions are not completely fused in P. bonsai and P. glaziovii (although in the original description the author described simple stigmas for P. glaziovii), whereas they are completely fused in P. muscosus and P. dichotomus. Given that the well-defined groups in Eriocaulaceae are generally homogeneous in this floral structure and Ruhlman (1903) stated that the inclusion of P. glaziovii in Paepalanthus subsect. Dichoedimus was doubtful, further phylogenetic studies are required to clarify the relations among these species.

Of the species in subsection Dichoedimus, Paepalanthus bonsai is morphologically most similar to P. glaziovii, which also occurs in the Espinhaço Range in Minas Gerais. Both have been collected in the same locality at a mountain locally known as Chapada do Couto; therefore, they are considered sympatric. These two species share a very similar branching pattern, urceolate capitula, and stigmatic portions that are not completely fused. However, P. glaziovii has persistent leaves among the ramifications, while P. bonsai has leaves only at the apex of the distal branches and the stem is covered by leaf sheaths. Paepalanthus bonsai is also distinguished by its smaller habit (ca. 10 cm tall vs. ca. 20 cm tall in P. glaziovii) and relatively thick stem with short internodes (vs. a relatively thin stem with elongated internodes in P. glaziovii).


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A New Zygomorphic-Flowered Rinorea (Violaceae) from the Neotropics

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Abstract. A distinctive new species from the Neotropics, Rinorea zygomorpha H. E. Ballard & Wahlert (Violaceae), is described and illustrated. It has several character states unique to Neotropical Rinorea Aublet, including a strongly zygomorphic corolla and single-seeded capsule, which distinguish it from other New World species. The new species is also aberrant in several respects in the family, with bifid dorsal connective appendages, stipitate ovary and fruit, and lateral attachment on the laterally compressed seed. A key is presented to separate this new species from other Neotropical members of Rinorea. An assessment of IUCN status using ArcView GIS software with georeferenced localities places the new species in the Least Concern category.

Keywords: IUCN Red List, Neotropics, Rinorea, Violaceae.

Rinorea Aublet (Violaceae) is a pantropical genus of woody shrubs and small trees with an estimated 155 to 210 species (Ballard, unpublished data). The 48 species of Neotropical Rinorea are generally well known, owing to a monograph of the genus by Hekking (1988). Rinorea can be a common understory element in lowland tropical rainforests and semi-deciduous forests, yet the diversity and distribution of species are not well understood, particularly for African and Southeast Asian species. No infrageneric classification has been proposed for the entire genus, and phylogenetic relationships among the world’s Rinorea species are not yet known.

Until now, Neotropical Rinorea have been described generally as having actinomorphic corollas (e.g., in floras and diagnostic keys). However, a carefully dissected flower often reveals the tendency toward zygomorphy in the calyx and the corolla. In most cases, three sets of sepals and petals can be identified: one anterior and two pairs each of lateral and posterior sepals and petals. Some species also show zygomorphic symmetry in the ornamentation and insertion of the staminal tube and in the orientation of the style (Hekking, 1988; Wahlert & Ballard, pers. obs.). In Hekking’s (1988) careful revision of Neotropical Rinorea, it is curious that he did not address the trend toward zygomorphic flowers in some species. Study of floral dissections of Neotropical Rinorea shows some species to have a subequal calyx and corolla, while others tend toward weakly zygomorphic flowers (Wahlert & Ballard, unpublished data). The strongly zygomorphic corolla of the new species described here makes it instantly recognizable and distinct from all other Neotropical Rinorea.

Examination of herbarium material at the Ecuadorian Museum of Natural Sciences (QCNE) revealed specimens with strikingly zygomorphic corollas and zygomorphic, one-seeded capsules that had been misidentified as Rinorea apiculata Hekking or R. guianensis Aublet. The aberrant specimens superficially resembled R. guianensis in their phyllotaxy, gross leaf morphology, and thyridoid inflorescences, but were immediately distinct from it upon scrutiny of the flowers and fruits. Subsequent examination of other collections uncovered many additional misidentified specimens of a fairly widely distributed Neotropical species with strongly zygomorphic corollas and unusual fruits. The new species is now represented by collections at two separate sites in east-central Panama and many specimens from approximately 20 more sites in eastern Ecuador and adjacent Peru (Fig. 1).

Intensive study of accumulated material from AAU, MO, U, and WIS has revealed a suite of characters not seen in other Neotropical Rinorea species or, in some cases, other genera of the Violaceae. Features not documented previously in Neotropical Rinorea include the strongly zygomorphic corolla, single seed per capsule, and zygomorphic capsule symmetry (but with straight sutures). Other traits that are novel in the family are the bifid apices of the dorsal connective scales, the maturing ovary enlarging apically as a “cap” that differs in color and texture from the ovary base, the strongly indented dehiscence sutures on the ovary “cap” and mature fruit, the stipitate base of the ovary persisting into fruit, and the lateral attachment of the laterally compressed asymmetrical seed. This assemblage of novel character states (Fig. 2) initially led us to conclude that the misidentified taxon was probably a new genus. However, evidence from DNA sequences of the trnL intron and trnL-F spacer strongly support placement of the new species within Rinorea and more specifically with Neotropical taxa (see below).

Rinorea zygomorpha H. E. Ballard & Wahlert

Haece species quoad folia alterna, nervationem tertiarium scalariformem et inflorescentiam thyrsiformem ad Rinorea guianense Aublet accedit, sed ab ea corolla zygomorpha, petalo postico dense lanato, filamentorum summo tubi irregulariter lacerato, antheranum connectivum dorsalium apicibus bidentatis, ovario maturissenti e pileo apicali indurante sutorius indentatis manifestis notato, fundo ovarii in fructu pro stipite persistenti atque in capsula semine solitario laterali compresse et affixo differt.

Tree 3–20 m tall, stem to 20 cm diam.; terminal branchlets terete, glabrous or hispidulous. Leaves alternate, petiolar; petiole 5–13 mm, glabrescent or strigillose; stipules persistent, free, lanceolate, 5–10 × 0.9–2 mm, herbaceous, outer surface glabrous or sparsely strigillose, veins present, margin entire, ciliolate, apex acuminat; leaves elliptic, lanceolate-obovate, or broadly lanceolate, blade 13–20 × 4.5–8.5 cm, herbaceous (occasionally papery or subcoriaceous), adaxially glabrous, abaxially glabrous or strigillose, midrib glabrous or strigillose, leaf domatia absent, secondary veins 9 to 11, ascending, tertiary veins scalariform, base rounded or subtruncate to broadly cuneate, symmetrical, margin crenate or sub serrate to subentire, glabrous, apex acuminate or cuspidate. Inflorescences axillary, lateral, terminal or subterminal, pseudacecum or basally branched thyrse, 5.5–13 cm long, 3–15 cm diam., lateral cymes with 3 to 5 normal flowers and often few to several additional aborted flower buds, axis puberulent; pedicel 1.5–2.7 mm, articulated near the middle, hispidulous; peduncle bracts eventually deciduous, broadly triangular, ca. 2.2 × 1.4 mm, herbaceous, 1-veined, outer surface hispidulous, margin entire, ciliolate, apex abruptly mucronulate; pedicel bractlets deciduous. Flowers 3.7–4.7 mm, bisexual; sepals subequal in size and shape, suborbicular or narrowly ovate, 1.9–2 × 1–1.5 mm, (1)3- to 5-veined, outer surface sparsely hispidulous, margin entire, ciliolate or ciliate, apex obtuse or rounded; petals white or cream, petal aestivation apotic, corollas zygomorphic; posterior ("upper") pair of petals broadly oblong or narrowly elliptic, 3.2–3.7 × 0.8–0.9 mm, outer surface pilosulous or puberulent, inner surface glabrous, margin ciliate near the base, apex rounded; lateral petals weakly bottle-shaped and often somewhat falcate, 3.2–3.8 × 1.2–1.3 mm, outer surface pilosulous or pubescent, inner surface sparsely pilosulous apically, margin ciliate, apex rounded; anterior ("bottom") petal strongly bottle-shaped, 3.6–3.8 × 1.1–1.3 mm, outer surface strigillose along costa, inner surface pilose throughout, margin ciliate, apex deeply emarginate, the lobes often incurved; stamens 5, 3–3.5 mm, all filaments almost fully connate into a continuous tube, tube ca. 0.3 mm tall below anthers, glabrous, irregularly lacerate at summit; anthers borne on very short free portion of filament, free portion attached to inner upper surface of filament tube, ca. 0.1 × 0.1–0.2 mm; anther connectives ovate, 0.7–0.8 × ca. 0.7 mm, outer
Figure 2. *Rinorea zygomorpha* H. E. Ballard & Wahlert. —A. Habit. —B. Lateral cymule. —C. Petals: $C_1$, anterior (“bottom”) petal; $C_2$, lateral petals; $C_3$, posterior (“upper”) petals. —D. Sepals. —E. Androecium, exterior view showing irregularly lacerate staminal tube, three anthers, and associated dorsal connective scales with bifid apices. —F. Ovary, showing developing apical “cap” and stipe. —G. Fruit, showing unequal valves and seed. A, B drawn from paratype, *D. Neill 8532* (MO); C–F drawn from holotype, *J. Kornung & K. Thomsen 8610* (AAU); G drawn from paratype, *T. B. Croat 67467* (WIS).
surface glabrous; dorsal connective scales large and conspicuous, apical as well as lateral, lanceolate-ovate, orange, 2.7–3.2 × 0.9–1.1 mm, outer surface glabrous, margins entire except for distinctly bifid apex; ovary maturing after fertilization from an apical pale brown “cap” different in color and texture from ovary base; ovary “cap” becoming indurate, with deep and prominent sutures representing deliuciscence lines of capsule, apex sparsely hisrate, blackish base persisting as stipe in mature capsule, eventually turning brown and converting to similar texture as rest of fruit, glabrous; style 2.3–3 mm, erect, filiform or subulate, straight or sigmoid, apically curved, glabrous; stigmatic orifice apical, undifferentiated. Fruit a thick-walled hard capsule, dehiscent along 3 straight sutures, asymmetrically narrowly ovoid, 4.3–6.5 × 4.3–4.6 mm, strongly zygomorphic with 1 valve much broader than other 2; young fruits green, mature fruits tan to light brown, outer surface smooth, sparsely hisrate or glabrate near apex, apex obtuse; 1 seed per capsule, seed ca. 2.5 × 1.9 mm, globose in profile, laterally compressed with longitudinal furrow including funicular, lateral attachment, tan, glabrous.

**Distribution and habitat.** *Rinorea zygomorpha* occurs in Ecuador and Peru, in lowland humid tropical rainforests, pastures, river terraces, and well-drained hills. It grows on red oxisols or acidic clay soils, from 150–450(800) m elevation. The species has also been collected in Panama and is expected in Colombia.

**IUCN Red List category.** An explicit conservation assessment following IUCN criteria (IUCN Standards and Petitions Working Group, 2008) was conducted following the general procedure outlined by Willis et al. (2004). This utilized a recently designed extension for ArcView GIS 3.2 software (Environmental Systems Research Institute, 1999) by Moat (2007). After placing the CATS (Conservation Assessment ToolS) extension in the main software folder for ArcView, georeferenced records representing all known localities for *Rinorea zygomorpha* were extracted from a BRAHMS (Botanical Research and Herbarium Management system) file (Filer, 2008) of Neotropical Violaceae and mapped to ArcView. The point data were analyzed by the CATS extension in three different ways to ascertain IUCN categories: the first analysis investigated all localities across the entire range of the species; the second and third analyses examined the disjunct Panamanian and South American points separately. The first, total range analysis with 23 records representing 13 distinct localities gave an extent of occurrence (EOO) estimate of 283,891.74 km² and area of occupancy (AOO) estimate of 157,944.53 km², with a recommended category in each case of Least Concern (LC). The second analysis examining only the two Panama records could only provide an AOO estimate of 177.04 km², which places the Panamanian localities in the Endangered (EN) category. The third analysis focusing on the 21 records representing 11 localities in the species’ main range yielded an EOO of 34,436.56 km² and an AOO of 22,803.13 km², with recommended categories of Near Threatened (NT) and Least Concern (LC), respectively. Because the Panamanian specimens are not presently considered distinct at any taxonomic level from those in the main range, we accept the broader conclusion of Least Concern (LC) as an appropriate IUCN status for the species based purely on geographic range data. Additional corroborative evidence supporting this status includes the protective conditions provided to several populations in Ecuador within reserve boundaries of the Estación Biológica Jatun Sacha and Parque Nacional Yasuní.

**Phenology.** The species produces flower buds from July through November, mature open flowers from December through February, and mature fruits from September through February. It is possible that at least some of the “flower buds” on plants also bearing mature fruits in September and October are actually eleostigamous, but this requires further investigation to confirm the breeding system.

**Etymology.** The specific epithet *zygomorpha* refers to the strongly zygomorphic corollas of this species, a character that is unknown in all other Neotropical Rinorea.

**Relationships.** A maximum parsimony analysis of chloroplast trnL intron and trnL-F spacer sequences from 60 species of *Rinorea* from Latin America, Asia, and Africa shows the new species to occupy a basal position in the phylogeny of the genus (results not shown). *Rinorea zygomorpha* is placed in a moderately well-supported clade containing two other alternate-leaved Neotropical taxa: *R. bahiensis* (Moricand) Kunthe and *R. guianensis* (Wahlert & Ballard, unpublished data). This three-species clade corresponds to Hekking’s (1988) informal infrageneric group Rinorea.

**Paratypes.** ECUADOR. MORONA-SANTIAGO: Morona, Cordillera de Cutucu, Centro Shuar Usumanta/Transquitukua, 2°32'S, 77°33'W, 800 m, 20 Jan. 2002, C. Teoza & M. Tirolo 8664 (MO). NAPA: Cantón Tena, Estación Biológica Jatun Sacha, Río Napo, 8 km al E de Misahualli, Parcela Permanente 03, 1°04'S, 77°36'W, 400 m, 26 Dec. 1999, C. E. Cerón M. & M. Montesdeoca 8138 (MO, U); Estación Biológica Jatun Sacha, 8 km al E de Misahualli, 1°04'S, 77°36'W, 450 m, 17 Nov. 1988, C. E. Cerón M. & C. Ignazio 5623 (BHO, MO, U); Estación Biológica Jatun Sacha, Río Napo, 8 km al E de Misahualli, 1°04'S, 77°36'W, 450 m, 28

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A New Species of Cyanus (Asteraceae, Centaureinae) from Southeastern Bulgaria

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ABSTRACT. A new species of Cyanus Miller, C. diospolitanus Bancheva & S. Stoyanov (Asteraceae, Centaureinae), from Tundzha hilly country floristic region in Elhovo municipality, southeastern Bulgaria, is described and illustrated. It belongs to Cyanus sect. Napuliferi (Stefanoff & T. Georgiev) Bancheva & Raimondo, and taxonomically its closest relative is C. pseudoaxillaris (Stefanoff & T. Georgiev) Holub, a rare local endemic for the Thracian Plain, Bulgaria. The new species is currently known from four localities in the Derventski Hills (Yambol Province), growing at the periphery of dry, stony meadows in thermophilous oak forests and brushwood. The chromosome number is 2n = 22, and SEM analysis of the pollen grains is described and illustrated.

Key words: Asteraceae, Centaureinae, Cyanus, IUCN Red List, sect. Napuliferi.

During floristic investigation in the Derventski Hills in Elhovo municipality, southeastern Bulgaria (Yambol Province), involving the mapping of priority habitats according to the Natura 2000 criteria (<http://www.natura.org>), a new species from Cyanus Miller (Asteraceae, Centaureinae) was found. The species has narrowly fusiform roots that shrink upon drying and consequently belongs to Cyanus sect. Napuliferi (Stefanoff & T. Georgiev) Bancheva & Raimondo (Bancheva & Raimondo, 2003). In contrast to all other perennial Cyanus, the new species has branched stems and numerous small capitula.

According to Greuter (2008), Cyanus comprises 29 species. Its center of diversity is in Turkey, southeastern Europe, and the Caucasus (Meusel & Jäger, 1992). Cyanus sect. Napuliferi includes eight species, seven of which are distributed in Bulgaria. The group is well distinguished by having fusiform or napiform roots, reduced leaf size, and leaf blades that are frequently deeply cut and with white-lanate hairs (Bancheva & Raimondo, 2003).

Living plants of the new species were examined in the field. Morphological characters were noted from herbarium material of personal collections and of the type collection. The karyotype was studied from mitotic metaphase obtained from root tips of three plants collected in the wild from the type locality. Root tips were pretreated with 8-oxycinoline for 30 min.; then fixed in acetic alcohol (1:3) for 24 hr. at 4°C, hydrolysed in 1 mol/L HCl for 15 min. at 60°C, stained with hematuxylin according to Gomori (Melander & Wingstrand, 1953) for 30 min. at 60°C, and squashed in 45% acetic acid. The karyotype has been determined according to Levan et al. (1964) on the basis of eight metaphase plates. The pollen morphology was studied by scanning electron microscopy (SEM) according to Huttunen and Laine’s protocol (1983).

Cyanus diospolitanus Bancheva & S. Stoyanov, sp. nov. TYPE: Bulgaria. Yambol Prov.: Elhovo mun., Tundzha hilly country floristic region, Derventski Hills, ca. 2 km SW of village of Vuleha Polyanja, 41°59'58.9"N, 26°39'26.2"E, 370 m, 23 May 2006, S. Bancheva & S. Stoyanov 163344 (holotype, SOM; isotypes, MO, SOM 163343, W, WU). Figure 1.

Haece species ab affinis Cyano pseudoaxillarii (Stefanoff & T. Georgiev) Holub capitulis numerosis (7 ad 28 nec doi: 10.3417/2008007

Herbaceous perennial plant; roots 15–20 × 0.6–0.7 cm, narrowly fusiform with very long, slender apices (that shrink upon drying); stems to 70 cm high, erect, branched above the middle, with many capitula (7 to 28). Lower leaves in basal rosette, 13–15 × 3–5 cm, arachno-tomentose, lyrate-pinnatisect, remotely dentate, with 3 lanceolate-triangular, 1.8–3 × 0.8–1 cm teeth on each side; upper stem leaves lanceolate-linear, 3–7 × 0.3–0.4 cm. Capitula small, 13–16 × 5–7 (–10) mm; phyllaries triangular-ovoid, arachno-tomentose, green to violet, with decurrent fimbriate margins; appendages triangular-ovoid to ovoid, brown to blackish brown, fimbriate; appendage margin below the fimbriae (0.1–)0.3–0.5–(0.9) mm wide, fimbriae (0.3–)0.5–0.7–(1) mm long. Florets ca. 12–15 mm, purple-violet to cornflower blue; marginal florets longer, radiate, sterile, with linear laciniæ ca. 1/2 as long as tube; anther tube of fertile florets exerted, pinkish violet. Achenes asymmetrically cylindrical-truncate, 4–5.5–1.5–2 mm, yellowish or pale brown, with lateral clypeal, ca. 0.5 × 0.3 mm; pappus multiseriate, 1.5–2 mm, pale brown.

Distribution and ecology. Cyamus dialisti is currently known from four localities in the Tundzha hill country of Elhovo municipality in southeastern Bulgaria (Yambol Province), near the villages of Chernozem, Vulcha Polyaná, Lesovo, and Malko Kirilovo. The new species was observed to grow at the periphery of dry, stony meadows in thermophilous oak forests and brushwood, at altitudes up to 500 m. It is also likely that C. dialisti would be found in northwestern Turkey, close to the Bulgarian border. This area falls within the Continental climate zone, characterized by a mean January temperature of 1°C, a mean July temperature of 23°C, and an annual precipitation of 500 mm with an autumn–winter maximum (Nikolova et al., 2002). According to the Food and Agriculture Organization of the United Nations (FAO) classification (FAO, 1988), soils such as lithic leptosols (LPq) and chroic luvisols (LVs) are most common in the investigated area (Ninov, 2002).

The Derventski Hills are a Site of Community Importance as part of the European ecological network Natura 2000. The habitat type “Eastern white oak forests–91AA,” where Cyamus dialisti is found, is included in Annex I of the “Habitat” Directive 92/43/EEC.


IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), Cyamus dialisti should be classified as Critically Endangered (CR B1ab[i,ii,iii]+2ab[i,ii,iii]). At present, the new species is known from four localities with an area of occupancy about 3 km² and an area of distribution about 80 km². The total population is estimated at ca. 800 mature individuals, and the subpopulations are severely fragmented. The major source of threat to the populations is the anthropogenic activity in and around the known collection localities. The felling of the thermophilous oak forests for economic purposes leads to an irreversible loss of the specific habitat to which the species is connected. Some possible measures for conservation of C. dialisti should be taken, such as the creation of a protected area between Lesovo customs house and Vulcha Polyaná, with elaboration of an action plan.

Phenology. The new species is known to flower in May and fruit in June.

Karyotype. 2n = 2x = 18 submetacentric + 4 subtelocentric with satellites = 22. The chromosomes are generally small, ca. 1.5–2 μm (Fig. 2A). The basic chromosome numbers of Cyamus known so far are x = 12, 11, 10, 9, and 8 (Hellwig, 2004). The members of
section *Napoliferi* investigated to date have \( x = 11 \)
and 10. The similar diploid number of \( 2n = 22 \) has been
found in *C. pseudoaxillaris* (Bancheva & Raimondo, 2003).

**Pollen.** Pollen grains are of Wagenitz’s *Centaurea montana* L.-type (1955), prolate, with the correlation of
the polar axis to the equatorial diameter of 1.7. The exine
sculpture is cuturate, with the density of the sculpture
elements being 5 to 8 per 25 \( \mu m^2 \). Measurements
include equatorial diameter 30 \( \pm 1.3 \mu m \); polar axis 50
\( \pm 3.2 \mu m \); mesocolpium 12.8 \( \pm 1.6 \mu m \); apocolpium
8.5 \( \pm 1.1 \mu m \); length of the colpus 41.5 \( \pm 3.4 \mu m \); and
breadth of the colpus 1.6 \( \pm 0.6 \mu m \) (Fig. 2B, C).

**Reproductive biology.** *Cyanus diospolitanus* is an
outcrossed species that is pollinated by ants and other
insects. During field observation, we noticed many
drops of a sugary syrup on the borders of the
 involucral phyllary appendages, which attracted ants.
Ants are also important for the dispersal of the
 diasporas (myrmecochoyry). The achenes have well-
developed lateral elaiosomes that are rich in oil and
are a food source for ants.

**Etymology.** The species epithet refers to Diospolis,
the ancient name of the city of Yambol. It is a city
in southeastern Bulgaria and the administrative center
of Yambol Province, which is the main area of
distribution of the new species.

**Relationships.** Based on morphological characters
and a basic chromosome number of \( x = 11 \), the
closest relative of the new species *Cyanus diospolitanus* is *C. pseudoaxillaris*, an equally rare species of
very local distribution on the Thracian Plain in
Bulgaria. The new species differs from *C. pseudoaxillaris* and from *C. thirkei* (which is found as an
associate at the collection localities) by its branched
stems, numerous small capitula, and finer fimbriae of
the appendages (Table 1).

**Paratypes.** BULGARIA. Yambol Prov.: Elhovo mun.,
Tundzha hilly country floristic region, Derventki Hills, S of
village of Chernozem, 42°05'31.6"N, 26°35'34.4"E, 24 June
2006, S. Bancheva & S. Stoyanov 163345, 163346 (SOM);
NE of Lessovo customs house, 22 May 2006, Bancheva & S.
Stoyanov 163345, 163346 (SOM); SE of village of Malko Kirilovo, 16 May 2005, Bancheva & S. Stoyanov 163347
(SOM).

**Acknowledgments.** Financial support from “Preparation
of the Bulgarian Natura 2000 network of
protected zones” for the field research is gratefully
acknowledged. We thank Assen Ignatov for the
drawing of the species and Nadya Hristova for
technical assistance in making chromosome metas-
phase plates. We are also indebted to Werner Greuter,
Javier Fernández Casas, and an anonymous referee for
providing critical comments and helpful suggestions
on the manuscript.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>C. diospolitanus</em></th>
<th><em>C. pseudoaxillaris</em></th>
<th><em>C. thirkei</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant height (cm)</td>
<td>to 70</td>
<td>to 30</td>
<td>5–10(–15)</td>
</tr>
<tr>
<td>Root length (cm) and shape</td>
<td>to 20, fusiform</td>
<td>to 20, fusiform</td>
<td>to 2–3, nupiform or fusiform</td>
</tr>
<tr>
<td>Capitulum number per plant</td>
<td>7 to 29</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Involucrum width (mm)</td>
<td>5–7</td>
<td>13–20</td>
<td>16–20</td>
</tr>
<tr>
<td>Fimbriae length (mm)</td>
<td>0.5–0.7</td>
<td>2–3</td>
<td>2–3</td>
</tr>
<tr>
<td>Color of the florets</td>
<td>purple-violet to cornflower blue</td>
<td>purple-violet</td>
<td>whitish</td>
</tr>
</tbody>
</table>

Table 1. Morphological comparison of the new species *Cyanus diospolitanus* with *C. pseudoaxillaris* and *C. thirkei*. 
Literature Cited


Psychotria perotensis (Rubiaceae, Psychotrieae), a New Species from the Montane Cloud Forest in Veracruz, Mexico

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ABSTRACT. Psychotria perotensis Castillo-Campos, belonging to subgenus Heteropsyotria Steyermark (Rubiaceae, Psychotrieae), is described and illustrated as a new species from the region of La Cordadura, Coatepec, on the eastern slopes of the volcano Cofre de Perote, Veracruz, Mexico. This species is related to P. phanerandra (Standley & Steyermark) Lorence and P. galeottiana (M. Martens) C. M. Taylor & Lorence; however, it differs from these species in its larger leaves and inflorescence.

RESUMEN. Se describe e ilustra Psychotria perotensis Castillo-Campos perteneciente al subgénero Heteropsyotria Steyermark (Rubiaceae, Psychotrieae) como una especie nueva de la región La Cordadura, Coatepec, en las faldas orientales del volcán Cofre de Perote, Veracruz, México. Esta especie muestra similitudes con P. phanerandra (Standley & Steyermark) Lorence y P. galeottiana (M. Martens) C. M. Taylor & Lorence; sin embargo, difiere por el tamaño de las hojas y de la inflorescencia.

Key words: Mexico, Psychotria, Psychotrieae, Rubiaceae, Veracruz.

Psychotria L. is one of the largest genera, and probably one of the most taxonomically complex, of the family Rubiaceae, containing more than 1000 species distributed in the tropics and subtropics of the world (Standley & Williams, 1975; Dwyer, 1981; Burger & Taylor, 1993; Taylor et al., 2007). This genus is also one of the best represented in Mexico, with approximately 44 recognized species of trees and shrubs, of which six are endemic to the country (Lorence & Dwyer, 1987).

The genus Psychotria is generally divided into two subgenera: Psychotria L. and Heteropsyotria Steyermark (Steyermark, 1972; Standley & Williams, 1975; Andersson, 2001, 2002). The two subgenera can be easily distinguished: in the subgenus Psychotria, of Pantropical distribution, the stipules are deciduous and the fruit red when ripe; while in the subgenus Heteropsyotria, which is restricted to the Neotropics, the stipules are perennial and the fruit generally white, blue, or purple at maturity (Lorence & Dwyer, 1987; Hamilton, 1989; Nepokroeff et al., 1999; Andersson, 2001, 2002; Taylor et al., 2007). Due to its perennial stipules and white or purple fruits, the new species Psychotria perotensis belongs to the latter subgenus.

Intensive collections have been carried out during recent explorations in the montane cloud forest in the area of La Cordadura, municipality of Coatepec, Veracruz, Mexico. These have resulted in the collection of rare and characteristic species of this particular vegetation type, such as Illicium mexicanum A. C. Smith (Illiciaceae) and Drimys grandadensis L. f. var. mexicana (DC.) A. C. Smith (Winteraceae) (García-Franco et al., 2008), as well as others such as Piper xanthostachyum C. DC. (Piperaceae) and Ponthieva brenensis Schlechter (Orchidaceae), which hitherto have been unreported in Veracruz (Castillo-Campos et al., 2009). Several collections of a Psychotria with white flowers were made in the montane cloud forest that appeared to be an undescribed species, which we describe here.

Psychotria perotensis Castillo-Campos, sp. nov.

Frutex vel arbuscula glabra. Stipulae persistentes minute biaristatae; folia petiolata, glabra, lamina elliptico-ovalis, 5–15 × 1.5–6 cm, venis secundaris 5 ad 13 paribus.
Figure 1. *Psychotria perotensis* Castillo-Campos. —A. Branch showing insertion and arrangement of leaves on the branches. —B, C. Node with stipules in young (B) and old (C) branches. —D. Stipule with colleters. —E. Inflorescence. —F. Flower. —G. Insertion of the stamens in the corolla. —H. Style. —I. Fully dissected flower. —J. Fruit. —K. Immature (right) and mature (left) seeds. Drawn from the holotype G. Castillo-Campos & J. Pale Pale 22827 (XAL).
Inflorescentia terminalis vel subterminalis, glabra, paniculata, 3.7–8.5 cm longa, pedunculo 3.1–7.2 cm longo rubello. Flos calyce viridi-rubello, corollae tubo 4.8–11 mm longo albo. Fructus subglabrosus caeruleus vel niger in maturitate, didymus, 4–7 × 4–7(–9) mm, 4 ad 8-costatus in siccitate, saepe loculum unum abortivum effertes.

Shrubs or small trees 0.6–5 m tall, green in young terminal branches, brown in old branches, shiny when dry, cylindrical stems, internodes 1–3.3 cm, glabrous, with constrictions at the nodes above the young stems when dry and turgid, reddish when fresh; stipules perennial, interpetiolar, 2 per node, green in young branches, brown in old branches, shiny, biaristate, deltoid, ascending, acute at apex, apex commonly retrorse, hairs in interior base and with colleters forming a white collar in the adaxial base, associated with pubescence, 0.3–1 mm long, 0.1–0.2 mm thick, externally glabrous, 2–3 × 1.8–3 mm. Leaves simple, opposite, petiolar, glabrous, adaxially dark green, abaxially light green, lamina elliptic-oval, 5–15 × 1.5–6 cm, papyraceous, venation mixed craspedodromous, impressed adaxially, prominent abaxially, 5 to 13 pairs of secondary veins, apex acuminate, 1–1.5 cm, margin entire, slightly repand, base attenuate, petiole 0.7–2.5 cm × 0.6–1 mm, green when dry, reddish when fresh in young leaves, shiny. Inflorescences terminal or lateral in new branches, 3.7–8.5 × 4–7 cm, 15 to 40 flowers, paniculate, main stem 31–72 × 0.7–1.2 mm, secondary axes 11–26 × 0.5–0.8 mm, brown or reddish, shiny, bracts linear to triangular, glabrous, 1–5.4(–22) × 0.2–1.2(–2.1) mm, margin entire, apex acute, base obtuse; bractlets triangular to linear, glabrous, 0.5–1.1 × ca. 0.4 mm, margin entire, apex acute, base obtuse; pedicel 0.5–7 × 0.2–0.6 mm, occasionally almost sessile. Flowers white, calyx tubular, calyx cup 1.4–1.8 × 0.5–0.8 mm, 5-lobate, reddish green, dark on drying, lobes 0.5–1.2 × 0.4–0.6 mm, margin dentate or entire, apex acute, corolla tube white, glabrous, tube 4.8–11 × 0.7–2 mm in the middle part of corolla, corolla throat internally villous, externally glabrous, lobes generally 5, glabrous, white, often recurvate, 2–4.5 × 1–2.5 mm from the base, margin entire, apex rounded or acute; stamens 5, petalostemonous, subsessile or filaments, filaments 2.2–3 × ca. 0.2 mm, glabrous, anthers 1.3–2.3 × 0.2–0.3 mm, slightly exerted; style short, slender, glabrous, 6–11 × 0.1–0.3 mm, included in corolla tube, the length exerted 8.3–11.7 × 1–3 mm, glabrous; stigma bifid, papillate,
0.5–2 × 0.5–0.8 mm. Fruit pyrenocarpous, often didymous, subglobose, green, with 1 or 2 seeds, blue or black on ripening, black on drying, shiny, glabrous, from 1 to 23 per inflorescence, 4–8-costate when dry, costae 4–7 mm; persistent calyx, 4–7(9) mm diam., pedicel 0.5–8 × 0.2–0.7 mm, green when fresh, brown when dry, shiny, main stalk glabrous, 31–60 × 0.6–1.7 mm, secondary axes glabrous, 6–29 × 0.5–2.2 mm, bracts linear, glabrous, 0.6–8.5(–35) × 0.2–0.6(–2.5) mm, apex acute, base obtuse, margin entire; bractlets triangular, glabrous, 0.7–1.5 × 0.2–0.5 mm; seeds 1 to 2, slightly arcuate, 4–4.3 × 2–2.3 mm, cream colored, 4-costate, 2 prominent, often an aborted seed.

Distribution. Despite extensive inspections of other forested areas of Veracruz, the specimens collected so far suggest that distribution of Psychotria perotensis is restricted to the montane cloud forest on the eastern slopes of the volcano Colore de Perote, in the center of the state of Veracruz. Therefore, it is likely that this species is endemic to the state of Veracruz.

Habitat. Psychotria perotensis is a common species in the understory of the well-preserved montane cloud forest of La Cortadura. This habitat has a semihumid climate and is the warmest climate found in temperate areas, with average annual temperatures of over 18°C (García, 2004). Within the arboreal stratum, P. perotensis is associated mainly with the trees Drimys granadensis var. mexicana, Liquidambar styraciflua L., Podocarpus matudae Lundell, Prunus samyoides Schleichendal, Quercus corrugata Hooker, Q. laurina Bonpland, and Rhamnus longistyla C. B. Wolf. Within the shrub stratum, the most common taxa are Bernardia interrupta (Schlechtendal) Müller Argoviensis, Deppea grandiflora Schlechtendal, Hoffmannia excelsa (Kunth) K. Schumann, and Monsonia deppeana (Schlechtendal & Chaminos) Hanstein. The
herb stratum is characterized by a diversity of ferns, chief among which are Arachniodes denticulata (Swartz) Ching, Asplenium auriculatum Swartz, and Blechnum falciforme (Liebm.) C. Christensen, as well as species such as Gregia van-hyningii L. B. Smith and Piper xanthostachyum.

IUCN Red List category. Psychotria perotensis is known locally as “jihuinite” and is a forage species, being very palatable to goats. In the study area, it is associated with P. galeottiana (M. Martens) C. M. Taylor & Lorence and P. nervosa Swartz. Psychotria galeottiana also belongs to subgenus Heteropshytia, while P. nervosa, which has red fruit, belongs to subgenus Psychotria. Therefore, two subgroups of the same genus coexist in the La Cortadura, one Neotropical and the other Pantropical. Although population levels of P. perotensis appear to be adequate, its habitat is limited to well-preserved montane cloud forests. These forests may be considered endemic to the center of the state of Veracruz due to their restricted distribution, and therefore P. perotensis could be considered Vulnerable (VU B1a, C2) according to IUCN Red List criteria (IUCN, 2001) because these original fragments of montane cloud forest are small and unprotected.

Phenology. Flowering in Psychotria perotensis is from February to May and fruiting from July to October. Both flowering and fruiting are irregular, varying between individuals during each season.

Etymology. The epithet refers to the volcano Cofre de Perote, one of the highest mountains in the state of Veracruz, where the species grows on the eastern slopes.

Discussion. Due to the great diversity of species of the genus Psychotria, an exhaustive review was carried out in order to confirm that P. perotensis, of montane cloud forest, is a new taxon, and that P. galeottiana, also of montane cloud forest, and P. phanerandra (Standley & Steyermark) Lorence, of the tropical evergreen rainforest in southern Veracruz, Oaxaca, Chiapas, and Tabasco (Lorence & Dwyer, 1987; Taylor & Lorence, 1992), are the morphologically closest species. Psychotria perotensis is similar to P. phanerandra and P. galeottiana in habit, leaf shape, floral dimorphism (distyly), flower color, and the shape, size, and color of the fruit. However, it differs from P. galeottiana in leaf pubescence, number of primary nerves and flowers per inflorescence, indumentum of the stamen filaments, pedicel length, and number of ribs of the fruit. It also differs from P. phanerandra in leaf pubescence and size, number of primary veins, prominence of venation, petiole length, color and number of flowers per inflorescence, pedicel length, and in the number of ribs of the dry fruits and seeds (Table 1).

Paratypes. MEXICO. Veracruz: Mpio. Coatepec, La Cortadura, local nature reserve, E slope of the volcano Cofre Perote, 2200 m, G. Castillo-Campos & M. J. Peralta 21415 (ENCB, XAL), 21506 (MEXU, XAL), 21796 (XAL), 22299 (XAL), 22441 (ENCB, MEXU, XAL), G. Castillo-Campos & J. Pale 22702 (ENCB, MEXU, MO, XAL), 22703 (ENCB, MEXU, XAL), 22705 (ENCB, MEXU, MO, XAL), 22737 (XAL), 22746 (ENCB, MEXU, MO, XAL), 22750 (XAL), 22868 (ENCB, MEXU, XAL), G. Castillo-Campos & R. Madrigal 22907 (ENCB, MEXU, MO, XAL), 22942 (XAL), 22943 (ENCB, MEXU, XAL), 22944 (MEXU, XAL), 22946 (ENCB, MEXU, XAL), 23381 (XAL), 23383 (XAL), 23384 (XAL).

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Literature Cited

García, E. 2004. Modificaciones al Sistema de Köppen para Adapta a las Condiciones de la República Mexicana. Instituto de Geografía, Universidad Nacional Autónoma de México, México, D.F.
A New Variety of *Salvia sericeotomentosa* (Lamiaceae) from South Anatolia, Turkey

Ferhat Celep, Musa Doğan, Safi Bagherpour, and Ahmet Kahraman

Department of Biological Sciences, Middle East Technical University, 06531 Ankara, Turkey. fcelep@metu.edu.tr; doganm@metu.edu.tr

**ABSTRACT.** *Salvia sericeotomentosa* Rechinger f. (Lamiaceae) was first collected by A. Eig and M. Zohary in 1932 and was described in 1952 by K. H. Rechinger, but since that time it has not been collected again from its type locality. Among specimens collected from the Amanos Mountains near Hatay Province, Turkey, in 2006, the taxon was rediscovered on the basis of two different populations growing at low altitudes. These populations provide the type for the new variety *S. sericeotomentosa* var. *hatayica* Celep & Doğan, which differs from the typical variety by having densely sericeous-tomentose and short glandular-pilose inflorescences. A full description of the new variety is also provided, as well as its conservation assessment.

Key words: Hatay Province, IUCN Red List, *Salvia*, Turkey.

The first revision of *Salvia L.* (Lamiaceae) in Turkey was made by Hedge (1982a) in Davis’ *Flora of Turkey and the East Aegean Islands*, in which 86 species were recognized. Since 2005, extensive field surveys and laboratory studies have been conducted on *Salvia* in Turkey by the authors. These studies revealed two additional new species, *S. marashica* İlçim, Celep & Doğan (İlçim et al., 2009) and *S. ekimiana* Celep & Doğan (Celep & Doğan, 2009); two new records, *S. viscida* Jacquin (Celep et al., 2009) and *S. macrocephala* Boissier (Kahraman et al., 2009); and now one additional new taxon is also recognized.

The type of *Salvia sericeotomentosa* Rechinger f. was collected by A. Eig and M. Zohary from northern Hatay Province in Turkey in 1932 and described as a new species by K. H. Rechinger in 1952 (Rechinger, 1952). Hedge (1982a) later accepted this species as a local endemic growing in the Mediterranean region of Turkey. Between 2005 and 2006, the authors visited the type locality of *S. sericeotomentosa* as well as a number of other sites where it might potentially occur. Despite these expeditions, *S. sericeotomentosa* was not found from its type locality or the surrounding area. Our field and herbarium surveys have indicated that the species has not been collected since the original type collection. Specimens identified to this species were collected by the authors from the Amanos Mountains above Samandağ from southern Hatay Province in Turkey in 2006. These specimens were first identified with the keys provided by Hedge (1982a) in Davis’ *Flora of Turkey and the East Aegean Islands* and other relevant floras, including Rechinger (1952, 1963), *Flora Iranica* (Hedge, 1982b), and *Flora of Cyprus* (Hedge, 1985). They were cross-checked with the collections cited in the flora as well as material housed at various herbaria (AEF, ANK, BM, E, G, GAZI, HUB, ISTE, ISTF, K, and W). After careful examination, some specimens had a distinctive, densely sericeous-tomentose and glandular-pilose indument on their inflorescences, while all remaining material had glabrous inflorescences. Rechinger’s (1952) protologue noted a glabrous inflorescence, and this has been confirmed by our examination. Our field observations demonstrated that both glabrous and pubescent populations may occur in the same locality, and it therefore seems reasonable to treat these as different varieties.

In Rechinger’s 1952 protologue, flower color and seed characteristics were not properly indicated for *Salvia sericeotomentosa*, probably due to lack of proper material. Therefore, a full description of the new variety is given here on the basis of firsthand observations made in the field and herbarium.


1a. *Salvia sericeotomentosa* var. *sericeotomentosa*.

1b. *Salvia sericeotomentosa* var. *hatayica* Celep & Doğan, var. nov. TYPE: Turkey. Hatay: Samandağ to Arsu, among Quercus coccifera shrubs, 36°12′734″N, 35°51′218″E, 20–50 m, 19 June 2007, F. Celep 1232 & G. Akgül (holotype, GAZ; isotypes, ANK, E, K, MO). Figure 1.

Haec varietas a Salvia sericeotomentosa var. sericeotomentosa inflorescentia dense sericeo-tomentosa et breviter glanduloso-pilosae differt.

Perennial suffrutescent herb; stems ascending, erect, 20–70 cm, with a densely sericeous-tomentose and short glandular-pilose indument with sessile glands. Leaves simple, mostly basal, oblong or oblong to lanceolate, 10–60 × 6–18 mm, densely sericeous-tomentose and short glandular-pilose with sessile glands, attenuate at base, margins minutely crenulate, petiole 0.5–3 cm. Verticillasters 2- to 4-flowered, distant; bracts broadly ovate to cordate, acuminate, 5–20 × 5–20 mm, green or green to purplish green; pedicels 3–7 mm. Calyx membranous, green to purplish green, eglandular-tomentose and short glandular-pilose with sessile glands, broadly campanulate, 12–22 mm, broadening and expanding to 30 mm in fruit, upper calyx lip entire; corolla white to cream with yellow upper lip, 25–32 mm, corolla tube ca. 20–23 mm, slightly curved and widening toward throat, upper corolla lip ± straight; stamens 2, staminal connectives shorter than filaments; style white, glabrous, 20–25 mm. Nutlets globose to ovoid, dark brown to black, ca. 3–4 × 2–3.2 mm, surface slightly tuberculat.

Distribution and ecology. The two varieties are both known from Hatay Province in southern Anatolia, Turkey. Field and literature studies showed that Salvia sericeotomentosa var. sericeotomentosa was confined to open fields within Pinus L. forest at altitudes of 800–1000 m in its type locality in the
northern Amanos Mountains. The new variety and the Autonymic variety have now been collected from rocky mountain slopes in association with Quercus cocciifera L., Pinus brutia Tenore, Cistus L., Centaurea L., and Pistacia L. shrubs in the southern Amanos Mountains at lower altitudes of 20–50 m, thus extending the altitudinal range of the species from 20–1000 m.

**IUCN Red List category.** Despite recent expeditions, *Salvia sericeotomentosa* has not been found in its type locality. It is known only from the present localities, and its estimated area of occupancy is less than 100 km² with a population of less than 2000 individuals. According to our field observations, habitat destruction through human encroachment such as road construction, urbanization, and fire are the principal threats in the area. Therefore, the species should be considered Endangered (EN), according to IUCN Red List criteria (IUCN, 2001).

**Etymology.** The varietal epithet is derived from Hatay Province, the area where the new variety was first collected.

**Notes.** The new variety differs from the autonymic variety in its densely sericeous-tomentose and glandular-pilose inflorescences (Fig. 2, Table 1).

**Paratypes.** TURKEY. Hatay: Samandag to Arszu, 36°12′34″N, 35°51′218″E, 25 July 2006, S. Bagherpour & F. Celep 11976 (ANK); Samandag to Arszu, 36°12′34″N, 35°51′218″E, 19 June 2007, F. Celep 1232 (ANK); Arszu to Samandag, 36°13′39″N 35°50′711″E, 2 May 2008, G. Akyüden & F. Celep 1403 (ANK).

**Acknowledgments.** We wish to thank the curators of herbaria AEF, ANK, BM, E, G, GAZI, HUB, ISTE, ISTF, K, and W for allowing us to study their *Salvia* collections and the Scientific and Technical Research Council of Turkey (TUBITAK-TBAG-104 T 450) for their financial assistance.

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**Table 1.** Morphological comparison of *Salvia sericeotomentosa* var. *sericeotomentos* and *S. sericeotomentosa* var. *hatayica*.

<table>
<thead>
<tr>
<th>Variety sericeotomentosa¹</th>
<th>Variety sericeotomentosa²</th>
<th>Variety hatayica³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf indumentum</td>
<td>densely sericeous-tomentose and short glandular-pilose</td>
<td>densely sericeous-tomentose and short glandular-pilose</td>
</tr>
<tr>
<td>Inflorescence axis</td>
<td>glabrous</td>
<td>glabrous</td>
</tr>
<tr>
<td>Calyx</td>
<td>glabrous</td>
<td>glabrous</td>
</tr>
<tr>
<td>Corolla</td>
<td>—</td>
<td>white to cream with yellow upper lip</td>
</tr>
<tr>
<td>Altitude (m)</td>
<td>800–1000</td>
<td>20–50</td>
</tr>
</tbody>
</table>

¹ Studied from the isotype A. Eig & M. Zohary s.n. (E).
² Studied from *F. Celep 1402a* (ANK).
³ Studied from the holotype *F. Celep 1232* (GAZI).
Literature Cited


Taxonomic Notes on Chinese *Saussurea* (Asteraceae, Cardueae)

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**Abstract.** Some names in Chinese *Saussurea* DC. (Asteraceae, Cardueae) are reviewed. *Saussurea tsulingensis* F. H. Chen is accepted as the taxonomically correct name, having priority over *S. sclerocephaloides* Nakai & Kitagawa. *Saussurea haoi* Y. Ling ex Y. L. Chen & S. Yun Liang shares the same type with *S. bella* Y. Ling, so *S. haoi* is an illegitimate name. *Saussurea hopeiensis* F. H. Chen described from Hopei [Hebei] is subsumed as a synonym of the more widely distributed *S. mongolica* (Franchet) Franchet. *Saussurea chowana* F. H. Chen known only from its type locality in Hopei [Hebei] is treated as a synonym of the broadly distributed *S. parviflora* (Poiret) DC. *Saussurea lanatocephala* F. H. Chen known only from Jilin is synonymized to *S. triangulata* Trautvetter & C. A. Meyer. The names *S. nematocephaloides* Y. Ling and *S. cochlearifolia* Y. L. Chen & S. Yun Liang are lectotypified.

**Key words:** Asteraceae, China, Compositae, *Saussurea*.

*Saussurea* DC. is one of the largest genera in the tribe *Cardueae* Cassini (Asteraceae); it includes approximately 400 species (Lipschitz, 1979) and represents the largest genus of Asteraceae in China. There were 264 species recorded as native to China in *Flora Reipublicae Popularis Sinicae* (Shih & Jin, 1999).

During study of the genus *Saussurea* from China, the author found some taxonomic discrepancies. Because *Flora of China* (Asteraceae) will be published in the near future, I wish to correct these problems herein. Species with new synonymies are given in the first section, whereas notes on typifications follow.

**New Synonymies**


*Saussurea chowana* has until now only been recorded from its type locality. Chen (1938: 119) originally thought it was related to "S. alata Turcz." (most likely referring to *S. alata* DC.). However, S. Liu (1996) treated *Saussurea haoi* as a synonym of *S. bella*, but he did not explain the reason, and he did not realize that the two taxa shared the same type. The holotype specimen of *S. bella* corresponds to the isotype for *S. haoi*, while the isotype of *S. bella* is the holotype of *S. haoi*. Accordingly, the name *S. haoi* is superfluous and therefore illegitimate by Article 52.1 of the *International Code of Botanical Nomenclature* (ICBN; McNeill et al., 2006).

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chowana differs from S. alata by its smaller and undivided leaves, glabrous heads, and dark, non-recurred involucral bracts. This misled Lipschitz (1979) to place this taxon incorrectly in Saussurea subgen. Theodorea (Cassini) Lipschitz, a disposition later adopted by Shih and Jin (1999). After examining the type of S. chowana, I found this taxon is in fact synonymous with S. parviflora, which belongs to the subgenus Saussurea and is common in high mountains in northern China.


Chen (1938) regarded the name Saussurea lanatocephala as related to S. sinuata and S. sinuata var. cordata F. H. Chen [= S. huangshanensis Y. Ling] by its larger heads, but S. lanatocephala differs from both S. sinuata and S. sinuata var. cordata by its leaves without sinuous margins and with truncate leaf bases, and by the yellow woolly involucral bracts. After comparing the type with other species from Jilin Province, I found that S. lanatocephala should be reduced to the synonymy of S. triangulata, which occurs in Changbaishan in China, as well as in Korea and the Russian Far East.


When Chen (1934) described Saussurea tunglingensis, he considered it related to S. gracilis Maximowicz, S. saxatilis Komarov [= S. komaroviann Lipschitz], and S. umbrosa Komarov. These taxa occur in Korea, Russia, and Japan, as well as extending into northeastern China, and are not taken here as close congeners. Saussurea tunglingensis occurs widely in Hebei, Nei Mongol, Liaoning, Heilongjiang, and Shanxi provinces of China.

Interestingly, the name Saussurea tunglingensis has never been adopted by the taxonomic community since its original publication in May 1934. Without seeing the type, Lipschitz (1979) placed the Chinese species S. tunglingensis close to S. gracilis, which occurs only in Japan, and treated this as an uncertain species. Saussurea tunglingensis was later overlooked by Shih and Jin (1999) in the Flora Reipublicae Popularis Sinicae. After examining the type of S. tunglingensis and comparing it to types for other Saussurea species from Hebei Province, I found it is conspecific with the taxon currently known as S. sclerolepis Nakai & Kitagawa, which was described from a very close locality in Hebei. The protologues of S. tunglingensis and S. sclerolepis were published in the same year, with the former on 1 May 1934 and the latter in November of 1934. According to Article 11.4 of the ICBN (McNeill et al., 2006), the nomenclaturally correct name should be S. tunglingensis.

Saussurea sclerolepis f. pinnatifidaita Nakai & Kitagawa differs from the type for the parent species by its pinnatifidate leaves, but I have found these two kinds of forms growing together in the wild. Saussurea sclerolepis f. pinnatifidaita is therefore treated as a synonym of S. tunglingensis.

NOTES ON TYPIFICATION


When Chen et al. (1981) published the name Saussurea Cochlearifolia based on Qingzang Compl. Veg. Exped. 7690A (PE), they neglected that the type specimen sheet contained two different taxa. The right-hand plant corresponds most closely with the original description and diagnosis for S. cochlearifolia. After careful study, this author concluded that the left-hand plant is not a Saussurea at all, but in fact Youngia simulatrix (Babcock) Babcock & Stebbins. According to Article 9.9 and Article 9.12 of the ICBN (McNeill et al., 2006), I designate the right-hand plant on the sheet for Qingzang Compl. Veg. Exped. 7690A as the explicit lectotype for S. cochlearifolia.

When Ling (1949) published this species, he cited three collections: K. T. Fu 2235, K. T. Fu 7941, and W. Y. Hsia 7026, without designating an unambiguous holotype. All three specimens are found in PE; K. T. Fu 2235 is selected here as the lectotype because it is the most ample specimen.

Acknowledgments. The author thanks John Pruski and Echard von Raab-Straube for their valuable comments.

Literature Cited


Novae Gesneriaceae Neotropicarum XVI: Pearcea pileifolia, a New Species of Gesneriaceae from South America

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Abstract. A new species of Gesneriaceae (tribe Gloxiniaeae) is described from Ecuador and Peru in South America. Pearcea pileifolia J. L. Clark & L. E. Skog is vegetatively distinctive from all other species of Pearcea Regel by its oblong leaf blades with crenate to serrate margins and markedly anisophyllous, opposite leaves with the smaller leaf in a pair reduced to a scalelike appendage. Observations of the bivalved fruit dehiscence and the resulting appearance of winged appendages in P. pileifolia and other congeners are discussed.

Key words: Ecuador, Gloxiniaeae, IUCN Red List, Pearcea, Peru.

The most recent treatment of the genus Pearcea Regel (Gesneriaceae) is that by Kvist and Skog (1996), who recognized 17 species, including nine new species. The description of P. pileifolia J. L. Clark & L. E. Skog makes Pearcea a genus of 18 species. It is remarkable that the presently described species occurs where extensive fieldwork has been conducted and where several other species were recently described from Ecuador by Kvist and Skog (1996). Ecuador is the most diverse country for Pearcea with 13 species, followed by Peru with seven species. Pearcea pileifolia has been collected only four times: three times in Napo Province of Ecuador and once in the Cajamarca region of Peru. Napo Province of Ecuador is the most diverse region for Pearcea with more than half of the species (10 species of 18) evident in the genus.

The monophyly of the genus Pearcea is well supported by two separate molecular-based phylogenetic analyses that focused on relationships within the Gloxiniaeae. Realson et al. (2005) included four species of Pearcea as strongly supported based on nuclear ITS data (nuclear ribosomal DNA ITS region) and chloroplast data (trnL intron and trnL-trnF intergenic spacer region). Smith et al. (2004) included two species of Pearcea as strongly supported based on nuclear markers (GUC, which is a Gesneriaceae homolog of CYCLOIDEA, ITS, and two paralogues of the nuclear-encoded chloroplast-expressed glutamine synthetase) and chloroplast markers (ndhF, trnL intron, trnL-trnF intergenic spacer region, and rpl20-rps12 intergenic spacer region).

Pearcea differs from related genera in the tribe Gloxiniaeae by the detachment of the fruit walls at the base of a dry bivalved capsule. The detachment of the fruit wall appears like a pair of winged appendages (Figs. 1G, H, 2). The fruits of all Pearcea initially dehise loculicidally and then secondarily along the base of the capsule. The walls of the dry capsule remain attached to the apex of the septum. Thus, the capsule is nearly circumscissile except for the persistence of the two septa. This type of secondary dehiscence is unknown in any other genus of the Gesneriaceae.

This distinctive fruit dehiscence of Pearcea is illustrated in P. pileifolia (Fig. 1G, H). Detached fruit walls were also recently observed and photographed in many individuals and species of Pearcea (cf., selection of some of these images in Fig. 2). Images of the fruits exist at the Clark Lab (<http://www.bama.ua.edu/~gesner>) and in the Gesneriaceae photo library at the Smithsonian Institution’s National Museum of Natural History and herbarium collections (MO, SEL, US, UNA, and elsewhere) for the following species: Pearcea abanda (Wiehler) L. P. Kvist & L. E. Skog (Fig. 2A), P. hypocyrtiflora (Hooker f.) Regel (Fig. 2B), P. purpurea (Poepigg) L. P. Kvist & L. E. Skog (Fig. 2C), P. schimpfii Mansfeld (Fig. 2D), P. sprucei (Britton) L. P. Kvist & L. E. Skog var. sprucei (Fig. 2E), and P. sprucei var. parviflora (Rushy) L. P. Kvist & L. E. Skog (Fig. 2F).

Other fruits in the Gloxiniaeae are capsules with two or four valves, but never with detached capsule walls at the base. The typical fruit in the Gloxiniaeae is a bivalved capsule, and some fruits in Kohleria Regel dehise by a single longitudinal slit on the dorsal surface (Kvist & Skog, 1992; Clark & Skog, 2008). Very few observations of the fruits in Pearcea have been documented, and only one fruit was illustrated by Kvist and Skog (1996). The few observations of the

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fruit in Kvist and Skog (1996: 7) were summarized as “…field studies showed that *Peperomia* fruits instead split from the apex all the way to the base, with two fleshy valves reflexing to expose a glutinous seed mass.” We suggest that the fruits of *Peperomia* are not persistently fleshy as in many of the capsules of Episcieae, but become dry. Seeds in the capsules of *Peperomia* are exposed on reflexed valves that may at first be fleshy, but the valves persist much longer (e.g., up to weeks) instead of hours or days as in the fleshy fruits of Episcieae (e.g., *Glossoloma* Hanstein or *Drymonia* Martius).

A distinctive feature of *Peperomia pileifolia* is the change in posture from immature to mature flowers. Immature flowers of *P. pileifolia* are appressed to the abaxial leaf surface until they mature. Upon anthesis or soon thereafter, the pedicels become erect and the flowers and subsequent fruits are held above the leaves on erect pedicels. This has also been observed in two species of Gasteranthus Bentham (G. leopardus M. Freiberg and G. wendlandianus (Hanstein) Wielr); the significance of the change in flower posture has not been explored, but it may facilitate pollination or seed dispersal.

**Peperomia pileifolia** J. L. Clark & L. E. Skog, sp. nov.  

Hacc species a congeneris laminis foliobis oblongis margine crenatris vel serratis et foliis valde amiophyllis parvis folio minore in appendicem squamiformem rectum differt.

A terrestrial subshrub; roots fibrous, stolons and scaly rhizomes absent; stems slender, basal diam. to 3 mm, erect, 40–100 cm tall, terminally branched, subwoody at base and herbaceous at apex, terete, sparsely pilose below, densely pilose to villous above. **Leaves** opposite, unequal in a pair; larger leaf with petiolo terete, 1–3 mm, green, blade membranous when dry, oblong, (2)–3–5 X 1–2 cm, base acute and occasionally asymmetrical, apex attenuate, margin crenate to serrate, adaxially pale green, sparsely pilose, abaxially uniformly green, uniformly red, or green with reddish tinge, uniformly pilose to densely pilose on veins and leaf margins; smaller leaf sessile or petiolate, petiolo terete, up to 1 mm long, blade orbicular, 0.5–2 X 1–2 mm, vestiture and coloration same as larger leaf. **Inflorescence** ephedimulaceae with solitary flowers in upper leaf axils; bracteoles absent; pedicels held below leaves when immature and becoming erect at anthesis, 2.5–3.5 cm long, densely pilose. **Floral** tube conic, 1.5–2.5 X 2–3 mm, densely pilose; calyx lobes 5, equal, erect at anthesis, persistent and reflexed in fruit, oblong-lanceolate, 3–5 X 0.5–1.5 mm wide at base, apex attenuate, margin entire, light green, outside and inside uniformly pilose; corolla 8–15 mm long, ca. 5.5 mm diam., medially, uniformly tubular with constriction at base, coronal in calyx, outside mostly red with white base, sparsely pilose, inside mostly white with red spotting, glabrous, limb with lobes subequal, reflexed, rounded, ca. 1 X 3 mm wide at base, red, margin entire; stamens 4, didynamous, included; filaments 5–6 mm, adnate to base of corolla for 1–2 mm, glabrous; anthers longer than broad, ca. 2 X 1.5 mm, dehiscing by longitudinal slits; staminode not observed; nectary of 5 separate glands evenly distributed around ovary, glabrous, all a ca. 0.25 X 0.25 mm; ovary half inferior, ca. 0.5 X 1 mm, glabrous; style and stigma not observed. **Fruit** a globose capsule, ca. 5 X 5 mm, appearing fleshy at first and then becoming dry, valves reflexed, loculicidally dehiscent, secondarily dehiscent along base with valve walls attached to septum and appearing winged; seeds numerous, subglobose, irregularly striate, ca. 0.3 X 0.3 mm, dark brown.

**Distribution and habitat.** *Peperomia pileifolia* is known from Ecuador on the eastern Andean slopes in Napo Province and the Cayambe region of Peru from 540–2020 m. The forests where *P. pileifolia* occurs have been noted on the herbarium labels as being pluvial premontane, montane wet, or tropical wet. The species is not locally common, but has been observed to be abundant along streams (J. L. Clark et al. 5672) and a ridge (J. L. Clark et al. 5308). Otherwise, extensive fieldwork throughout Napo Province between 1997 and 2000 has not resulted in documenting other populations of this rare species.

**IUCN Red List category.** *Peperomia pileifolia* should be considered Critically Endangered (CR B2b[iV]) according to IUCN Red List criteria (IUCN, 2001). Farming and human pressures on native flora are extensive along the eastern border of the Reserva Ecológica Antisana, where one of the two Ecuadorian populations is known to exist. The population in Parque Nacional Sumaco Napo-Galeras is 40–45 km east of the Reserva Ecológica Antisana and 15–20 km east of major cities (e.g., Tena). It is likely that more fieldwork in these areas will locate additional populations of *P. pileifolia*, but so far it is considered to have a very restricted range. Although the population observed by the first author was locally abundant, it is not common along most regions of the river. It is assumed that populations are limited and that the range is severely fragmented.
Phenology. *Pearcea pileifolia* has been collected in flower in April, November, and December, and collected in fruit in December only.

Etymology. The epithet *pileifolia* is derived from the appearance of the leaves, which are reminiscent of the widespread genus *Pilea* Lindley in the Urticaceae. *Pilea* is distributed throughout the tropics and temperate regions and is one of the larger genera in the Urticales and eudicot rosids. The leaves of *Pearcea pileifolia* have crenate margins and brochidodromous venation, which are features that resemble those found in *Pilea*.


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Literature Cited


Melaleuca (Myrtaceae) from Australia
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ABSTRACT. Preparation of an account of Melaleuca L. (Myrtaceae) for Flora of Australia resulted in the recognition of nine new species and three subspecies of Melaleuca. The following are newly described from Australia: from Queensland: M. hemisticta S. T. Blake ex Craven, M. lacaridis Craven, M. monitis-zamiae Craven, M. phratria Craven, M. pyramidalis Craven, M. quercina Craven, M. viminals (Solander ex Gaertner) Byrne subsp. rhododendron Craven, M. williamssii Craven subsp. fletcheri Craven; from New South Wales: M. megalogensis Craven & S. M. Douglas, M. serpenita Craven, M. williamssii subsp. synoriensis Craven; and from Queensland and New South Wales: M. sabrina Craven. The recently described Callistemon wimmerensis Marriott & G. W. Carr is transferred to Melaleuca as M. wimmerensis (Marriott & G. W. Carr) Craven.

Key words: Australia, IUCN Red List, Melaleuca, Myrtaceae, New South Wales, Queensland.

During revisionary work directed toward preparation of an account of Melaleuca L. and its closer allies for Flora of Australia, the delimitation of Callistemon R. Brown from Melaleuca was considered. The conclusion was reached that Callistemon was insufficiently distinct from Melaleuca for it to be maintained at generic rank and those species for which there was no valid name yet available in Melaleuca were formally transferred to that genus (Craven, 2006). Several undescribed taxa were identified in the course of the work and are newly described below. The recently described C. wimmerensis Marriott & G. W. Carr (Marriott & Carr, 2008) is transferred to Melaleuca.

The Callistemon group of Melaleuca is taxonomically challenging. Having studied, and considered at length, much herbarium material over the previous 10 years, supplemented with field observations, it is my belief that morphological studies alone will not permit a satisfactory taxonomy to be established. James (1958) concluded on the basis of detailed investigations into micro- and megasporogenesis that Callistemon contained both sexual and apomictic species. The sexual species he studied was M. citrina (Curtis) Dumont de Courset (as Callistemon citrinus (Curtis) Skeels), which is diploid with 2n = 22 and thus typical of most other species of Myrtaceae, and the apomictic species he considered was M. linearis Schrader & J. C. Wendland (as the C. rigida-C. linearis-C. pinifolius complex). James (1958) noted reports that indicated some populations of M. linearis may be diploid, and reported from his own observations 2n counts of 33 and 44 for this species. It seems, therefore, that a single species of this complex may contain populations that are diploid, triploid, or tetraploid. Contemporary molecular techniques permit the rapid screening of large numbers of individuals and will be of benefit in further studies of the breeding systems of this part of the genus. Detailed understanding of these breeding systems, of both the more variable and widespread (e.g., M. citrina and M. pallida (Bonpland) Craven) and the localized, relatively invariant species (e.g., M. serpenita Craven), is an imperative before a lasting, stable taxonomy can be achieved. The inclusion of putative hybrid entities such as C. forresterae Molyneux, C. genoflavius Molyneux, C. kenmorrisonii Molyneux, and others, together with the putative parental species M. citrina and M. subulata (Cheel) Craven (utilizing the relevant local populations of the latter two species), in molecular investigations will be necessary before their biological and taxonomic status can be determined. It has been reported that at least some of the putative hybrids produce uniform progeny (Molyneux, 1994, 1997). Genetic mechanisms, perhaps apomixis, may result in stabilization of hybrids that can persist in suitable ecotones.

TAXONOMIC TREATMENT


Shrub 1–6 m tall; bark papery or approaching fibrous, hard, gray; branchlets glabrescent, sericeo-lanuginosius. Leaves alternate, 42–102 × 6–28 mm, 3.5–11× as long as wide; blade sericeous to sericeo-pubescent, glabrescent, narrowly elliptic, narrowly ovate, elliptic, or rarely narrowly obovate, in transverse section transversely linear or ± oblunate, base attenuate to narrowly attenuate, apex acute or shortly acuminate, primary veins pinnate, 15 to 31 on each side of the midrib, the oil glands dense to sparse, glands distinct or obscure, often only in the proximal region or along the midrib, when distributed throughout the blade more numerous in the proximal region. Inflorescences spicate, pseudoterminal and sometimes also upper axillary or interstitial, with 10 to 50 monads, 30–45 mm wide; hypanthium glabrescent, 2.9–3.9 mm; calyx lobes abaxially hairy (usually with cilia on the margin only), 1.2–1.6 mm, scarious in a marginal band 0.4–0.5 mm wide or herbaceous to the margin; petals deciduous, 3.4–5.4 mm; stamens free, 35 to 53 per flower; filaments red or reddish pink, 16–17 mm; anthers yellow; style 17–24 mm; ovules ca. 100 to 200 per locule. Fruit 4.5–2 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free, antesealpal, triangular processes; seed with obvolute cotyledons.

**Distribution, ecology, and phenology.** In Australia, this species occurs in the Bowen-Bundaberg District and adjacent islands of Queensland. It has been recorded to occur in shrubland, rainforest margins, shrubby low open forest, the edge of riverine rainforest, *Lophostemon* Schott scrub, cliff tops, a creek bed with small boulders, a rocky hillside beside creek above mangrove, shrub community at base of rock face, windswept heathland, and on rhyolite, granite, trachyte, and brown stony soil. The species flowers from March to September.

**IUCN Red List category.** *Melaleuca hemisticta* can be regarded as of Least Concern (LC) according to the IUCN Red List categories and criteria (IUCN, 2001) as it is a widespread species.

**Etymology.** The specific epithet is derived from the Greek, “hemi-,” meaning “half,” and “stictos,” meaning “spotted,” in reference to the distribution of the oil glands within the leaf lamina.

**Notes.** The species is given the unpublished specific epithet coined by S. T. Blake and described as new in preference to raising *Callistemon salignus* var. *roseus* to specific rank, because the epithet *roseus* is not diagnostic for the *Callistemon* group. The relative distribution of leaf oil glands, i.e., being only or more numerous in the proximal third of the blade, is diagnostic for this species and the epithet *hemisticta* reflects this.

*Melaleuca hemisticta* resembles *M. cirtina*, but *M. cirtina* differs in having papery bark on the main stems (vs. fissured and hard in *M. hemisticta*), branchlet indumentum that is velutinulous or sericeo-pubescent (vs. sericeo-lanuginosius in *M. hemisticta*), uniformly distributed oil glands in the leaf blades (vs. oil glands often only in the proximal region or along midrib in *M. hemisticta*), and purple to dark reddish anthers (vs. yellow anthers in *M. hemisticta*).

**Paratypes.** AUSTRALIA. QUEENSLAND: Whitsunday Island, C. Warrie 228 (BRI); Blackwood Natl. Park, P. Thompson 41 (BRI); near Mangrove Beach, Shaw Island, G. N. Batianoff & C. Dallison 3124 (BRI); 300 m S of Mt. Bertha, Gloucester Island, G. N. Batianoff, H. A. Dillewaard & J. Lind 9403307 (AD, BRI, CANB, DNA); Shoebatey Bay (Passage 3), strait S of Townshend Island, 26 Aug. 1802, R. Brown s.n. (CANB, NSW); summit area of Mt. Stanley, Mt. Stanley Nat. Park, Many Peaks Range, P. R. Forster 10273 (CANB); Ropers Peak, Peak Range, P. R. Forster 7208 (CANB, MEL, NSW, PERTH); E slopes, Mt. Castlewood Natl. Park, Many Peaks Range, P. R. Forster 16333 (CANB); Mt. Walsh, near Biggenden, L. A. Craven & J. A. Matarczyk 9963 (CANB).


Shrub 1–4 m tall; bark fibrous, hard; branchlets glabrescent, lanuginulius to sericeo-pubescent. Leaves alternate, 43–119 × 4.5–17 mm, 7–17× as long as wide; blade sericeous, glabrescent, narrowly elliptie, narrowly ovate, very narrowly ovate, or very narrowly elliptic, in transverse section transversely linear, sublunate, or ± oblunate, base narrowly attenuate or narrowly cuneate, apex acute, primary veins pinnate, 9 to 29 on each side of the midrib, oil glands dense or moderately dense, distinct. Inflorescences spicate, pseudoterminal or interstitial, with 25 to 60 monads, 35–60 mm wide; hypanthium glabrescent or hairy, 3.8–4.7 mm; calyx lobes abaxially hairy or glabrescent, 1.4–2 mm, scarious in a marginal band 0.4–0.9 mm wide; petals deciduous, 4.5–6.5 mm; stamens free, 48 to 59 per flower; filaments red, pink,
or mauve, 17–23 mm; anthers yellow; style 24–29 mm; ovules ca. 150 to 300 per locule. Fruit 4.5–5.7 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free, antescapalous, triangular processes; seed with ovulate cotyledons.

Distribution, ecology, and phenology. Within Australia, *Melaleuca lazaridis* occurs only in the Blackdown Tableland District of Queensland. Here, it has been reported to occur in open forest, on the top edge of an escarpment, along creek beds, on pale brown sandy loam, on skeletal sand over sandstone, on weathered sandstone, and on gravelly orange-brown sandy loam. The species has been collected in flower in June, August, and September.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is appropriate for *Melaleuca lazaridis*, because it is restricted to the Blackdown Tableland region of Queensland. However, because much of the Blackdown Tableland region is incorporated in a national park, its continued survival is not likely to be threatened.

Etymology. The specific epithet honors Michael Lazarides (1928–), whose collections of plants made over four decades during CSIRO’s northern Australian land resources surveys have contributed significantly to our knowledge of the flora of the region.

Notes. *Melaleuca lazaridis* apparently is related to *M. citrina* and *M. hemisticta* and is distinguished from them by the following combinations of character states: *M. lazaridis*: bark of main stems fibrous, branchlet indumentum lanuginosus or sericeous-pubescent, oil glands equally distributed across the leaf blade and equally distinguishable on each surface of the leaf, inflorescence up to 60 mm wide, hypanthium sericeous, calyx lobes free, anthers yellow, and cotyledons about half as long as the embryo. The corresponding states in *M. citrina* are: bark papery, branchlet indumentum pubescent or sericeous-pubescent, oil glands equally distributed across leaf blade and equally distinguishable on each surface of the leaf, inflorescence up to 70 mm wide, hypanthium sericeous-pubescent, calyx lobes free or connate at the base, anthers purple to dark red, and cotyledons about one third as long as the embryo; and in *M. hemisticta*: bark fissured and hard, branchlet indumentum sericeous-lanuginosus, oil glands not equally distributed across the leaf blade (see above) and more visible on the abaxial surface of the blade than on the adaxial surface, inflorescence up to 45 mm wide, hypanthium sericeous-pubescent, calyx lobes connate at the base, anthers yellow, and cotyledons about half to one third as long as the embryo.

Paratypes. AUSTRALIA. **Queensland**: Blackdown Tableland, 3.4 km SW of Horseshoe Lookout turnoff on main rd., B. J. Leschi & A. V. Slev 1193 (BRI, CANB); a few hundred meters from Stony Creek Falls lookout along walking track, L. A. Craven & J. A. Matarczyk 9990 (BRI, CANB); ca. 6 km W from Forestry camp area on Mimosa Creek, K. A. W. Williams 74033 (BRI).


A *Melaleuca citrina* (Curtis) Dumont de Courset ramiulis sericeis, hypanthio breviore (3.3–3.5 mm longo), staminibus brevioribus (9.5–14 mm longis) et cotyledonibus concavo-convexis distincti.

Shrub to 5 m tall; bark subpubery, medium soft, flaking or peeling; branchlets glabrescent, sericeous. Leaves alternate, 35–55 × 3.5–5 mm, 8.8–12.5× as long as wide; blade sericeous, glabrescent, narrowly elliptic to narrowly obovate, in transverse section transversely linear (and usually thickened at the margin and midrib), base narrowly cuneate, apex narrowly acute to narrowly acuminate, primary veins pinnae, ca. 15 to 24 on each side of the midrib, oil glands moderately dense, distributed throughout the lamina, distinct or obscure. Inflorescences spicate, pseudoterminal, with 25 to 60 monads, 30–40 mm wide; hypanthium hairy, 3.3–3.5 mm; calyx lobes abaxially glabrescent, 1.7–2 mm, scarious in a marginal band ca. 0.5–0.7 mm wide; petals deciduous, 3.3–3.7 mm; stamens free, ca. 45 to 50 per flower; filaments magenta-pink, 9.5–14 mm; anthers dark red; style 17–19 mm; ovules numerous. Fruit ca. 6 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free antescapalous triangular processes; seed with concavo-convex cotyledons.

Distribution, ecology, and phenology. *Melaleuca megalongensis* is known to occur only in Mealong Valley in New South Wales, Australia. Here, it occurs on a spring-fed (and winter wet) flat with *Lomandra* Labillardièrei, surrounded by open eucalyptus forest with *Leptospermum* J. R. Forster & G. Forster, *Hakea* Schrader, and *Acacia* Miller growing mainly in the interzone between the flat and the forest. It flowers in November and December.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable
(VU) is appropriate for *Melaleuca megalongensis* because it is restricted to Megalong Valley in New South Wales, where it occurs in small, scattered populations.

**Etymology.** The specific epithet is derived from the locality, Megalong Valley.

**Notes.** *Melaleuca megalongensis* is apparently closely related to *M. citrina*. The two species differ in the following features: branchlet indument (sericeous in *M. megalongensis* vs. velutinous or sericeous-pubescent with sparse over-topping velutinous hairs in *M. citrina*), inflorescence width (30–40 mm in *M. megalongensis* vs. 45–70 mm in *M. citrina*), hypanthium length (3.3–3.5 mm in *M. megalongensis* vs. 3.8–5.4 mm in *M. citrina*), petal length (3.3–3.7 mm in *M. megalongensis* vs. 3.9–5.8 mm in *M. citrina*), stamen length (9.5–14 mm in *M. megalongensis* vs. 17–25 mm in *M. citrina*), style length (17–19 mm in *M. megalongensis* vs. 23–31 mm in *M. citrina*), and cotyledon orientation (concavo-convex in *M. megalongensis* vs. obsolete in *M. citrina*).

4. *Melaleuca montis-zamiae* Craven, sp. nov.  
**TYPE:** Australia. Queensland: upstream from Freds Gorge, Mt. Ziaia Environ. Park, ca. 3.5 km NW of Springsure, 16 Oct. 1993, B. J. Lepschi & A. V. S. Beeh 1186 (holotype, CANB; isotypes, A, BRI, L, MEL, NSW).

A *Melaleuca citrina* (Curtis) Dumont de Courset corice fibrosa, ramulis sericeis, hypanthio breviore (3–3.4 mm longo) et antheris latis differt.

Shrub or tree 2.5–4 m tall; bark fibrous; branchlets glabrescent, sericeous. Leaves alternate, 37–92 × 2.5–9 mm, 9.5–15× as long as wide, petiolar blade sericeous, glabrescent, very narrowly elliptic, to narrowly ovate or narrowly elliptic, in transverse section transversely linear or subulate, base very narrowly attenuate or narrowly cuneate, apex acute or shortly acuminate, primary veins pinnate, 18 to 27 on each side of the midrib, oil glands dense or moderately scattered, distinct. Inflorescences spicate, pseudoterminal or interstitial, with 10 to 40 monads, 30–45 mm wide; hypanthium glabrous or hairy, 3–3.4 mm; calyx lobes abaxially hairy or glabrescent, 1–1.3 mm, scarious in a marginal band ca. 0.3 mm wide or herbaceous to the margin; petals deciduous, 3.1–4.7 mm; stamens free, 40 to 58 per flower; filaments red, 14–17 mm; anthers yellow; style 12–20 mm; ovules ca. 200 per locule. Fruit 3.4–4.9 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free anteseepalous triangular processes; seed with obsolete cotyledons.

**Distribution, ecology, and phenology.** In Australia, *Melaleuca montis-zamiae* occurs in the Springsure District of Queensland, where it has been collected in riparian scrub, on a cliff top, and along an ephemeral watercourse. It flowers in August and September.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is appropriate for *Melaleuca montis-zamiae*, because it is restricted to the Mt. Ziaia region of Queensland. Further research is required to determine if the species occurs elsewhere in the Springsure area.

**Etymology.** The specific epithet is derived from the locality Mt. Ziaia (from the Latin “mons,” meaning “mountain,” and Ziaia, a genus of plant).

**Notes.** This species is distinguished from *Melaleuca citrina* in the following characteristic states: bark texture (fibrous in *M. montis-zamiae* vs. papery in *M. citrina*), branchlet indument (sericeous in *M. montis-zamiae* vs. velutinous or sericeous-pubescent with sparse over-topping velutinous hairs in *M. citrina*), inflorescence rachis indument (sericeous or sericeous-pubescent in *M. montis-zamiae* vs. pubescent or lanuginous-pubescent in *M. citrina*), inflorescence width (30–45 mm in *M. montis-zamiae* vs. 45–70 mm in *M. citrina*), hypanthium length (3–3.4 mm in *M. montis-zamiae* vs. 3.8–5.4 mm in *M. citrina*), anther color (yellow in *M. montis-zamiae* vs. purple to dark red in *M. citrina*), style length (12–20 mm in *M. megalongensis* vs. 23–31 mm in *M. citrina*).


5. *Melaleuca phratra* Craven, sp. nov.  
**TYPE:** Australia. Queensland: Wilgavale, S headwaters of Little Plain Creek, 1.5 km S of State Forest 176, near Texas, 9 Jan. 1993, P. I. Forster & D. Halford 12693 (holotype, BRI; isotype, CANB).

A *Melaleuca paludicola* Craven ramulis pubescentibus vel lanuginos-pubescentibus, et lamina foliari trichomatibus semper sericeis et antheris latis differt.

Shrub or tree 2–10 m tall; bark fissured, grayish brown or black; branchlets glabrescent, pubescent to lanuginous-pubescent. Leaves alternate, 22–57 × 1.2–5 mm, 10–30× as long as wide; blade sericeous, glabrescent, narrowly elliptic, in transverse section transversely linear or subulate, base narrowly attenuate or narrowly cuneate, apex acute or shortly acuminate, primary veins pinnate, 13 to 24 on each side of the midrib, oil glands not seen. Inflorescences spicate, pseudoterminal or interstitial, with 10 to 30.
Table 1. Morphological characters distinguishing *Melaleuca paludicola*, *M. phrastra*, *M. quercina*, and *M. sabrina*.

<table>
<thead>
<tr>
<th>Character</th>
<th><em>M. paludicola</em></th>
<th><em>M. phrastra</em></th>
<th><em>M. quercina</em></th>
<th><em>M. sabrina</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Branchlet indumentum</td>
<td>hispidulous or strigose</td>
<td>pubescent or lamuginous-pubescent</td>
<td>lamuginous</td>
<td>pubescent</td>
</tr>
<tr>
<td>Leaf blade indumentum</td>
<td>lamuginous or sericeous</td>
<td>sericeous</td>
<td>sericeous</td>
<td>pubescent to sericeous-pubescent</td>
</tr>
<tr>
<td>Calyx lobe indumentum</td>
<td>sericeous-pubescent</td>
<td>sericeous-pubescent</td>
<td>sericeous-pubescent</td>
<td>lamuginous</td>
</tr>
<tr>
<td>Stamen length (mm)</td>
<td>7–11</td>
<td>7–11</td>
<td>10–14</td>
<td>17–24</td>
</tr>
<tr>
<td>Staminial filament color</td>
<td>cream, yellow, or pink</td>
<td>cream, yellow, or pink</td>
<td>cream, yellow, or pink</td>
<td>red</td>
</tr>
<tr>
<td>Anther color</td>
<td>pink</td>
<td>yellow</td>
<td>yellow</td>
<td>yellow</td>
</tr>
<tr>
<td>Style length (mm)</td>
<td>10–15</td>
<td>12–15</td>
<td>12–13</td>
<td>20–26</td>
</tr>
<tr>
<td>Cotyledons (times as long as the embryo)</td>
<td>ca. 1/2</td>
<td>ca. 1/3</td>
<td>ca. 1/2</td>
<td>ca. 1/3</td>
</tr>
</tbody>
</table>

monads, 25–30 mm wide; hypanthium hairy or glabrescent, 1.7–2.8 mm; calyx lobes abaxially hairy or glabrescent (sometimes with cilia on the margin only), 0.5–1.2 mm, herbaceous to the margin; petals deciduous, 2–3.8 mm; stamens free, 47 to 72 per flower; filaments pinkish red, pink, or creamy pale pink, 7–11 mm; anthers yellow; style 12–15 mm; ovules ca. 100 to 150 per locule. Fruit 3.1–3.7 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free anteseopalous triangular processes; seed with obsolete cotyledons.

**Distribution, ecology, and phenology.** In Australia, *Melaleuca phrastra* occurs in the Injune and Texas districts of Queensland, where it has been recorded as occurring in shrubland on creek banks and on limestone. The species flowers from November to February.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the category Data Deficient (DD) is appropriate for *Melaleuca phrastra*, because, despite its occurrence across a relatively wide area, the size and conservation status of the several populations are unknown. It may be that the category Vulnerable (VU) would be more appropriate.

**Etymology.** The specific epithet refers to the group of species in southeastern Queensland and northeastern New South Wales that putatively are closely related to *Melaleuca paludicola* Craven, i.e., *M. phrastra*, *M. quercina* Craven, and *M. sabrina* Craven (from the Greek, “phrastra,” meaning “clan” or “brotherhood”).

**Notes.** *Melaleuca phrastra*, *M. quercina*, and *M. sabrina* appear to be very closely related to *M. paludicola*, a widespread species that occurs in South Australia, Victoria, New South Wales, and the extreme south of Queensland. The four species can be distinguished by the respective combinations of character states listed in Table 1.

**Paratypes.** AUSTRALIA. QUEENSLAND: Injune, in creek at rd. crossing to Taroom, R. D. Spencer 95 (BRI, MEL); Littl Plains Creek, 25 km SE of Texas, L. Polley A7402 (BRI, CANB, NSW); Western Creek Forestry, W of Millmerran, Mar. 1978, H. Horton s.n. (BRI, NSW); jet. of Dogwood Creek & Condamine River, ca. 48 km WSW of Condamine, 18 Jan. 1970, K. Emmerson s.n. (BRI); Charley Creek, Chinchilla, 16 Mar. 1963, K. Emmerson s.n. (BRI).

6. **Melaleuca pyramidalis** Craven, sp. nov. **TYPE:**

**Australia. Queensland:** top of Walshs Pyramid, near Gordonvale, 29 July 1993, P. I. Forster 13767 (holotype, BRI; isotypes, CANB, MEL, QRS).

A *Melaleuca citrina* (Curtis) Dumont de Coursert glandulias laminae foliaris obscurs, hypanthio sericeo brevior (2.2–3.6 mm longo) et antheris luteis differt.

Shrub or tree 1.5–3.5 m tall; bark papery, compact, dark gray; branchlets glabrescent, sericeous or sericeous-pubescent (and then with a sparse layer of long hairs overlying a dense layer of shorter hairs). Leaves alternate, 29–84 × 8–24 mm, 3–4.5 × as long as wide; blade sericeous or sericeous-pubescent, glabrescent, narrowly elliptic, narrowly obovate, or elliptic, in transverse section transversely linear, base attenuate to narrowly attenuate, apex obtusely shortly acuminate, shortly acuminate, or acute, primary veins pinnate, 15 to 28 on each side of the midrib, oil glands sparse, obscure. Inflorescences spicate, interstitial, with 20 to 50 monads, 40–60 mm wide; hypanthium hairy or rarely glabrous, 2.2–3.6 mm; calyx lobes abaxially hairy (sometimes with cilia on the margin only), 1–2.3 mm, scarious in a marginal band 0.2–0.4 mm wide or herbaceous to the margin; petals deciduous, 2.8–6.3 mm; stamens free, 35 to 42 per flower; filaments red or pink, 15–24 mm; anthers yellow; style 16–32 mm; ovules ca. 120 to 160 per locule. Fruit 3.8–5 mm, calyx lobes weathering away; inner distal wall of staminophore with reflexed, free
antesepalus ± square processes; seed with obvolute cotyledons.

**Distribution, ecology, and phenology.** In Australia, *Melaleuca pyramidalis* occurs in the Gordonvale–Ingham region of Queensland, where it has been recorded as growing in open forest, along a creek, on rocky slopes and hilltops, rarely in [freshwater] mangrove swamp, on granite, and in sandy humus soil. The species has been collected in flower in July and August.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is appropriate for *Melaleuca pyramidalis*, because presently it is known from few localities and some of these are elevated sites that in the future could be subject to changed land use (e.g., building developments), whereas at present they effectively are undisturbed.

**Etymology.** The specific epithet is derived from the locality, Walshs Pyramid.

**Notes.** *Melaleuca pyramidalis* putatively is closely related to *M. citrina*, and the two species can be distinguished by the following character states: leaf oil glands (obscure in *M. pyramidalis* vs. distinctly visible in *M. citrina*), hypanthium indumentum (sericous in *M. pyramidalis* vs. sericous-pubescent in *M. citrina*), hypanthium length (2.2–3.6 mm in *M. pyramidalis* vs. 3.8–5.4 mm in *M. citrina*), anther color (yellow in *M. pyramidalis* vs. purple to dark red in *M. citrina*), and cotyledon length (ca. 1/2 as long as the embryo in *M. pyramidalis* vs. ca. 1/3 as long as the embryo in *M. citrina*).

**Paratypes.** AUSTRALIA. Queensland: summit of Walshs Pyramid, H. Flesher s.n. [QNC 5056] (BRI, QRS); ca. 16 km N of Ingham, R. Smith 1 (BRI); Hinchinbrook Island, NE slope of Mt. Diamantina, S. T. Blake 18859 (BRI).


A *Melaleuca paludicola* Craven ramulis lanuginosis et antheris luteis differt.

**Tree** 6–10 m tall; bark corky, dark; branchlets glabrescent, lanuginous. Leaves alternate, 23–74 × 3.5–12 mm, 4.7–9× as long as wide; blade sericeous, glabrescent, narrowly elliptic or elliptic, in transverse section transversely linear, subululate, or obovulmate, base narrowly attenuate, apex shortly acuminate or acute, primary veins pinnate, 11 to 20 on each side of the midrib. Inflorescences spicate, interstitial or pseudodeterminate, with 15 to 40 monads, 25–30 mm wide; hypanthium glabrescent or glabrous, 2.5–3.2 mm; calyx lobes abaxially hairy (sometimes with cilia on the margin only), 1–1.3 mm, herbaceous to the margin; petals deciduous, 3.1–4.4 mm; stamens free, 70 to 94 per flower; filaments pink, cream, or pale yellow, 10–14 mm; anthers yellow; style 12–13 mm; ovules ca. 110 to 150 per locule. Fruit 3–5.3 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free antesepalus triangular processes; seed with obvolute cotyledons.

**Distribution, ecology, and phenology.** *Melaleuca quercina* occurs in the Dalby–Oakey District of Queensland, Australia. There, it grows along the flats and banks of creeks and rivers, on blackish brown clay. It has been collected in flower in October, December, and February.

**IUCN Red List category.** According to IUCN Red List criteria (IUCN, 2001), the category Data Deficient (DD) is applicable to *Melaleuca quercina*. Presently it is known only from the Oakey Creek and Clifton areas of Queensland, and both of these are in agricultural country. With further field investigations, the category Near Threatened (NT) may be more appropriate.

**Etymology.** The specific epithet is derived from *Quercus* L. (oak) in reference to the locality Oakey Creek. It is noted that the term “oak” in Australia commonly, but not exclusively, is applied to plants of the genus *Casuarina* L. (In the common names of *Casuarina* species, the term apparently is to be spelled “oke” as in buloke.)

**Notes.** The differences between this species and its putative relatives, *Melaleuca paludicola*, *M. phratreata*, and *M. sabrina*, are given in Table 1.

**Paratypes.** AUSTRALIA. Queensland: Oakey Creek crossing on rd. to Brookvale Park, ca. 7 km W of Oakey, B. J. Lepschi & A. V. S. Lee 1330 (BRI, CANB); Oakey Creek, near Brookvale Park, also where rd. from Jondaryan crosses Oakey Creek, P. F. Lamley 1132 (CANB, MEL); Aides Bridge, Kings Creek, 4 km W of Clifton, B. J. Lepschi & A. V. S. Lee 1332 (BRI, CANB).


A *Melaleuca paludicola* Craven lamina foliari pubescente vel sericeo-pubescente, lobis calycinis lanuginosis, staminibus longioribus (17–24 mm longis) filamentis rubris antheris luteis et stylo longiore differt.
Shrub or tree 1–4 m tall; bark fibrous; branchlets glabrescent, pubescent. Leaves alternate, 10–59 × 1–3.5 mm, 8–27× as long as wide; blade pubescent to sericeous-pubescent, glabrescent, narrowly elliptic, narrowly obovate, linear-elliptic, or linear-obovate, in transverse section transversely linear, subulate, or suboblongate, base narrowly attenuate, narrowly cuneate, or parallel (blade width equals petiole width), apex shortly acuminate or acute, primary veins pinnate, 9 to 17 on each side of the midrib. Inflorescences spicate, interstitial or pseudoterminal, with 5 to 25 monads, 30–50 mm wide; hypanthium hairy, 2.6–3.5 mm; calyx lobes abaxially hairy, 1.1–1.9 mm, herbeaceous to the margin or scarious in a marginal band 0.2–0.3 mm wide; petals deciduous, 3.2–5.3 mm; stamens free, 49 to 73 per flower; filaments red, 17–24 mm; anthers yellow; style 20–26 mm; ovules ca. 100 to 200 per locule. Fruit 3.5–3.8 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free anteseapalous triangular processes; seed with obvolute cotyledons.

Distribution, ecology, and phenology. Melaleuca sabrina occurs in Australia in the Stanthorpe District of Queensland and the Tenterfield District of New South Wales. The species has been recorded as occurring on a floodplain in granite sand among boulders, and on alluvial stream banks. It flowers from October to January and in March.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Data Deficient (DD) is applicable to Melaleuca sabrina. The species does occur in agricultural country, but the present pattern of land use is unlikely to lead to severe degradation of its riverine habitat to the extent that its continued survival is of concern. However, with further field investigations the category Near Threatened (NT) or Vulnerable (VU) may be more appropriate.

Etymology. The specific epithet refers to the Latin name of the river nymph, Sabrina, who according to Celtic mythology was believed to dwell in, and be one with, the Severn River in the United Kingdom. It seems appropriate to me that this riverine species of Melaleuca is given an epithet so strongly associated with the river that presumably prompted the naming of the Australian stream.

Notes. Melaleuca sabrina is an attractive plant in flower. In its morphology it seems to be very closely related to M. paludicola, but it is strikingly distinct in its longer stamens with red filaments. The differences between the two species are given in Table 1.

Paratypes. AUSTRALIA. Queensland: Granite Creek betw. Warwick & Stanthorpe, Oct. 1967, W. T. Jones s.n. (CANB); Pikes Crossing, Goldfields, Stanthorpe, 9 March 1968, G. Traganell s.n. (BRI, CANB); Coochy Creek, Coochy Station on Warwick-Stanthorpe Rd., 9 March 1968, G. Traganell s.n. (BRI). New South Wales: on the side of a small creek, ca. 16 km past the Summit Border Gate, on rd. to Maryvale, J. C. Mowre 45 (BRI); Maryland River crossing on the Wylie Creek Rd., P. G. Wilson & R. Rowe 1310 (CANB, NSW).


A Melaleuca citrina (Curtis) Dumont de Courset filamentis staminaliis pallidis (luteis vel cremeo-viridibus), antheris luteis, et stylro breviore (11–18 mm longo) different.

Shrub 2.5–4 m tall; bark hard and papery, flaking; branchlets glabrescent, sericeous. Leaves alternate, 21–53 × 2–5 mm, 7.5–15× as long as wide; blade sericeous to pubescent, glabrescent, linear-obovate, narrowly obovate, or narrowly elliptic, in transverse section suboblongate or transversely linear, base narrowly cuneate, apex acute or shortly acuminate, primary veins longitudinal-pinnate, oil glands moderately dense or dense, distinct. Inflorescences spicate, pseudoterminal and sometimes also upper axillary, with 15 to 35 monads, 30–40 mm wide; hypanthium hairy, 3–4 mm; calyx lobes abaxially hairy or glabrescent, 0.9–1.8 mm, scarious in a marginal band 0.4–0.7 mm wide; petals deciduous, 2.2–4 mm; stamens free, 37 to 51 per flower; filaments yellow or cream-green, 9–17 mm; anthers yellow; style 11–18 mm; ovules ca. 200 to 300 per locule. Fruit 4.2–4.6 mm, calyx lobes abaxially deciduous; inner distal wall of staminophore without reflexed, free anteseapalous triangular processes; seed with obvolute cotyledons.

Distribution, ecology, and phenology. This species occurs in Australia in the Barraba District of New South Wales. Here, it grows in grassy, gully woodlands on serpentine soils. Melaleuca serpentina has been collected in flower in April, October, and December.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is applicable to Melaleuca serpentina, as its populations are believed to be small and there is a possibility that pasture improvement or renewed mining-associated activities could seriously reduce the size of, or even eliminate, some of its populations.
Etymology. The specific epithet refers to the apparent restriction of this plant to serpentine soils.

Notes. *Melaleuca serpentina* putatively is closely related to *M. citrina*, and the two species may be distinguished by the following character states: branchlet indumentum (sericose in *M. serpentina* vs. velutinous or sericeous-pubescent in *M. citrina*), orientation of primary veins relative to the midrib (longitudinal-pinnate in *M. serpentina* vs. pinnate in *M. citrina*), length of staminal filaments (9–17 mm in *M. serpentina* vs. 17–25 mm in *M. citrina*), color of staminal filaments (yellow or cream-green in *M. serpentina* vs. red or mauve in *M. citrina*), anther color (yellow in *M. serpentina* vs. purple to dark red in *M. citrina*), and style length (11–18 mm in *M. serpentina* vs. 23–31 mm in *M. citrina*).

Paratypes. AUSTRALIA. New South Wales: 1 km S of Woodsreef mine tailings, J. R. Hosking 494 (CANB, NE); gully below King Solomon Mine, W of Woodsreef, J. R., T. L. & G. R. Hosking 1580 (CANB); 8 km S of Upper Bingara, alongside Upper Bingara Rd., J. R. Hosking 1621 (CANB); Ironbank Creek, Barraba, Sep. 1929, H. M. Rupp s.n. (NSW).


A *Melaleuca viminalis* (Solander ex Gaertn.) Byrnes subsp. *viminalis* habitus arboris unicaulis usque ad 35 m altae et hypanthio breviori (1.8–2.8 mm longo) differt.

Tree to 35 m tall, single-stemmed; bark hard, persistent; branchlets glabrescent, long pubescent. Leaves alternate, 25–60 × 2–6 mm, 8–12× as long as wide; blade pubescent, glabrescent, narrowly elliptic, in transverse section transversely linear, base attenuate, apex acuminate to narrowly acute, primary veins pinnate, numerous, oil glands moderately dense. Inflorescence spicate, pseudoterminal or with a leafy axis distal to the inflorescence, with 10 to 30 monads, 30–47 mm wide; hypanthium hairy, 1.8–2.8 mm; calyx lobes abaxially hairy, 1.1–1.8 mm, scarious in a narrow marginal band 0.3–0.8 mm wide; petals deciduous, 4–5 mm; stamens connate proximally into 5 bundles and falling as a single unit, 9 to 12 per bundle, red, 12–21 mm, the bundle claw 1.1–2 mm, 0.05–0.07× as long as the filaments; anthers purple to maroon; style 15–21 mm; ovules ca. 100 to 125 per locule. Fruit 3–5.4 mm, calyx lobes weathering away; seed not seen.

Distribution and ecology. This subspecies occurs in the Injune District of Queensland, Australia. The only population known occurs along a creek bank in basalt soil.

*ICUN Red List category*. According to *ICUN Red List criteria* (ICUN, 2001), the category Vulnerable (VU) is applicable to *Melaleuca viminalis* subsp. *rhododendron*, as it is known from a single population of unknown size. Further field investigations are needed to determine if any other populations or subpopulations exist.

Etymology. The subspecific epithet is a compound noun in apposition derived from the Greek “rhodon,” meaning “rose” or “rose-colored,” and “dendron,” meaning “tree,” in reference to the staminal filament color and habit of the plant.

Note. This species is distinguished from the more common, multi-stemmed form of *Melaleuca viminalis* on the basis of its habit. Forming a single-stemmed, large tree, it is a remarkable plant, and it is speculated that this may represent an ancestral morph of the species, i.e., the common, multi-stemmed rheophyte, *M. viminalis* subsp. *viminalis*. It is anticipated that this plant may be useful as a tree for urban parks and street plantings in suitable climates, and its potential as a plantation tree for timber needs consideration also.

Paratype. AUSTRALIA. Queensland: Mt. Hutton, W of Injune, J. Larmour 2170 (CANB).


11b. *Melaleuca williamsii* subsp. *fletcheri* Craven, subsp. nov. TYPE: Australia. Queensland: Broadwater Creek, where crossed by rd. from The Summit, 5 km beyond turnoff to Jollies Falls, ca. 10 km N of Stanthorpe, 19 Nov. 1983, P. F. Lumley 1120 (holotype, MEL; isotypes, BRI, CANB).
Table 2. Morphological characters distinguishing *Melaleuca williamsii* subsp. *williamsii*, *M. williamsii* subsp. *fletcheri*, and *M. williamsii* subsp. *synoriensis*.

<table>
<thead>
<tr>
<th>Character</th>
<th>subsp. <em>williamsii</em></th>
<th>subsp. <em>fletcheri</em></th>
<th>subsp. <em>synoriensis</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bark texture</td>
<td>papery</td>
<td>fibrous</td>
<td>—</td>
</tr>
<tr>
<td>Leaf blade indumentum</td>
<td>lanuginous</td>
<td>sericeous</td>
<td>sericeous or velutinous</td>
</tr>
<tr>
<td>Hypanthon indumentum</td>
<td>sericeous</td>
<td>sericeous</td>
<td>sericeous-pubescent</td>
</tr>
<tr>
<td>Staminal filament color</td>
<td>red or purple</td>
<td>white, pink, or mauve</td>
<td>pink, red, or purple</td>
</tr>
<tr>
<td>Cotyledon (appearance in</td>
<td>obvolute</td>
<td>plano-convex or</td>
<td>concavo-convex</td>
</tr>
<tr>
<td>transverse section)</td>
<td></td>
<td>concavo-convex</td>
<td></td>
</tr>
</tbody>
</table>

A *Melaleuca williamsii* Craven subsp. *williamsii* cortex fibrosum, lamina foliari sericea, filamentis albis roseis vel malvinis et cotyledonibus planoconvexus vel concavoconvexus differt.

Shrub to 4 m tall; bark flaking or persistent, fibrous, hard; branchlets hairy to glabrous, sericeous with some longer spreading or spreading-ascending, sericeous-pubescent hairs, or lanuginous with some spreading-ascending or ascending sericeous-pubescent hairs, or pubescent with spreading hairs of variable lengths. Leaves alternate, 20–68 × 4–14 mm, 3.1–8.8 × as long as wide; blade sericeous or glabrous, occasionally with a few spreading-ascending or ascending hairs, narrowly obovate, narrowly elliptic, elliptic, or obovate, in transverse section transversely linear or subulate, base narrowly attenuate or narrowly cuneate, apex shortly acuminate, acuminate, or acute, primary veins pinnate or longitudinal-pinnate, when pinnate 8 to 14 on each side of the midrib, oil glands dense or moderately dense, distinct. Inflorescences spicate, pseudoterminal, with 15 to 45 monads, 30–45 mm wide; hypanthon hairy or glabrescent, 3.1–4.3 mm; calyx lobes abaxially hairy or glabrescent, 1.6–2.1 mm, scarious in a marginal band 0.8–0.9 mm wide or scarious throughout; petals deciduous, 2.1–5.8 mm, margin ciliate; oil glands circular or subcircular; stamens free, 35 to 48 per flower; filaments white or mauve-pink, 9–19 mm; anthers purple or maroon; style 13–23 mm; ovules ca. 100 to 150 per locule. Fruit 4.4–6.6 mm, calyx lobes deciduous; inner distal wall of staminal column without reflexed, free anteseopalous triangular processes; seed with plano-convex or concavo-convex cotyledons.

Distribution, ecology, and phenology. *Melaleuca williamsii* subsp. *fletcheri* occurs in the Stanthorpe District of Queensland, Australia. It has been recorded as growing in riparian woodland/shrubland and in crevices of small granite outcrops, and as flowering in November.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is applicable to this plant, as it is known only from the Stanthorpe region of Queensland. As with *Melaleuca subrina*, *M. williamsii* subsp. *fletcheri* does occur in agricultural country, but the present pattern of land use is unlikely to lead to severe degradation of its habitat to the extent that its continued survival is of concern. However, further field investigations are required.

Etymology. This taxon is named in honor of Mervyn P. Fletcher (1901–1982), who collected many interesting and unusual plants in the Ballandeane District, including *Homoranthus montanus* Craven & S. R. Jones. Fletcher lived from 1950 until his death in his 1948 Commer Utility, mainly on the banks of the Severn River, and was an advocate in the Stanthorpe District for the conservation of nature.

Notes. The differences between this taxon and subspecies *williamsii* and *synoriensis* are given in Table 2.

Paratypes. AUSTRALIA. Queensland: Happy Valley, roadside on Stanthorpe–Amiens Rd. ca. 3 km from Stanthorpe, K. A. W. Williams 75163 (BRI); Glen Alpin, ca. 6 km SW of Stanthorpe, 29 Dec. 1967, G. Trapnell s.n. (BRI); Jollis Falls, 1.6 km W of The Summit, 8 km N of Stanthorpe, D. Hoskins s.n. (BRI); Severn River Crossing, Fletcher Rd., near jct. with Eum Swamp Rd., Fletcher, P. Grimshaw 441 (BRI); rd. crossing of Severn River, 2.9 km along Bent Rd. from Ballandeane township, L. A. Craven & J. A. Matarczyk 9950 (BRI, CANB); Ballandeane, 6 Nov. 1976, M. P. Fletcher s.n. (BRI).


Shrub to 3.5 m tall; bark flaking or peeling away; branchlets hairy or glabrous, pubescent. Leaves alternate, 18–51 × 4–9 mm, 4.2–7.8 × as long as wide; blade sericeous to velutinous or glabrous, narrowly elliptic, elliptic, or narrowly obovate, in
transverse section transversely linear or shallowly bird-winged, base narrowly attenuate or attenuate, apex shortly acuminate or acute, primary veins pinnate, 9 to 12 on each side of the midrib, oil glands dense or moderately dense, distinct. Inflorescences spicate, pseudoterminal and sometimes additional inflorescences occur in distal leaf axils, with 10 to 40 monads, 25–30 mm wide; hypanthium hairy or glabrescent, 3.2–4 mm; calyx lobes abaxially hairy or glabrescent, 1–1.8 mm, scarious throughout; petals deciduous, 3–3.8 mm; stamens free or rarely some are fused to one another at the very base, 50 to 66 per flower; filaments red or pink-purple, 6.5–11 mm; anthers dark; style 12–15 mm; ovules ca. 200 per locule. Fruit 3.9–5.2 mm, calyx lobes deciduous; inner distal wall of staminophore without reflexed, free antesePalosal triangular processes; seed with conca-convex cotyledons.

Distribution, ecology, and phenology. This taxon occurs in the Gibraltar Range–Point Lookout District of New South Wales, Australia. It has been recorded to occur in scrub and scythe on extensive trachyte outcrops, in a creek bed in dry sclerophyll forest, and on wet heathy flats on granite. *Melaleuca williamsii* subsp. *synoriensis* flowers in November and December.

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), the category Vulnerable (VU) is applicable to this plant, as it is known only from the Gibraltar Range–Point Lookout District of New South Wales. As with many similarly localized species, further field investigations are required to assess population size and other factors.

Etymology. The subspecific epithet refers to the distribution of this taxon on the edge of the Northern Tablelands (from the Greek “synoria,” meaning “borderland”).

Notes. The differences between this taxon and subspecies *williamsii* and *fletcheri* are given in Table 2.

Paratypes. AUSTRALIA, New South Wales: Gibraltar Range Natl. Park, 8 km past Ranger’s Hut on Gwydir Hwy. toward Grafton, near Waratah Trig, P. F. Lumley 1142 (CANB, MEL); 1.6 km WSW of Point Lookout, New England Natl. Park, 8 Feb. 1970, J. B. Williams s.n. (NE).


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Literature Cited


Quassia arnhemensis, a New Species of Simaroubaceae from Australia

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**Abstract.** *Quassia arnhemensis* Craven & Dunlop is described and illustrated from the Northern Territory, Australia. Within the Simaroubaceae, this new species is considered best placed in *Quassia* L., necessitating an expanded circumscription of that genus to accommodate plants with elongate staminal filaments.

**Key words:** Australia, IUCN Red List, *Quassia*, Simaroubaceae.

Among the many fire-adapted subshrubs and shrubs occurring in the savannah woodland and open forest communities of the Top End of the Northern Territory of Australia, there are several species that are noteworthy due to their taxonomic distinctiveness, e.g., *Arnhemia cryptantha* Airy Shaw (Thymelaeaceae), *Gossypium* L. sect. *Grandicalyx* (Fryxell) Fryxell (Malvaceae), and *Pachynea* R. Brown ex DC. spp. (Dilleniaceae). These species share the following characteristics: aerial stems that rarely grow to as much as 1 m in height, aerial stems that are burnt by the frequent fires (and consequently these stems are, in effect, annual or biennial), and rootstocks that survive fire and from which new shoots arise. To their number may now be added a species of *Quassia* L. (Simaroubaceae). It is likely that the species is relictual, although its adaptations to survive the fire regimes may represent more recent evolutionary innovations. One of the populations of the present species was found on a residual (ancient) lateritic Tertiary plateau, one of a number scattered across northern Australia.

The generic placement of the Australian species requires comment. Nooteboom (1962) circumscribed *Quassia* broadly with 19 other genera included in it, among them *Samadera* Gaertner and *Simaba* Aublet. Nooteboom recognized both *Samadera* and *Simaba* at sectional rank and placed the two then-named Australian species in section *Simaba* (Aublet) Pierre, making the new combinations *Q. bidwillii* (Hooker f.) Nooteboom and *Q. baileyana* (Oliver) Nooteboom. Such a broad generic circumscription, although it may well be justified, requires further investigation. The available molecular evidence is not sufficiently comprehensive to enable comparison with Nooteboom’s concept of *Quassia*. Fernando et al. (1995) included *Quassia*, *Simarouba* Aublet, and *Q. bidwillii* (as *Simaba bidwillii* (Hooker f.) Feuillet) in a molecular systematic study of Simaroubaceae using rbcL sequence data. In their analysis, *Quassia sensu* Nooteboom is not monophyletic, with two sister Australian species forming a clade, and *Simarouba* and *Quassia* s. str. each in separate clades within a five-branched polytomy (Fernando et al., 1995: fig. 3). The subject of the present paper, *Q. arnhemensis* Craven & Dunlop, was included by Fernando et al. (1995: 97, as “Species novum (ined.)”) in their study. They found that the species formed a clade with the Australian species, *Q. bidwillii*. Until a more comprehensive molecular systematic study of Simaroubaceae (Richard ex Arnott) Dumortier, incorporating many more of the generic concepts taken into *Quassia* by Nooteboom (1962), is undertaken, we believe the present species is best placed in *Quassia*, the circumscription of which should be emended to include plants with elongate staminal filaments.

*Quassia arnhemensis* Craven & Dunlop, sp. nov.

**Type:** Australia. Northern Territory: western Arnhem Land, Kakadu Natl. Park, near Mary River Ranger Station on track to Ferny Pool, 24 Apr. 1990, A. V. Slee & L. A. Craven 9825 (holotype, CANB; isotypes, A, DNA, L). Figure 1.

A *Quassia bidwillii* (Hooker f.) Nooteboom foliis linearisibus 1–1.5 mm latis (10–20 mm in *Q. bidwillii*), petalis albis (rubroviolubidosibus in *Q. bidwillii*) et staminibus longioribus (3–3.5 mm longis in floribus perfectis; 1.5–2 mm in *Q. bidwillii*) differt.

Shrub, erect, several-stemmed, 0.2–0.4 m tall; trichomes simple, multicellular, uniseriate, mostly glandular; bark of tap root manifestly corky; stems...
bitter, corky, like the leaves; pedicels, sepals, and
disc hispidulous. Leaves alternate, simple; petiole
0.6–1 mm; blade linear, revolute, 20–50 × 1–
1.5 mm, midrib prominent abaxially, impressed
adaxially, otherwise venation invisible. Pedicels 7–
15 mm, with 1 or 2 linear, caducous bracts 0.5–
1.5 mm; flowers functionally unisexual, solitary,
axillary. Sepals 5, distinct, valvate, lanceolate, 1.5–
3.5 mm, deciduous in fruit; petals 5, white, distinct,
imbriate, spreading-ascending, keeled, glabrous
except for the hispidulous keel, elliptic, 5–7.5 mm,
deciduous in fruit; stamens 10, distinct, 3–3.5 mm (in
carpellate flowers 2.5–3 mm), filament hispidulous in
proximal 1/2–2/3, elongate (i.e., with a basal
appendage), sublinear, filiform at apex, anther
ellipsoid, 1–1.3 mm (in carpellate flowers collapsed,
without pollen, 0.7–0.8 mm), dorsifixed, versatile,
lorate; disc intrastaminal, broadly columnar, ca. 0.5
× 0.5 mm, accrescent to ca. 2.5 × 2 mm in fruit;
gynococcus 5-carpellate, 2.5–3 mm (in staminate
flowers 1.5–2 mm), carpels hispidulous or sparsely
so, subreniform, joined apically in the style,
otherwise distinct, the placenta axile, near the apex,
so the ovule, 1 per carpel (in staminate flowers abortive),
pendulous, epitepalous ventral, anatropous, style straight,
glabrous or nearly so, ca. 1.5 mm, 5-sulcate, 5-
branched distally, branches terete, linear, recurved,
ca. 0.25 mm, stigmatic in distal 1/2. Fruit a 1-seeded,
1-carpellate drupe (4 of the 5 carpels abortive and
usually deciduous) subtended by the accrescent fleshly
disc, ellipsoid-reniform, 12–14 mm, inconspicuously
constricted into a 2-lobed broadly stipitate base,
epicarp fleshy, reddish orange, sparsely hispidulous,
endocarp thickly cartilaginous; seed ellipsoid, ca.
7.5 mm; testa pergamentaceous; endosperm lacking;
embryo straight, cotyledons plano-convex, elliptic
in outline, hypocotyl short, exserted.

**Distribution, ecology, and phenology.** The new
species occurs in Australia in the western Arnhem
Land region of the Northern Territory. It has been
collected in *Eucalyptus tetrodonta* F. Mueller woodland on red sand
soil with some gravel, *Eucalyptus miniata* A. Cunningham ex Schauer—*E.
tetrodonta* F. Mueller—*Erythrophleum* Afzelius ex G. Don forest on red-
brown sandy soil below sandstone outcrop, *Eucalyptus tetrodonta* open forest
on laterite, and in sandstone woodland. The taxon flowers from April to
December.

**IUCN Red List category.** *Quassia arnhemensis* can be regarded as Vulnerable (VU) according to IUCN Red List categories and criteria (IUCN, 2001), as it
apparently occurs in localized populations. However, the known populations are
within a national park and, because a change in the pattern of current land use is unlikely, the status of this species is not considered threatened.

**Etymology.** The specific epithet is derived from
the name of the region, Arnhem Land, from which the
species was collected.

**Breeding system.** Field observations are required
to clarify whether plants are dioecious or monoecious.
The available herbarium specimens are not adequate
to determine this fact conclusively.

**Phytochemistry.** Gibbons et al. (1997: 1109, as
"aff. Samadera SAC-2825") reported on the secondary
metabolites found in this species. *Quassia arnhemensis* is unusual in the Rutaales, as it contains limonin,
which had hitherto been unique to the Rutaceae.
The secondary metabolite 2’-acetylglaucarubin had
previously been known only from one other species in
the Simaroubaceae. Gibbons et al. (1997: 1110) suggested
that this unusual chemistry could have existed in early
members of Rutales prior to the metabolic differentiation
that now exists between the Meliaceae, Rutaceae, and Simaroubaceae.

**Paratypes.** AUSTRALIA. Northern Territory: on rd.
to Jabiru, 70 km NE of Pine Creek, T. & J. Whaite 3989
(DNA; C. R. Dunlop 1454 (CANB, DNA); 3 km SSW of
Mary River Ranger Station, A. V. Slea, L. A. Craven, C. R.
Dunlop & P. Munns 2900 (A, BRI, CANB, DNA, E, L); 1 km
NE of Bloomfield Spring, 30 km SE of Mary River Station, T.
Orr & K. Brennan 326 (CANB, DNA; AD, BRI, G, K, MEL,
MO, NSW, NY, P, PERTH not seen); 1 km N of small
waterhole, 30 km W of Sleisbeck on Buladeno Tableland, K.
Brennan & T. Orr 337 (CANB, DNA); Kakadu Natl. Park,
Bukkukluk, J. Russell-Smith & R. Harwood 160492 (CANB, DNA; BRI not seen); Kakadu Natl. Park, C. R.
Dunlop & C. G. Wilson 8893 (DNA).

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Figure 1 was prepared by Milton Andrews.

**Literature Cited.**

Simaroubaceae, an artificial construct: Evidence from rbcL

aff. Samadera SAC-2825: An Australian Simaroubaceae with
unusual chemistry. Phytochemistry 44: 1109–1114.

IUCN, Gland, Switzerland, and Cambridge, United
Kingdom.

Nooteboom, H. P. 1962. Generic delimitation in Simaroubaceae
tribus Simarouboideae and a conspectus of the genus
A New Species of *Viola* (Violaceae) from Guangdong, China

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**ABSTRACT.** A new species of *Viola* L. from Guangdong Province, China, *V. guangzhounensis* A. Q. Dong, J. S. Zhou & F. W. Xing, is described and illustrated here. The new taxon represents a fifth species in *Viola* sect. *Diffusae* (W. Becker) Ching J. Wang, and a taxonomic key to distinguish these taxa in China is included. *Viola guangzhounensis* is distinct from the sympatric *V. diffusa* Gingins by having obviously aerial stems, brownish purple stolons, and a bearded anterior petal. The new species is a narrow endemic, collected only from Dalingshan in Guangzhou, Guangdong Province, and is assessed as Critically Endangered (CR).

**Key words:** China, Guangdong, IUCN Red List, section *Diffusae*, *Viola*, Violaceae.

During fieldwork in March 2007 for the investigation of the flora in the mountainous region of Dalingshan in Guangdong Province, China, we found a distinctive population of violets along a forest margin at altitudes of 710–750 m. Individuals were found growing in watery rocky crevices and bearing both flowers and fruits. The purplish flowers were very conspicuous against the rock surfaces. This violet is similar to *Viola diffusa* Gingins in having a slightly 2-lobed stigma, long stolons with rosulate leaves at the apex, purplish flowers, a short corolla spur, and pubescent leaf blades. The new species differs in its obviously aerial stems, brownish purple stolons, the more narrowly triangular, cordate, acute leaves, and the bearded anterior petal. After careful study, we believe that this represents an undescribed species in *Viola* L.

*Viola guangzhounensis* A. Q. Dong, J. S. Zhou & F. W. Xing, sp. nov. **TYPE:** China. Guangdong: Guangzhou city, Conghua Co., Dalingshan, watery rocky crevices along forest margin, 710 m, 2 Apr. 2007, An-qiang Dong 1104 (holotype, IBSC). Figure 1.

Haec species *Viola diffusa* Gingins aﬃinis, sed ab ea caulibus aequis manifestis 5–25 cm longis, stoloniis fuscopurpureis, foliis ovato-triangulatis vel anguste triangulatis atque petalo antico barbatum diﬀerit.

Perennial herb to 10–30 cm tall, caulescent; rhizome usually obliquely ascending, 1–1.5 mm diam., brownish purple, short, stout, nodes congested, with numerous white adventitious rootlets; stems solitary or several and fasciculate, erect, slender, glabrous, 5–25 cm, 0.8–2 mm diam., leafy; stolons with an apical rosette of leaves, usually producing adventitious roots. Basal leaves numerous, rosulate, petiole 1–3 cm; blades narrowly ovate to ovate, 1–2 × 0.5–1 cm, base cordate, apex acute, margins obtusely dentate, both surfaces white puberulent, usually withering early; cauline leaves few, petiole 1.5–4 cm, conspicuously winged, usually white puberu-

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lent, blades ovate-triangular to narrowly triangular, 2–5 × 0.8–2 cm, base cordate, apex acute, margins obtusely dentate and ciliate, both surfaces densely white puberulent when young, later glabrescent between veins, but densely puberulent along veins and margins; stipules linear-lanceolate, 6–8 mm, margins remotely denticulate or fimbriate-dentate, apex acuminate, cauline stipules free, basal stipules adnate 1/3 to petiole bases. Flowers solitary in axils of cauline leaves, white to purplish white, with purple striations, 15–18 mm diam.; pedicels 6–10 cm, usually exceeding leaves, slender; 2-bracteolate at upper portion, bracteoles opposite, linear, 5–7 mm. Sepals lanceolate to ovate-lanceolate, 5–6 × 1.5–1.8 mm, apex acuminate, basal auricles short, margin narrowly membranous; upper petals narrowly obovate, 12–14 × ca. 7 mm, lateral petals oblong, 11–13 × ca. 5 mm, bearded, anterior petal shorter, spatulate, ca. 12 mm (spur included), bearded; spur shallowly saccate, 1.3–1.5 × ca. 1.5 mm; stamens 5, 3–4.2 × ca. 1.5 mm, nectaries of 2 anterior stamens short, subtriangular, ca. 1.5 × 0.8 mm; ovary glabrous; styles clavate, base
Table 1. Morphological comparison of Viola guangzhouensis and V. diffusa.

<table>
<thead>
<tr>
<th>Characters</th>
<th>V. guangzhouensis</th>
<th>V. diffusa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flower</td>
<td>lateral and anterior petals bearded</td>
<td>lateral petals glabrous or shortly bearded, anterior petal glabrous</td>
</tr>
<tr>
<td>Leaf blade</td>
<td>ovate-triangular to narrowly triangular, base</td>
<td>ovate or ovate-oblong, cuneate or shallowly cordate, apex obtuse</td>
</tr>
<tr>
<td></td>
<td>cordate, apex acute</td>
<td></td>
</tr>
<tr>
<td>Stolon</td>
<td>brownish purple, nodes dense and with remains</td>
<td>slender, green</td>
</tr>
<tr>
<td></td>
<td>of stipules</td>
<td></td>
</tr>
<tr>
<td>Aerial stem</td>
<td>solitary or several, fasciculate, erect, slender, glabrous, 5–25 cm long</td>
<td>absent</td>
</tr>
</tbody>
</table>

Distribution and habitat. Viola guangzhouensis is a narrow endemic of southern China, found only in the type locality, Dalingshan, Guangzhou city, Guangdong Province, China. It is not common there, and is mostly found growing in watery rocky crevices.

IUCN Red List category. During the investigation, the first author found fewer than 20 populations, encompassing about 350 individuals in an area of approximately 1000 m². According to IUCN Red List categories and criteria (IUCN, 2001), this species should be categorized as Critically Endangered (CR). Fortunately, the type locality has been established as an exceptionally well-preserved forest park since 1995.

Phenology. Viola guangzhouensis was observed in flower from March to May.

Discussion. Viola is the largest genus in the family Violaceae, with 525 to 600 species in the world (Clausen, 1964; Ballard et al., 1999). Becker (1925) divided the genus Viola into 14 sections; the most complicated of these, section Viola L., includes 17 subsections. Viola guangzhouensis is a member of section Diffusae (Becker) under section Viola L., comprising 12-lobed stigma and stolons tipped by rosettes of leaves, but is distinguished by its evident, aerial stems. This section is comprised of about four species that are distributed in southern and southeastern Asia (Becker, 1925; Wang, 1991), and one new taxa was added recently (Zhou et al., 2008). Five species are currently accepted in section Diffusae and are presented in a key below. Viola diffusa, which is quite common in the type locality of V. guangzhouensis, is the closest relative of V. guangzhouensis. The two species have similar purplish flowers, accumbent stolons, and leaf petioles with conspicuous wings, but V. guangzhouensis is distinguished by its obviously vertical aerial stems and bearded anterior petal. The morphological characters of the two species are compared in Table 1.

**Key to the Species of Viola sect. Diffusae in China**

1a. Plant with aerial stems

1b. Plant lacking stems.

2a. Flowers 30–35 mm across

2b. Flowers < 20 mm across

3a. Flowers < 15 mm across.

4a. Leaves cuneate or shallowly cordate at base; lateral petals usually bearded

4b. Leaves cordate at base; lateral petals usually beardless

3b. Flowers 15–20 mm across.

5a. Leaves ovate; lateral petals beardless

5b. Leaves triangular-ovate; lateral petals bearded

V. guangzhouensis

V. nanlingensis J. S. Zhou & F. W. Xing

V. diffusa

V. tenax Bentham

V. nagasawae Makino & Hayata var. nagasawae

V. nagasawae var. pricei (W. Becker) J. C. Wang & T. C. Huang

Paratypes. CHINA. Guangdong: Guangzhou city, Conghua Co., Dalingshan, watery rocky crevices along forest margin, 750 m, 27 Apr. 2007, An-qiang Dong 1130 (IBSC); 750 m, 29 May 2007, An-qiang Dong 1157 (IBSC), An-qiang Dong 2257 (IBSC).

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Literature Cited


Stylosanthes quintanarooensis (Leguminosae, Papilionoideae), Una Nueva Especie del Sureste de México

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RESUMEN. Una nueva especie, Stylosanthes quintanarooensis Gama & Dávila (Leguminosae, tribu Dalbergieae, dentro del clado Pterocarpus), del estado de Quintana Roo (sureste de México), se describe e ilustra. Se presentan datos sobre su hábitat y distribución geográfica. Con base en caracteres morfológicos y moleculares, esta especie se compara con S. calcicola Small, S. macrocarpa S. F. Blake y S. mexicana Taubert, las cuales se consideran como las especies más relacionadas.

ABSTRACT. A new species from the state of Quintana Roo (southeastern Mexico), Stylosanthes quintanarooensis Gama & Dávila (Leguminosae, tribe Dalbergieae, within a Pterocarpus clade), is described and illustrated. Data are presented on the habitat and geographical distribution of the new species. Based on morphological and molecular data, the new species is compared to its most closely related taxa, S. calcicola Small, S. macrocarpa S. F. Blake, and S. mexicana Taubert.

Key words: Mexico, Quintana Roo, Stylosanthes.

Como parte del proyecto de investigación sobre la diversidad genética del género Stylosanthes Swartz (Leguminosae, tribu Dalbergieae, clado Pterocarpus) para México, apoyado por el Instituto Internacional de Recursos Fitogenéticos (IPGRI), se visitaron y colectaron en la República Mexicana diferentes poblaciones de Stylosanthes. Durante los años 1998 y 1999, se llevó a cabo el trabajo de campo en el sureste de México, en la Península de Yucatán. El material colectado en el Municipio de Felipe Carrillo Puerto, en el estado de Quintana Roo, fue inicialmente identificado como Stylosanthes aff. calcicola y relacionado morfológicamente con las especies de S. calcicola Small, S. macrocarpa S. F. Blake y S. mexicana Taubert (Cuadro 1). Sin embargo, con los estudios morfológicos y moleculares de estos ejemplares y de aquellos depositados en el Herbario Nacional de México (MEXU) se sustenta la existencia de una especie nueva, la cual se describe a continuación.


Herba perennis vel frutex 40–60 cm altus; caules ramosi, erecti vel erecto-prostrati, non visci. Stipulae securi caulem persistentes, 4–11 × 1–4 mm, bidentatae, dentibus quam basi stipularum breviorebus vel eavm aequantibus; folia trifoliolata, foliolis lancolatis vel ellipticis, coriaceis. Inflorescentiae paniculatae, longiores quam latiores, pedunculis 1 vel 2 (vel 3) per bracteas, (5–)10–30 (–55) mm; bractea estima 1–vel 3-foliolata; axes rudimentares absens; bracteola externa 1, internae 2 (vel 3); Caryx 5–6.5 (–7) × 7–8 mm; corolla lutea, vexillo 8.5–10 × 9–9.5 mm. Fructus generaliter ex articulis fertilibus 2 constans, superiores 4.5–5 × 1.5–2 mm, in partitibus marginalibus lateralisbusque hirsutulo, sine trichomatibus glandularibus, rostro recto vel recurvato, inferiores 3–3.5 × 2–3 mm, in paginis totis hirsutulo; fructus basii latior quam longior.

Hierbas perennes o arbustos, tallos ramificados, erectos a erecto-prostrados, (20–)40–60 (–80) cm alto, indumento sericeo-hirsulto, ocasionalmente estri- goso, no viscido, el sericeo 0.1–0.5 mm, el hirsulto 0.6–1 mm, blanco o amarillo pálido, se distribuye por un lado del tallo, el estriego cuando presente, 1–2 mm, amarillo pálido a pardo-amarillento, se distribuye en la base de las estípulas, entrenudos (0.5–)1–4.5 mm. Estípulas persistentes a lo largo del tallo,
Cuadro 1. Comparación morfológica entre *Stylosanthes quinonarauensis*, *S. calciclava*, *S. macrocarpa* y *S. mexicana*.

<table>
<thead>
<tr>
<th></th>
<th><em>S. quinonarauensis</em></th>
<th><em>S. calciclava</em></th>
<th><em>S. macrocarpa</em></th>
<th><em>S. mexicana</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hábito</td>
<td>hierbas perennes o arbustos</td>
<td>herbáceo</td>
<td>herbáceo</td>
<td>herbáceo</td>
</tr>
<tr>
<td>Persistencia de estípulas a lo largo del tallo</td>
<td>sí</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Consistencia de los foliolos</td>
<td>coriáceos</td>
<td>no coriáceos</td>
<td>no coriáceos</td>
<td>no coriáceos</td>
</tr>
<tr>
<td>Dimensiones del estandarte, mm</td>
<td>8.5–10 × 9–9.5</td>
<td>4–6</td>
<td>3.5–5.5</td>
<td>2.5–6</td>
</tr>
<tr>
<td>Eje rudimentario</td>
<td>no</td>
<td>sí</td>
<td>sí</td>
<td>sí</td>
</tr>
</tbody>
</table>

8–11 × 2–4 mm, superficie adaxial glabra, superficie abaxial con indumento sericeo de color blanco o amarillo pálido a pardo-amarillento, bidentadas; dientes más cortos o iguales que la base de las estípulas, 3.5–4.5 mm, ápice abruptamente acuminado, margen generalmente entero; región basal de la estípula 5–6.5 mm, de 2 ó 3(4) pares de venas; zona de abscisión entre el peciolo y la región basal de la estípula (0.3–0.5–1 mm). Hojas trifolioladas; pecíolos (1.5–)2–3.5 mm, con indumento sericeo-hirsútilo; raquis 0.9–1.5 mm, con indumento sericeo-hirsútilo; folíolo central 12–15.5–16 × 2–4.5–(5) mm; folíolos laterales 10.5–14.5–(15) × 2.3–3.5 mm, lanceolados a elípticos, ápice mucronado, margen entero-creado, coriáceos, superficie adaxial con indumento sericeo, superficie abaxial con indumento sericeo-estrigoso, el estrígoso se distribuye sobre la vena central, máculas presentes de color pardo-rojizo, venas conspicuas de 3 ó 4 pares. Inflorescencias paniculadas, más largas que anchas, 10–15–(18) × 5–10 mm, 4 a 6(8) flores; pedúnculos 1 ó 2(3) por bráctea, (5)10–30–(55) mm largo, con indumento sericeo-hirsútilo-estrigoso, el sericeo se distribuye a lo largo del pedúnculo, el hirsútilo se acumula a un lado del pedúnculo, el estrígoso se dispone en la base de la bráctea más externa. Bráctea más externa unida trifoliolada, cuando unifoliolada 7–10 × 4–6 mm, bidentada; dientes ligeramente igual de largos que la base, 3.5–5 mm, base 4.4–5.5–(6) mm, ápice acuminado, margen creado, superficie adaxial glabra, superficie abaxial con indumento sericeo-estrigoso, amarillo a pardo-amarillento, 2 ó 3(4) pares de venas; cuando trifoliolada, el folíolo central 8–11 × (1.8–)2–4 mm, los folíolos laterales 7–11 × 1.8–3.5 mm, folíolos elíptico-lanceolados, ápice mucronado, coriáceos, superficie adaxial con indumento sericeo, superficie abaxial generalmente con indumento sericeo o sericeo-estrigoso, el estrígoso principalmente en la vena central, máculas presentes o ausentes, pardo-rojizas, venas conspicuas (1)2 a 4 pares, margen entero-creado; eje rudimentario ausente; bractéola externa 1, 4.5–5.5 × 0.8–1.3 mm, lóbulos 2 a 4, venas 1 ó 2(4), bractéolas internas 2(3), 4–5 × ca. 0.5 mm, lóbulo 1, vena 1. Flores papilionadas, cáliz 5–6.5–(7) × 7–8 mm, tubo del cáliz 10.5–14 mm, lóbulos laterales 2, 4.5–5 × 1.1–1.8 mm, ápice acuminado o agudo, glabro o con indumento en ambas superficies; lóbulos vexilares 4.5–5.5 × 2–2.5 mm, ápice acuminado o agudo, glabro o con indumento en ambas superficies, lóbulo carinal 5–6.5 × 2–2.5 mm, ápice acuminado o agudo, con indumento generalmente en ambas superficies; corola amarilla, estandarte 8.5–10 × 9–9.5 mm; alas 6.5–8.5 × 3.5–4.5 mm, aurícula del ala 0.6–0.8 × 0.7–0.75 mm; quilla 8–10 × (0.75–)1.5–2.25 mm; tubo estaminal 11–14.5 mm, filamentos de anteras basifílias 5.5–6.5 mm, filamentos de anteras dorsifílias 6.5–8 mm; ovario 1.5–2.5 mm, estilo 10.5–15.5 mm. Frutos generalmente con 2 artículos fértiles; el superior 4.5–5 × 1.5–2 mm, hírtilo en las regiones marginales y laterales, sin tricomas glandulares, venas conspicuas, 1 dorsal, 1 lateral, las secundarias reticuladas, el rostro recto o recurvado, hírtilo a hirsútilo en el margen interno; el inferior 3–3.5 × 2–3 mm, hírtilo generalmente en toda la superficie, la base del fruto más ancha que larga.

Hábitat y distribución. *Stylosanthes quinonarauensis* se conoce únicamente del sureste de México, en la costa de Quintana Roo; habita en el bosque subcaducifolio, en lugares con suelo arenoso y crece en un intervalo altitudinal de 0–10 m.

Fenología. Respecto a la época de floración, existen también diferencias entre *Stylosanthes quinonarauensis* y las otras especies mencionadas. En *S. quinonarauensis* la floración es de diciembre a febrero. En contraste, en *S. calciclava* la floración se presenta de noviembre a enero, en *S. macrocarpa* de octubre a diciembre y en *S. mexicana* de agosto a octubre.

Discusión. De acuerdo a los resultados obtenidos en este trabajo y en los estudios moleculares previos (Vander Stappen et al., 2002; Gama-López et al., 2007), esta especie está relacionada con *Stylosanthes calciclava*, *S. macrocarpa* y *S. mexicana*. Todas son plantas sufrutecentes, tienen dos bractéolas internas, el fruto posee dos regiones fértiles, y el rostro es recto a recurvado en el ápice. Sin embargo, *S. quinonarauensis* es diferente de ellas por ser arbustiva, tener estípulas persistentes en la base del tallo y en las ramas secundarias, tener foliolos coriáceos, estandarte...
hasta de 10 mm de largo y por carecer de un eje rudimentario (Fig. 1).

**Paratipos.** MÉXICO. **Quintana Roo:** Mpio. Felipe Carrillo Puerto, 3 km O de Vigía Chico, R. Durán & I. Olmsted 243 (MEXU) [GenBank AJ416024, cp partial tRNA-Leu (UAA) gene; AJ416312, rRNA gene, ITS1 & ITS2]; 2 km O del Rancho El Ramonal, R. Durán & I. Olmsted 729 (MEXU) [GenBank AJ416027, cp partial tRNA-Leu (UAA) gene; AJ416315, rRNA gene ITS1 & ITS2]; Km 2.7 carr. Vigía Chico-Felipe Carrillo Puerto, R. Villanueva 435 (MEXU) [GenBank AJ416025, cp partial tRNA-Leu (UAA) gene; AJ416313, rRNA gene ITS1 & ITS2]; Km 3.5 carr.
Vigía Chico–Felipe Carrillo Puerto, R. Villanueva 496 (MEXU) [GenBank AJ416026, cp partial tRNA-Leu (UAA) gene; AJ416514, rRNA gene, ITS1 & ITS2]; a 12 km NE de Felipe Carrillo Puerto, sobre el camino a Vigía Chico, E. Cabrera C. & H. de Cabrera 4399 (MEXU) [GenBank AJ416316, rRNA gene ITS1 & ITS2; AJ416717, shat2 gene 3’UTR; AJ416727, STS shat1 gene; AJ416028, cp partial tRNA-Leu (UAA) gene].

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Literatura Citada


Two New Trifoliolate-Leaved Species of Cucurbitaceae (Cucurbitaceae) from Central and South America

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ABSTRACT. Two new species of Cucurbitaceae, tribe Cucurbitae, with trifoliolate leaves are described from Costa Rica, one each in Cayaponia Silva Manso and Cionosicyys Grisebach. Cayaponia hammelii Grayum, with large, pendent staminate flowers, ranges from Costa Rica to Pacific Ecuador, while the exceptionally large-fruited Cionosicyys guabuba Grayum & J. A. González is restricted to Nicaragua, Costa Rica, and central Panama. Both of these new species have sometimes been misidentified as Cayaponia granatensis Cogniaux, a species with trifoliate leaves that is dubiously present in Mesoamerica. The distinction between Cayaponia and the similar Cionosicyys is discussed in some detail, and a key is provided for all species of Cionosicyys with validly published names.

Key words: Cayaponia, Cionosicyys, Colombia, Costa Rica, Cucurbitaceae, Cucurbitae, Ecuador, IUCN Red List, Nicaragua, Panama.

CAYAPONIA

The genus Cayaponia, one of the largest in Cucurbitaceae with an estimated 60 species (Jeffrey, 2001), is widespread in the New World from the southern United States to Argentina, and has one or two species in Africa and Madagascar. Cayaponia is distinguished by its leaves usually with sessile glands abaxially (at least near the base), generally racemose inflorescences, staminate flowers with three distinct stamen filaments and coherent anthers, pistillate flowers with three broad, reflexed stigmas, and fleshy, indehiscent, generally berry-like fruits. Although a synopsis was provided by Jeffrey (1971), the most recent monograph of Cayaponia is the Cogniaux (1881), leaving the genus “in fairly desperate need of a thorough revision” (Jeffrey, 1971: 201). Nevertheless, I feel confident in having been able to establish the following species as new to science.

Cayaponia hammelii Grayum, sp. nov. TYPE: Costa Rica. Puntarenas: Reserva Forestal Golfo Dulce, Península de Osa, Dos Brazos de Río Tigre, 300 m, 3 Dec. 1990, G. Herrera 4684 (holotype, INB; isotypes, CR, MO). Figure 1.

Species nova caulibus juvenibus sicut inflorescentiae axibus dense vestitis trichomatis glandulosis brunneolis, cirris pleurumque simplicibus, foliis trifoliolatis membra neis centraali hispidulis atque corola florum staminatorum ca. 17-38 mm longa tubo lobis ut minimum 3-plo longiore a congeneris diversa.

Vine, sometimes hanging, monoeccious; stems sparsely strigillose to moderately pilosulose and densely beset with minute, sessile or (less commonly) stalked, brownish glands, glabrescent; tendrils unbranched or (rarely) 2-branched. Leaves with petiole 1.5-6.5 cm; lamina compound, trifoliolate, with petiolules 0.05-0.9(-1.5) cm; medial leaflet 4-13.5 x 2-7.2 cm, elliptical to obovate, narrowly to broadly cuneate at the base, acuminate to caudate at the apex, remotely dentate (especially distally) or entire, pinnately 4- to 7-nerved, membranous, glabrous and uniformly verruculate adaxially, minutely pubescent along midrib and larger main veins, uniform
pustulose-hispidulous abaxially, minutely pubescent and with sessile or stalked, brownish glands along midrib and larger veins, usually with 1 to several larger, flat or immersed glands toward base; lateral leaflets asymmetrical, oblique at base, occasionally lobed (Hammel et al. 19383). Inflorescences of 1 solitary flower, or racemose with the rachis to ca. 4 cm. Staminate flowers pendulous, to at least 25 mm
Gray urn 467
Cucurbitaceae from Central and South America
c. 9-12 mm, c. 11-17 mm diam., cupulate, ±
uniformly and moderately pubescent, the sepals erect,
c. 0.5-2 mm, narrowly to broadly triangular; petals
conflate for at least 1/3 their total length in a greenish
cream or yellowish white, campanulate corolla c. 17-
38 mm, ± uniformly puberulent externally with both
glandular (at least distally) and nonglandular tri-
chomes, glabrous internally toward base, villous
distally; stamens inserted c. halfway toward base of
receptacle; filaments 3, distinct, 2-4 mm, with dense,
unilateral tuft of uniseriate trichomes near base (on
inner side); anthers coherent, forming a cylindrical
head c. 8-13 mm, the thecae tightly replicate
vertically. Pistillate flowers not seen at maturity.
Fruits yellowish green, 2.7-4 cm, subglobose,
the surface with obscure to conspicuous polygonal pattern
(at least when dried), with pedicel c. 1-4.5 cm; seeds
ca. 7 to 11, of undetermined orientation, of unspec-
ified color when fresh, 12-14 X 8-10 mm, broadly
oblong to elliptical, strongly compressed.

Distribution and habitat. Cayaponia hammelii
occurs in tropical wet forest (Tosi, 1969), at elevations
of about 50 to at least 1000 m, from Costa Rica (on
both Atlantic and Pacific slopes) to the Pacific slope
of Ecuador.

IUCN Red List category. Although it is relatively
widespread, Cayaponia hammelii has been found only
sporadically by collectors. It may be rare, or possibly
just inconspicuous or seldom fertile. Certainly it is
remarkable that it has been collected just once at the
La Selva Biological Station in Costa Rica, one of the
most intensively botanized sites in the Neotropics over
the course of the past 30 years. This is a species of
primary forest, dependent on the continued availability
of that habitat. At least in Costa Rica, it has been
collected principally (if not exclusively) in public or
private preserves; as long as these areas remain
secure, the future of C. hammelii should be secure as
well. Because population size and extent have not
been established or monitored for this species in any
part of its range, it must be classified as Data
Deficient (DD) according to IUCN Red List criteria
(IUCN, 2001).

Phenology. Mature flowers have been gathered in
January, June, September, October, and December
(Costa Rica) and July (Ecuador), and fruits in
February and March (Colombia), April (Panama),
and June and October through December (Costa
Rica).

Etymology. The epithet honors Barry E. Hammel
of the Missouri Botanical Garden, my colleague on the
Manual de Plantas de Costa Rica project, who has
long taken an interest in Cucurbitaceae and was the
first to collect both species described in this paper at
the La Selva Biological Station in Costa Rica.

Discussion. Cayaponia hammelii is distinguished
by the combination of generally simple tendrils,
compound (trilobiate), membranous, abaxially hisp-
dulous leaves, and pendent staminate flowers with the
petals conflate for at least 1/3 of their total length in a
relatively large, campanulate corolla. Also distinctive
is the brownish glandular pubescence of the young
stems and inflorescence axes. The berry-like fruits
of this species are large enough to satisfy some concepts
of Cionosicyos (see the discussion under that heading),
but have a relatively thin, brittle shell rather than a
leathery rind. Some specimens of Cayaponia hammelii
have been misidentified as C. baraeevii Cogniaux or
C. granatensis Cogniaux. Although it may also have
trilobiate leaves, C. baraeevi occurs at higher
elevations than C. hammelii (1300-1700 m, in Costa
Rica) and has more coriaceous leaves, as well as much
smaller flowers (hypanthium ca. 4-4.5 mm diam.;
corolla ca. 6-7 mm) and smaller fruits (ca. 1.2-
1.5 cm) with fewer seeds (2 or 3). According to its
protologue (Cogniaux, 1881: 794), C. granatensis
differs from C. hammelii in having trilobate leaves
(“ultra medium trilobatis”), as well as 3-branched
tendrils and larger (ca. 6 X 3-4.5 cm), ovoid fruits
that are (as specified in Cogniaux’s key to Cayaponia
species) 1-seeded. The Cayaponia species key in
Cogniaux (1881: 739-743) does not accommodate a
species with the combination of characters seen in C.
hammelii, viz., simple tendrils, trilobulate leaves with
petiolulate, abaxially hispidulous leaflets, and flowers
with the sepals much shorter than the hypanthium.
I have checked all seven Cayaponia species described
subsequently from within the geographic range of C.
hammelii, as well as the trilobulate-leaved species
described from other regions (e.g., Jeffrey, 1978;
Gomes-Klein, 2003; Gomes-Klein & Pirani, 2005),
and found none that matches.

Some further consideration of Cayaponia grana-
tensis is warranted, as that name has been applied
uncritically in herbaria to several different Cayaponia
species (probably at least four in the Mesoamerican
region) with trilobate leaves, as well as to some
species (at least three) of both Cayaponia and
Cionosicyos with trilobulate leaves. My concept of C.
granatensis is based on the protologue, supplemented
by color photos of an isolecotype (Karsten s.n., BR;
lectotype designated by Jeffrey, 1971: 217) and one of
the other original syntypes (Triona 2998, P), both of
which were collected in Meta Department, Colombia.
I have also seen a modern collection from Meta
Department bearing Jeffrey’s annotation (Callejas &
Marulanda 6009, MO). Although none of this material is floriferous (and flowers were unknown to Cogniaux), C. granatensis is well characterized vegetatively by its consistently simple, trilobate leaves. The various trilobate-leaved Cayaponia species occurring in the Mesoamerican region have yet to be rigorously sorted out, and it is possible that one may prove conspecific with the type of C. granatensis; however, the last-mentioned name may be safely rejected for the trifoliolate-leaved species of Cayaponia and Cionioscys to which it has been applied, including both of those described herein.

I have seen just a few pistillate flowers of Cayaponia hambelii (Estrada et al. 1862; Herrera & Martínez M. 2219), in what I assume to be very young bud. Because I do not definitely know the mature pistillate flowers of this species, I am unable to assign it to one of the two sections accepted by Jeffrey (1971), whose infrageneric classification relies solely on stigma morphology.


Cionioscys

The genus Cionioscys has generally been regarded (following Jeffrey, 1971) as comprising three or four species, ranging from southern Mexico to Panama and the Greater Antilles (Cuba and Jamaica). Cionioscys was established by Grisebach (1864) on the basis of the Jamaican endemic C. pomiformis Grisebach and persisted as monospecific for more than a century thereafter. In 1971, Jeffrey moved Cionioscys into subtribe Aborinaceae (from subtribe Cucurbitinae, where he had previously maintained it), emphasizing the simple (unbranched) tendrils of C. pomiformis. This action brought Cionioscys into closer proximity with Cayaponia and precipitated Jeffrey’s transfer, in the same paper, of two large-fruited, Mesoamerican species, then known as Cayaponia excisa (Grisebach) Cogniaux and C. macrantha Pittier, into Cionioscys (despite the fact that both have generally branched tendrils). Although Jeffrey (1971: 200) admitted that his reconfigured Cionioscys could be distinguished from Cayaponia “solely by the fleshy peponiform fruit, as contrasted with the typical fibrous berry of the latter,” he considered this to be an “important enough” biological difference to justify their generic segregation.

There have been no additional revisionary studies involving either Cayaponia or Cionioscys since Jeffrey (1971). However, the genus Cionioscys has been maintained in a number of floristic accounts, mostly authored by contemporary Cucurbitaceae specialists. For the most part, the distinction between Cayaponia and Cionioscys has been expressed, in these accounts, in dichotomous keys, often by means of artificially constructed couplets designed to expediently pigeonhole the local taxa. The couplet employed by Adams (1972) to separate Cionioscys pomiformis from Cayaponia relied on inflorescence structure: solitary or clustered flowers or racemes in the former, panicles in the latter. Dieterle (1976) utilized the size of the staminate flowers (petals 5–7 mm long in Cayaponia vs. 15–20 mm in Cionioscys) and the size and nature of the fruits (1–2 cm long and thick-walled in Cayaponia vs. 3–5 cm and thick-walled in Cionioscys). Neé (1993) also employed fruit size (0.8–1 cm diam. in Cayaponia vs. 6–12 cm diam. in Cionioscys), as well as seed number (2 or 3 in Cayaponia vs. ca. 15 to 25 in Cionioscys). Lira Saade (2004: 21) added seed orientation (“en posición vertical” in Cayaponia vs. “en posición horizontal o ligeramente ascendentes sólo en la porción inferior del fruto” in Cionioscys). Although these differences may seem dramatic, it must be noted that Lira Saade treated a single Cayaponia species, C. racemosa (Miller) Cogniaux, and both Dieterle and Neé only C. attenuata (Hooker & Arnott) Cogniaux and C. racemosa; these two species have among the smallest flowers and fruits in the genus, as well as the fewest seeds per fruit. Wunderlin (1978), who had six Cayaponia species to contend with for Panama, quoted the standly fruit difference (berry vs. peponiform), but also introduced a new character: petal connation. According to his keys to genera, the flowers of Cayaponia are characterized by having the “petals free nearly to the base,” as opposed to “connate over half their length” in Cionioscys (Wunderlin, 1978: 287). This notion, however, was contradicted by his own genus description, in which the staminate corolla of Cionioscys is said to be 5-lobate almost to the base. Moreover, Wunderlin’s illustration of Cionioscys
macranthus (Pittier) C. Jeffrey depicted a flower with distinct petals. Grisebach (1864), Dieterle (1976), Nee (1993), and Jeffrey (2001) converged in describing the staminate corolla of Cionsicos as deeply 5-parted or 5-parted almost to the base, although Dieterle’s (1976: 323) illustration of C. macranthus appears to show the staminate petals connate to near the middle or beyond. Jeffrey (2001), in his key to genera, characterized Cayaponia as having small, numerous flowers in racemes and fruits 1–2 cm long, as opposed to Cionsicos, which has large, solitary or less numerous flowers and fruits 3–6 cm long. However, closer inspection of his species descriptions reveals overlap in both floral and fruit dimensions.

My own observations only serve to further blur the distinction between Cayaponia and Cionsicos. While it may be true that Cionsicos excisus (Grisebach) C. Jeffrey and C. macranthus have many solitary flowers, at least the former also has flowers in racemes; furthermore, most Cayaponia species have at least some solitary flowers, and in a few (e.g., C. macrocalyx Harms) the flowers are principally or exclusively solitary. The staminate corolla in Cionsicos excisus and C. macranthus measures ca. 15–25 mm, which is indeed relatively long by Cayaponia criteria; nevertheless, corollas of comparable length occur in numerous Cayaponia species, e.g., C. glandulosus (Poepigg & Endlicher) Cogniaux (8–21 mm), C. macrocalyx (ca. 11–38 mm), and C. sessiliflora Wunderlin (ca. 8–17 mm). Many Cayaponia species have the petals of the staminate flowers distinct to near the base, as reported for Cionsicos (see above), but in other species they are connate to near the middle (Cayaponia glandulosus) or beyond (C. macrocalyx). Most of the floras cited previously describe the fruits of Cionsicos excisus and C. macranthus as ca. 3–7 cm in length (or diam.; they are subglobose), and my measurements concur. Again, this is on the large side for Cayaponia, but overlap does occur: the fruits of Cayaponia granatensis measure ca. 6 cm (Cogniaux, 1881: 794), those of C. macrocalyx ca. 2.5–3.5 cm, and those of C. sessiliflora ca. 3–4.5 cm. The fruits of Cionsicos pomiformis were reported to have 27 seeds (9 per cell) by Grisebach (1864), while Nee (1993) characterized the genus as having fruits with ca. 15 to 25 seeds. Cayaponia typically has just one to 12 seeds per fruit (Cogniaux, 1881), but C. glandulosus may have as many as 15 (Wunderlin, 1978). To some extent, seed number is no doubt correlated with fruit size; seed orientation may be as well, and is often difficult or impossible to evaluate in the herbarium.

But if Cionsicos fruits cannot be sharply distinguished from those of Cayaponia on a mensural basis, there does seem to be a qualitative difference, as generally expressed by the adjective peponiform. The fruits of Cionsicos excisus and C. macranthus have a thick, leathery rind, and their seeds are firmly embedded in a dense pulp that adheres tightly to the inner surface of the rind. By contrast, typical Cayaponia fruits (when dried) have a relatively thin, brittle shell (e.g., as in Passiflora ligularis Jussieu), and the mass of seeds and pulp pulls away from the inner surface of the shell. The Passiflora L. analogy is worthwhile, for within that genus (which, admittedly, is much larger than Cayaponia) can be found a greater range of fruit sizes and types than occurs even in Cayaponia and Cionsicos, from thin-walled berries ca. 1 cm long (e.g., P. apetala Killip) to leathery-rinded, peponiform fruits 10–30 cm long (e.g., P. ambigua Hemsley, P. quadrangularis L.). Similar variation in fruit types can be seen in Solanum L. (e.g., S. americana Miller, with tiny berries 0.5–0.8 cm diam., vs. S. gomphodes Dunal and S. lycoctrum A. St.-Hilaire of South America, with fruits ca. 15 cm diam.; M. Nee, pers. comm.).

The morphological distinction of Cionsicos from Cayaponia would thus distill to: larger-than-average (3–6+ cm), peponiform fruits with more than 14 seeds. However tenuous this may seem, a recent molecular analysis of Cucurbitaceae, based on chloroplast DNA sequences, provides some cladistic support for the generic separation. This extensive study (Schaefer et al., 2009), involving all but one of the 115 genera in the family and a quarter of its species, portrayed most of Jeffrey’s (2005) tribes as monophyletic, including the Cucurbitaceae. His subtribes did not generally fare so well, but the four genera of subtribe Aboriniae sensu Jeffrey (1971) do comprise a monophyletic group, albeit nested among genera of his subtribe Cucurbitinae. Cionsicos (represented by C. macranthus) was basal within this group, sister to the clade harboring Abobra, Cayaponia, and Selysia (Schaefer et al., 2009: 845).


Species insignis foliis (2 vel)3(ad 5)-foliolatis, floribus staminatis grandibus corolla aliquanto carnosa aestris capitulum globoseum fomentibus theciae valde contortis atque fructibus magnis pulpula alba seminibus numerosus a speciebus mili notis bene distincta.

Vine or liana, climbing to at least 30 m, apparently monoecious; stems glabrate; tendrils 2-branched (with 1 branch sometimes vestigial). Leaves with petiole ca. 0.9–5.5(–7) cm; lamina compound, trifoliolate (rarely
Figure 2. *Gonosicya guabuba* Grayum & J. A. González, flowering specimen (Grayum 2714, DUKE). Inset: staminate flower, with corolla partly removed to show androecium.

2- or pedately 4- or 5-foliolate), with petiolules 0.6–2(–2.3) cm; medial leaflet 6–18(–21+) × 2.8–7(–8) cm, elliptical to oblong or ± narrowly obovate, cuneate to short-attenuate at the base, ± abruptly short-acuminate at the apex, minutely denticulate or subentire, pinnately 4- to 7-nerved, chartaceous or subcoriaceous, glabrous on both surfaces (except sometimes sparsely and minutely pubescent along
the major veins), minutely verruculate adaxially, uniformly glandular-punctulate abaxially and with scattered larger, immersed glands (most in proximity of midrib and major veins); lateral leaflets asymmetrical, oblique at the base, rarely coarsely dentate to lobed basiscopically or with the lobe pedately distinct (Hammel 24504; Rojas 285). Inflorescences usually of 1 solitary flower or 2 or 3 fasciculate flowers (occasionally racemose with the rachis to ca. 5 cm). Staminate flowers ca. 35–45 mm diam., 5-merous,
with pedicel ca. 5–40 mm; hypanthium basally orange within, ca. 13–21 mm, 20–30 mm diam., broadly oboconical, glabrous (or with scattered, minute trichomes along the margin), the sepals ± erect, 1–3.5 (–3; Chávez 504) mm, subulate to narrowly triangular; petals distinct to near the base and connate for up to ca. 1/2 their length in a green or yellow-green, apparently campasulate corolla 11–24 mm, fleshy, longitudinally ridged externally, densely pilose-toneaceous with uniseriate trichomes on both surfaces (or sometimes glabrescent within); stamens inserted in proximal 1/3 of receptacle; filaments 3, distinct, 3–5 mm, stout, with dense, unilateral tuft of uniseriate trichomes near base (on inner side); anthers coherent, forming a yellowish subglobose head (8–)12–13 mm, the thecae strongly contorted. Pistillate flowers not seen. Fruits green, sometimes (Merello et al. 3050) with lighter green stripes (the pulp white, cottony and juicy when ripe; Hammel et al. 17410, ca. 7–11 cm, oblanceolate, ± lustrous, with pedicel 1–3.4 cm; seeds numerous (about 30 noted; Hammel 8137), horizontal to descending or subvertical proximally (Haber ex Bello C. & Lierheimer 4399; Hammel 8137), atropurpureus (Gómez et al. 22767) or black (Hammel et al. 17410; Rivera & Hoomans 1753), 15–35 × 10–20 mm, subrectangular to oblong or narrowly elliptical, ± strongly compressed.

Habitat and distribution. Cionosicyys guabubu occurs in tropical wet forest (Tosi, 1969), at elevations of about 50–1200 m, in Nicaragua (two collections), Costa Rica, and central Panama (two collections). Although most collections are from the Atlantic slope, the species is also found on the Pacific slope in the northern Costa Rican cordilleras (Cordillera de Guanacaste and de Tilarán).

IUCN Red List category. Until recently, the only collections of Cionosicyys guabubu known to us were from the La Selva Biological Station, Costa Rica, and housed at DUKE. Additional collections have since accrued to expand the geographic range, and though it is still relatively small, we can now cite records from all seven Costa Rican provinces, as well as a few from Nicaragua and Panama. As in the case of Cayaponia hammelii, the fate of Cionosicyys guabubu is intertwined with that of the primary forest habitat to which it is confined. Most (if not all) of the voucher populations of C. guabubu are in public or private preserves, and as long as these areas remain pristine, the species should be safe. Even though this species is presently common at some sites (e.g., in Costa Rica’s Parque Nacional Braulio Carrillo), it may have declined in others (e.g., the La Selva Biological Station, where it has not been seen in nearly 30 years). Because population size and extent have not been rigorously established or monitored for C. guabubu in any part of its range, it must be classified as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Flowering has been documented from February through April, and mature fruits from February through May. At anthesis, the flowers are said to have an aroma of “mango verde” or “follaje de mango” (Hammel 24495).

Common name. Guabubu (Coronado et al. 1434, Nicaragua).

Etymology. The epithet is taken from the common name indicated on the label of Coronado et al. 1434 (MO), from Nicaragua.

Discussion. Cionosicyys guabubu may be recognized by its compound (typically trifoliate) leaves; large staminate flowers, with the corolla somewhat fleshy and the anthers forming a subglobose head, with the thecae highly contorted; and oblanceolate to subglobose fruits, with white pulp and numerous seeds. It is distinct from the other three described species of Cionosicyys by virtue of its compound, generally trifoliate (vs. simple and unlobed to lobed) leaves and highly contorted (vs. tightly replicate) anther thecae, and its fruits are probably the largest known in Cionosicyys. We have no precise quantitative data on fruit size for the Jamaican C. pomiformis, but Grisebach (1864: 288) described the fruits as the “size of an orange.” We imagine that the orange Grisebach had in mind would be on the small side, by modern standards, while the fruits of C. guabubu attain nearly the size of a modern grapefruit. The key to genera of Cucurbitaceae in Adams (1972: 501) requires that the fruits of C. pomiformis be “about 7 cm in diameter.” The white pulp of C. guabubu fruits provides an additional distinction from the sympatric C. macranthus, the fruits of which have orange to red pulp (the fruits of the more northern C. excisus also have whitish pulp).

As in the case of Cayaponia hammelii, herbarium specimens of Cionosicyys guabubu have often been misidentified using the catch-all name Cayaponia granatensis, properly applied to a species with trilobate leaves as well as smaller, berry-like fruits. In Cogniaux’s (1881) key to Cayaponia species, Cionosicyys guabubu keys directly to Cayaponia petiolulata Cogniaux, based on a specimen from Bahia, Brazil. However, the latter species differs in its much longer stamen filaments (20–30 mm) and shorter anther head (ca. 8 mm). Because of its large, subglobose fruits, Cionosicyys guabubu has sometimes been identified as Fevilllea L., a distantly related genus (Schaefer et al., 2009).
in subfamily Zanonioidae; *Ferillea* differs in its simple (in the two Mesoamerican species), eglandular leaves, flowers with five distinct stamens and three distinct styles, and fruits with a distal, circumferential scar.

The highly contorted anther thecae of *Cionoscis guabubu* are a particularly distinctive feature of this species. Those of *C. pomiformis* have been described as “bent upwards and downwards, with 3 parallel anfractuositics” (Grisbach, 1864: 288); “longitudinal-triplicatis” (Cogniaux, 1881: 516); or “folded vertically into an erect column” (Adams, 1972: 501). These characterizations also accord well with published descriptions of the anthers of both *C. excisus* and *C. macranthus*, as well as many Cayaponia species, and corroborate our own observations. In *Cionoscis excisus* and *C. macranthus*, the anther thecae are tightly replicate vertically, forming a cylindrical head (vs. subglobose in *C. guabubu*). The allusions to verticality refer to the tight folding of the thecae in long, straight segments (which are themselves easily mistaken for whole, uncured anthers); by contrast, no significant portion of any anther in *C. guabubu* could reasonably be characterized as “vertical” or “straight.”

We have not seen any pistillate flowers that can definitely be identified as belonging to *Cionoscis guabubu*.

The following key will suffice to distinguish those species of *Cionoscis* with validly published names:

**KEY TO THE DESCRIBED SPECIES OF CIONOSCIS**

1a. Leaves compound, 3(to 5)-foliolate; anthers forming a subglobose head, the thecae highly contorted; mature fruits ca. 7-11 cm ......... *C. guabubu*

1b. Leaves simple, unfolioid to deeply 3- to 7-lobed; anthers forming a cylindrical head, the thecae tightly folded vertically; mature fruits ca. 3-7 cm.

2a. Sepals of staminate flowers 1-3(–6) mm, dentiform to narrowly or broadly triangular, broadest at base; ripe fruits with orange to red pulp; southern Mexico to Panama. ......... *C. macranthus*

2b. Sepals of staminate flowers 9-18 mm, elliptical or ova to oblong-lanceolate, constricted at base; ripe fruits with whitish pulp (color unknown in *C. pomiformis*); southern Mexico, Belize, and Guatemala, Cuba, Jamaica.

3a. Tendrils simple or 2- or 3-branched; corolla ca. 10-30 mm; Mexico, Belize, and Guatemala, Cuba. ......... *C. excisus*

3b. Tendrils simple; corolla ca. 35-40 mm; Jamaica. ......... *C. pomiformis*

The relationship between *Cionoscis excisus* and *C. pomiformis* bears closer scrutiny, as these species would seem to be extremely similar, yet have apparently never been compared directly.


**Cartago:** Sector Rio Guayabo, El Ceibo, G. Rivera & Y. Hoornaert 1753 (CR, USJ).

**Guanacaste:** Parque Nacional Guanacaste, Cordillera de Guanacaste, Cerro Cacao, Estación Cacao, C. Chávez 504 (INB); Estación Pitala, Cerro La Chirripó, Atlantic slope rain forest, W. A. Haber ex E. Bello C. & L. Lieberheim 4399 (MO); Parque Nacional Guanacaste, Estación Pitala 4.5 km al N, finca Finca La Pasompa, H. Hammel, M. Chacarría, H. Herrera, R. Robles & Grupo de Estudiantes de Biodiversidad 17410 (INB).

**Hereda:** Finca La Selva, OTS Field Station on Rio Puerto Viejo just E of jet with Rio Sarapiquí, M. H. Grayum 2714 (DUKE [2]); B. Hammel 7856 (DUKE), B. Hammel 8009 (DUKE [2], LSUC).


**San José:** Parque Nacional Braulio Carrillo, ca. 1 km carretera arriba del puente sobre el rio Sucio, B. Hammel 24504 (INB). PANAMA: Colon: Teck Cominco Mining Concession, Colina Camp, M. Merello, J. J. Calarache & J. I. González 3050 (MO); Teck Cominco Petaquilla mining concession, G. McPherson 19623 (MO).

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Literature Cited


Hoya persicinicoronaria (Apocynaceae, Asclepiadoideae), a New Species from Hainan, China

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ABSTRACT. The new species Hoya persicinicoronaria S. Y. He & P. T. Li (Apocynaceae, Asclepiadoideae) is described and illustrated from Hainan, China. The morphology of the related species H. pottsii Traill and H. liangii Tsiang are compared to the new species, which differs in its indumentum, leaf arrangement, leaflet pattern, leaf shape, apex, and size, calyx shape, and corolla color.

Key words: Apocynaceae, Asclepiadoideae, China, Hainan, Hoya, IUCN Red List.

Hoya R. Brown is a genus of about 60 species distributed in tropical Asian Malesia and Australia, and with 32 species in India (Hooker, 1885). In his later study, Costantin (1912) maintained that the genus comprised approximately 70 species across tropical Asia and Australia. More recently, about 200 species were considered to be distributed throughout the moist parts of the eastern tropics from Nepal and Ceylon to southern China, northern Australia, and the Pacific region, with 29 species in India (Jagtap & Singh, 1999). Tsiang and Li (1977) recognized the genus as having ca. 200 species distributed from eastern Asia to Oceania, and 22 species, three varieties, and two forms in China. Thirty-three species and one variety of Hoya are currently recognized in China (Gilbert et al., 1995; Li et al., 1995; He et al., 2009b), with Yunnan, Hainan, Guangdong, and Guangxi provinces as the centers of distribution, and with 12 species recorded in Hainan (Li et al., 1995; He et al., 2009a, b). Forster and Liddle (1996) recognized the genus as having more than 300 species distributed primarily in Malesia, particularly the Philippines, New Guinea, the western Pacific Islands, and Asia, including the Indian subcontinent; they recognized six native species in Australia, among which were one endemic and one naturalized species. Regardless of which circumscription is recognized, the International Plant Names Index (<http://www.ipni.org>) lists nearly 500 named species in Hoya in the world so far.

Hoya is characterized as a taxon by its opposite leaves and simple leaflet pattern (Hooker, 1885; Costantin, 1912; Li et al., 1995; Jagtap & Singh, 1999). However, four unusual specimens of Hoya were collected by the authors while on two expeditions to Bawangling in Hainan Province in 2007 and 2008. After comparison with specimens at CANT, KUN, HITBC, and IBSC and literature surveys, these collections prove to be a new species. The new species is distinguished by leaves that are alternate, opposite, or whorled and a leaflet pattern that is either simple or ternate, which is rare for Hoya, with only H. dickasoniana P. T. Li previously described with opposite and whorled leaves (Li, 1994).

Hoya persicinicoronaria S. Y. He & P. T. Li, sp. nov. TYPE: China. Hainan Prov.: Bawangling, on a tree in montane tropical rainforest, 19°06’N, 109°06’E, 214 m, 8 Aug. 2007, S. Y. He & J. Y. Lin 0708086 (holotype, CANT, photo at MO).

Hace species Hoyaekiangii Tsiang valde affinis, sed ab ea foliis alterris oppositis vel verticillatis, simplicibus vel trifoliolatis, calyce extra strigosos, corolla inala alba et dilute persicina aequa corona inera persicina differt.

Epiphytic vine, glabrous except for the calyx and corolla; stems thick, terete, with tumid nodes evident, young stems dark green, mature ones gray-white. Leaves alternate, opposite, or whorled, leaflet pattern simple or ternate, fleshy; blades similar and flat, elliptic or obovate, 7–10 × 4–5 cm, ca. 0.3 cm thick; blade surfaces reticulate, with the midrib and lateral vein evident or indistinct, lateral veins in 3 to 5 pairs, adaxially green, abaxially light green, base green; blade with base rounded or cuneate, apex rounded, cuspitate, or retuse; petiole 0.5–1 cm, ca. 0.6 diam., green or gray-white, adaxially with 1 or 2 glands. Peduncle 3.5–7 × 0.4–1 cm, acropetally green, pedicel ca. 1.5 cm, yellowish green; perennials umbel, 5 to 20 flowers; calyx elliptic, apex rounded, externally strigose, yellowish green; corolla pubescent on upper surface, ca. 1.5 cm diam., lobes ca. 3 × 3.5 mm, white with peach markings, lightly reflexed


toward the outer lobe; corona lobes waxy, scales elliptic, pumpkinseed-shaped, with the scales of the corona toward the center with ascending tips, cuspitate, the outer end obtuse, the margins with a hump above the middle, peach-colored, lobe dorsally channeled in the middle, but not to apex, with a branch, lobe ca. 2.7 × 2 mm, ca. 2 mm thick; stigma well developed; pollinia compressed, with the extremity broad, but sloping inward, golden yellow, ca. 550 × 330 μm, outer apex obtuse with hyaline banding not reaching pollinium apex; retinaculum minute, rhomboid, the stamens situated on the inner basal parts and enclosing the pistil.

Habitat and ecology. Hoya persicinorumaria grows in montane tropical rainforest, at altitudes from 200–250 m, as an epiphyte on trees. It is associated with Taxotrephis aquifolioides W. C. Ko, Streblus taxoides (Roth) Kurz, Terminalia hainanensis Exell, Olea hainanensis H. L. Li, Drypetes indica (Mueller Argoviensis) Pax & K. Hoffmann, Clausena dentata Burman f., Capparis zeylanica L., and Renanthera coccinea Loureiro.
**Table 1.** Morphological comparison of *Hoya persicinicornaria*, *H. pottsii*, and *H. liangii*.

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>H. persicinicornaria</em></th>
<th><em>H. pottsii</em></th>
<th><em>H. liangii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Indumentum</td>
<td>glabrous except for calyx and corolla</td>
<td>glabrous</td>
<td>glabrous except for corolla</td>
</tr>
<tr>
<td>Leaf arrangement</td>
<td>alternate, opposite, or whorled</td>
<td>opposite</td>
<td>opposite</td>
</tr>
<tr>
<td>Leaflet pattern</td>
<td>simple or ternate</td>
<td>simple</td>
<td>simple</td>
</tr>
<tr>
<td>Leaf texture</td>
<td>fleshy</td>
<td>fleshy</td>
<td>fleshy</td>
</tr>
<tr>
<td>Leaf shape</td>
<td>elliptic or obovate</td>
<td>ovate-oblong or oblong-lanceolate</td>
<td>obovate or obovate-oblong</td>
</tr>
<tr>
<td>Blade apex</td>
<td>rounded, cupulidate, or retuse</td>
<td>acute</td>
<td>obtuse or rounded</td>
</tr>
<tr>
<td>Blade base</td>
<td>rounded or cuneate</td>
<td>rounded or subcordate</td>
<td>rounded or subcordate</td>
</tr>
<tr>
<td>Blade length</td>
<td>7–10 cm</td>
<td>6–12 cm</td>
<td>4.5–9 cm</td>
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<tr>
<td>Blade width</td>
<td>4–5 cm</td>
<td>3–6 cm</td>
<td>3–5 cm</td>
</tr>
<tr>
<td>Leaf venation</td>
<td>lateral veins in 3 to 5 pairs</td>
<td>basal veins trinerved</td>
<td>lateral veins in ca. 4 pairs</td>
</tr>
<tr>
<td>Calyx shape</td>
<td>elliptic</td>
<td>deltoid</td>
<td>deltoid</td>
</tr>
<tr>
<td>External calyx surface</td>
<td>strigose</td>
<td>glabrous</td>
<td>glabrous</td>
</tr>
<tr>
<td>Calyx apex</td>
<td>rounded</td>
<td>acuminate</td>
<td>obtuse</td>
</tr>
<tr>
<td>Internal corolla surface</td>
<td>white pilose</td>
<td>white pilose</td>
<td>pubescent</td>
</tr>
<tr>
<td>Corolla color</td>
<td>white with peach markings</td>
<td>white with reddish center</td>
<td>creamy white</td>
</tr>
<tr>
<td>Corolla diameter</td>
<td>ca. 1.3 cm</td>
<td>ca. 1 cm</td>
<td>ca. 1.2 cm</td>
</tr>
<tr>
<td>Distribution</td>
<td>China: Bawangling, Hainan Province</td>
<td>China: Guangdong, Guangxi, Hainan, and Yunnan provinces</td>
<td>China: Hainan Province</td>
</tr>
</tbody>
</table>

**Distribution.** *Hoya persicinicornaria* is currently only known from the type collections from a small area in Bawangling, Hainan Province, China. Other species of *Hoya* usually grow at elevations between 200 and 1000 m in Bawangling. Another Chinese endemic, *H. lasioxyrostegia* P. T. Li, was recorded 25 years ago from Diaohuashan and Jianfengling, Hainan Province (Li, 1984), and was recently rediscovered in Bawangling, Hainan Province (S. Y. He 20085121, CANT).

**IUCN Red List category.** *Hoya persicinicornaria* is endemic to Hainan, China. It is found in a disturbed area, and its area of habitat has declined gradually. Our fieldwork indicates that the new species has a total population of approximately 300 mature individuals, with an area of occupancy estimated to be less than 10 km². Therefore, according to IUCN Red List criteria (IUCN, 2001), this species should be considered Vulnerable (VU D1+2).

**Phenology.** The new species was observed to flower from May to August. The fragrance of the fresh flowers is sweet.

**Etymology.** The specific epithet is derived from the new taxon's peach-colored corona.

**Discussion.** *Hoya persicinicornaria* closely resembles *H. pottsii* Traill and *H. liangii* Tsiang, but differs from these species in indumentum, leaf arrangement, leaflet pattern, leaf shape, apex, and size, calyx shape, and corolla color (Table 1).


**Acknowledgments.** The study was financially supported by funds from Guangdong Province, China Science and Technology Project (grant numbers 2003c201020 and 2007A020300009-7). The authors are grateful to Hainan Province Wildlife Conservation Center and Bawangling Wildlife Conservation Center, Hainan, China. We also thank Guoyang Lin of Pennsylvania State University and Xiao-ying Wu of South China Agricultural University for their help.

**Literature Cited**


Gonolobus spiranthus (Apocynaceae, Asclepiadoideae), una Nueva Especie de la Vertiente del Pacífico Mexicano

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Resumen. Recientes estudios de Asclepiadoideae (Apocynaceae) del sur y oeste de México permitió el descubrimiento de un nuevo taxón que se describe e ilustra como Gonolobus spiranthus Juárez-Jaimes, W. D. Stevens & Lozada-Pérez. Se caracteriza por tener un ginosostego conspicuosamente estipitado, una corola tubular de más de 12 mm de largo e inflada en la base, los lóbulos de la corola fuertemente espiralados, y apéndices dorsales de las anteras triangularesagitados y carnosos. La ausencia de un anillo faucial en la corola la incluye en el subgénero Pseudolachnostoma Woodson.

Palabras clave: Apocynaceae, Asclepiadoideae, Gonolobus, IUCN Red List, Pacific Mexico, subgen. Pseudolachnostoma.

En México, el género Gonolobus Michaux se encuentra representado por alrededor de 40 especies (Juárez-Jaimes et al., 2007), esto es un poco menos de un tercio de las especies reconocidas del género. De éstas, alrededor de la mitad son endémicas del país, concentrándose la mayor diversidad en la porción tropical de mismo. Tradicionalmente el género ha sido dividido en tres subgéneros (Woodson, 1941) en función de caracteres asociados a la corola, el ginosostego y el anillo faucial: Pterolobus Woodson, Eugonolobus Woodson y Pseudolachnostoma Woodson. La especie que a continuación se describe se incluye en este último.


Inter species Gonolob subgen. Pseudolachnostomatis Woodson corolla tubo imp inflato lobis torsvis asymmetricis atque antherarum appendicibus dorsalibus triangularibus sagittatis carnosis faciile distinguitur.

Trepadoras leñosas, látex blanco; tallos jóvenes con indumento mixto, más o menos en 2 líneas, tricomas largos multicelulares, reflejos, amarillentos, tricomas cortos glandulares, con ápices rojos. Hojas opuestas, simples, láminas elípticas, 3.5–12 × 2.5–6.2 cm, ápice acuminado a atenuado, base lobada, lóbulos descendentes a convergentes, seno 6–16 mm de profundidad, haz glabra o pubescente con tricomas multicelulares, adpresos, sin tricomas cortos o glandulares, envés glabro o con indumento mixto en los nervios, 4 a 5 pares de nervios laterales, coléteres 2 a 8 en la base del nervio principal; pecíolo 2–7.5 cm, glabro o con indumento mixto en el lado adaxial, los tricomas multicelulares erectos. Inflor- escencia extra-axilar, 1 por nudo, congestionado racemiforme, con 1 a 5 flores, pedúnculo 1–10 mm,

Indumento mixto, tricosas multicelulares adpresos, pedicelo 6–16 mm, indumento mixto, tricosas multicelulares adpresos, brácteas lineares, 2.5–5 mm, adaxialmente glabras, abaxialmente con tricosas multicelulares adpresos. Cáliz con 5 lóbulos divididos casi hasta la base, coléteres 1 por seno, lóbulos imbricados, lanceolados, 11–21 × 2.5–6 mm, glabros en ambas superficies, margen espardidamente pu-
Gonzolobus spiranthus (Apocynaceae) de México

beseante hacia el ápice, tricomas multicelulares adpresos, ápices agudos; corola tubular con la base inflada, la parte más estrecha ligeramente cóncava-alargada por abajo de la unión de los lóbulos, amarillo-verdosa, tubo 12–20 mm, glabro por fuera, adentro glabro excepto con tricomas unicelulares, amarillos a rojos, rígidos, patentes, 0.5–0.7 mm, dispuestos en un anillo a nivel del ginestigio, y en forma de 5 triángulos opuestos a los lóbulos de la corola; anillo falciforme ausente, lóbulos de la corola faldados, 15–20(–30) × 2.3–4(–7) mm, glabros, ápice obtuso, dextroso y espiralados en prefloración, margen derecho prolongado internamente ca. 6 mm; ginestigio conspicuamente estipitado, estípite cílin- drico, acostillado, 5.2–8 mm, ligeramente ensanchado en la base, corona ginestigial en forma de copa, membranácea, adnada a la base del ginestigio y completamente unida a la corola, 2.2–4 mm, crenu- lada, apéndices dorsales de las anteras 1–1.3 mm, triangular-sagitados, carnosos, apéndices terminales de las anteras ovadas, 0.8–1.5 × 0.8–1.2 mm, ápices obtusos, reclinados sobre el ápice del estilo, corpúsculos sagitados, 1.05–1.15 × 0.35–0.48 mm, cafés-obscuros, caudículas planas o algo enrolladas, 0.7–0.75 × 0.2–0.3 mm, polínios pérdidos, ovoides, 1.3–2.08 × 0.47–0.58 mm, excavados y translucidos cerca del ápice; ápice del estilo profundamente cóncavo. Foliculos ovoides, ca. 9 × 3 cm, base oblicua, ápice agudo, con 5 alas onduladas, glabros; semillas obovadas, 4.8–5.2 × 2.5–3.3 mm, irregular- mente crenuladas distalmente, superficie reticulada, com blanco, 1–4 cm.

Hábitat. Gonzolobus spiranthus se distribuye en la vertiente del Océano Pacífico en selvas medianas subcaducifolias y vegetación secundaria asociada, en los estados de Jalisco, Michoacán y Oaxaca, México, en altitudes que van de 220 a 1500 m. El especimen de Malinaltepec en el estado de Guerrero fue recolectado en un huerto familiar, pues de esta planta se consumen las hojas tiernas como quíte, y posiblemente fue extraído en otra localidad de la región.

Categoría de la Lista Roja de la UICN. Gonzolobus spiranthus, utilizando el criterio de la UICN (2001), es estimado como En Peligro (EN B1+2a) pues la extensión de la presencia estimada es menor de 500 km² y severamente fragmentada.

Fenología. Gonzolobus spiranthus florece de junio a septiembre y fructifica en octubre.

Discusión. Esta especie se relaciona con Gonzolobus albiflorus W. D. Stevens (Stevens, 2005) por compartir corolas tubulares sin anillo falciforme, corolas constru-ñidas, coronas que no cubren completamente el interior del tubo de la corola y ginestigios con largos estípites, pero en G. spiranthus la corola es más grande e inflada en la base, con el tubo de 12–20 mm, con los lóbulos faldados y fuertemente espiralados, y los apéndices dorsales de las anteras triangular-sagitados, a diferencia de G. albiflorus que tiene corola uniformemente tubular, con el tubo de 6–8.8 mm y los apéndices dorsales de las anteras espatulados y cóncavos por arriba. Los caracteres que comparten ambas especies, además de los frutos con 5 alas onduladas, también las relacionan con G. arizonicus (A. Gray) Woodson y G. gonoloboides (Greenman) Woodson, del subgénero Pseudolachnostoma propuesto por Woodson (1941).

Paratipos. MÉXICO. GUERRERO: Mpio. Malinaltepec, Malinaltepec, I. Wagenbreth 180 y 684 (MEXU); JALISCO: Mpio. El Limón, El Limón, F. J. Santana 522 (IBJU); Mpio. Casimiro Castillo, Cerro La Petaca, 2 km al SE de Casimiro Castillo, F. J. Santana 5772 (MEXU, ZEA), F. J. Santana & B. F. Benj 6387 (ZEA), F. J. Santana et al. 2769 (WIS); Mpio. Cuautitlán, 1–2 km NE de Cuautitlan, L. Gazmaz y F. J. Santana 755 (ZEA); MICHOACÁN: Mpio. Tumbescati, 15 km al NO de Arteaga sobre camino a Tumbescati, Barranca Honda, Y. Ramírez-Amezgua & V. W. Steinnann 694 (IEB, MEXU); OAXACA: Dpto. Pochutla, Mpio. San Pedro Chacalapa, Hac. Finca Concordia, vic. de Caletal Concordia, C. V. Morton & E. Malmivias 2516 (MO, US); Dpto. Pochutla, Mpio. San Miguel del Puerto, 1.6 km al W de Xadani, 600 m de la carretera que va a San Miguel del Puerto, A. Saynes, M. Elorza, S. Salas & E. Gambou 2643 (MEXU); Dpto. Yautepetl, Mpio. Santa María Ecatpec, 1.5 km al N de San Miguel Chongo, camino a San Pedro Soledad, S. Salas, A. Saynes & M. Elorza 4252 (MEXU); Mpio. San Carlos Yautepetl, 1 km de la desviación de la Merced del Potrerillo rumbo a Santa Catrina Jamistepec (Cerro de Oro), A. Saynes, M. Elorza & S. Salas 3167 (FCME, MEXU, MO); La Hamaca, 580 m E sobre el rio Zimatán, sobre la brecha a Santa Catrina Jamistepec, N. Velázquez, L. Schilbi & M. Elorza 394 (MEXU).

Agradecimientos. A los compañeros de la Sociedad para el Estudio de los Recursos Bióticos de Oaxaca A.C. (SERBO) por su asistencia en el campo a la primer autora; a Elvia Esparza por la ilustración.

Literatura Cita
da
Estudios en las Apocynaceae Neotropicales XXXVI: Una Nueva Especie de *Lacmellea* (Apocynaceae, Rauvolfioideae) para Colombia

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**Resumen.** Se describe *Lacmellea abbreviata* J. F. Morales (Apocynaceae, Rauvolfioideae), una nueva especie endémica de Región del Chocó, Colombia. Este nuevo taxón se encuentra relacionado con *L. panamensis* (Woodson) Markgraf, de la que difiere por la forma de sus hojas (ovadas a ovado-éllipticas vs. éllipticas a angostamente éllipticas), inflorescencias con menos flores (1–6 2 vs. 4 a 12), y corolas con los lóbulos más pequeños (3.5–4 mm vs. 6–11 mm). Se incluye una ilustración, datos de distribución, especímenes examinados y se discuten las especies más relacionadas.

**Abstract.** *Lacmellea abbreviata* J. F. Morales (Apocynaceae, Rauvolfioideae), a new species from the Chocó region, Colombia, is described and illustrated. This new taxon is related to *L. panamensis* (Woodson) Markgraf, but differs by the leaf shape (ovate to ovate-elliptic vs. elliptic to narrowly elliptic), few-flowered inflorescences (1 or 2 vs. 4 to 12), and shorter corolla lobes (3.5–4 mm vs. 6–11 mm). Distribution, specimens examined, and a discussion of taxonomic affinities are included here for the new species.

**Key words:** Apocynaceae, Colombia, IUCN Red List, *Lacmellea*, Rauvolfioideae.

*Lacmellea* H. Karsten (Apocynaceae, Rauvolfioideae) es un género de ca. 22 especies, confinado principalmente a la cuenca amazónica y el norte de Suramérica, con sólo cuatro presentes en Mesoamérica (Moraes, 1998, 2007). Este género pertenece a la tribu Willughbeae (Endress & Bruyns, 2000), con ca. 18 géneros distribuidos principalmente en el Paleotrópico. De los géneros presentes en el Neotrópico, *Lacmellea* puede confundirse con *Couna* Aublet y *Parahancornia* Ducke, pero se separa con facilidad de éstos por sus inflorescencias aglomeradas, reducidas y axilares (vs. extendidas, conspicuas y terminales) y por la presencia ocasional de agujones en su tronco (vs. ausentes). Otro género algo similar es *Hancornia* Gomes, el cual se puede reconocer por sus hojas con las venas secundarias conspicuas y densamente agrupadas (separadas 1–2 mm) y dispuestas más o menos perpendicularmente al nervio central, así como por su tronco carente de agujones. Las únicas monografías del género *Lacmellea* disponibles hasta la fecha, son los trabajos de Markgraf (1941) y Monachino (1944), ambas caracterizadas por ser divergentes en el número de especies aceptadas (14 y 18 respectivamente), descripciones en algunos casos incompletas (ante la ausencia de flores o frutos), así como por los pocos especímenes estudiados. En el caso de Markgraf (1941) dos especies fueron reportadas para Colombia, mientras que Monachino (1944) reconoció un total de cuatro taxones en ese país (incluyendo *L. foxii* (Stapf) Markgraf) cuya localidad tipo fue erróneamente reportada en Perú. En la preparación de un tratamiento de la familia Apocynaceae (subfamilias Apocynoideae y Rauvolfioideae) para Colombia, se encontró una nueva especie de *Lacmellea*, la cual es descrita a continuación. Con este nuevo taxón, se eleva a 11 el número actual de especies de ese género presentes en Colombia (Morales, datos sin publ.).


Haec species *Lacmellea panamensis* (Woodson) Markgraf, *L. arborescenti* (Müller Argoviensis) Markgraf et L eduli H. Karsten similis, sed a his duas corollae tubo longiore, ab ultima fructu subgloboso, a prima foliis ovatis vel ovato-ellipticis, inflorescentia 1- vel 2-flora et corollae lobis brevioribus differt.

Árboles 5–12 m de altura, el tronco con espinas, ramitas aplanadas cuando jóvenes, subteretes con la edad, glabras. Hojas con el pecíolo de 3–8 mm, glabro; láminas de 3.5–6 (–7.5) × 1–2.7 (–3.2) cm, ovadas a ovado-éllipticas, el ápice cortamente acuminado, la base obtusa a redondeada, glabra, a veces con puntuaciones negras en la superficie abaxial, no revolutas, venas secundarias separadas por 3–5 mm entre sí. Inflorescencia axilar, con 1–6 flores, glabra, pedúnculo de 3–5 mm, pedicelos de 2.5–5.5 mm, brácteas de 0.5–1 mm, bractéolas 0.8–1.4 mm, Sépa-
los 1.1–1.9 × 1.1–1.6 mm, anchamente ovados, el ápice agudo a obtuso, glabrescentes, diminutamente ciliolados marginalmente; corola blanca, la superficie externa y la cara adaxial de los lóbulos inconspicua y esparcidamente puberulenta, la pubescencia del tubo restringida a su región distal, tubo 19–22.5 × 1.5–3 mm, abultado en la base y en la posición de los estambres; lóbulos 3.5–4 × 2–2.5 mm, angostamente ovados; anteras ca. 4 mm, el dorso glabro, cabeza estigmática ca. 2 mm, ovario ca. 1.5 mm. Frutos subglobosos, (1.8–)2–2.4 cm diá., amarillos al madurar.

**Distribución, hábitat y fenología.** La nueva especie es endémica de los departamentos de Antioquia, Caldas y Chocó en Colombia, donde crece en bosques
muy húmedos y áreas de vegetación secundaria relacionada, en elevaciones de 50–1350 m. Especímenes con flores han sido recolectados en junio y material con frutos se conoce de febrero, abril y junio.

**Categoría de la Lista Roja de UICN.** *Lacmellea abbreviata* es una especie endémica de Colombia, específicamente al oeste del Departamento de Antioquia (Parque Nacional Natural Las Orquídeas) y el norte del Departamento del Chocó (región de Quibdó), donde se conoce de tres regiones geográficas definidas. De acuerdo a los criterios de la Lista Roja de UICN, el estatus a esta especie puede ser definido como En Peligro (EN), debido a su limitado rango de distribución geográfica y el reducido número de localidades conocidas (UICN, 2001).

**Etimología.** El nombre de la nueva especie hace referencia al relativo pequeño tamaño de las hojas e inflorescencias.

**Discusión.** *Lacmellea abbreviata* se puede confundir con *L. panamensis*, pero se separa por sus inflorescencias con menos flores (1 o 2 vs. 4 a 12), corolas con los lóbulos mucho más pequeños (3.5–4 mm vs. 6–11 mm), así como láminas foliares de forma diferente (ovadas a ovado-elípticas vs. elípticas a angostamente elípticas). Esta especie ha sido erróneamente identificada como *L. peruviana*, en la actualidad un sinónimo de *L. arborescens* (Müller Argoviensis) Markgraf, de la que se puede separar por sus flores con el tubo de la corola más largo (19–22.5 mm vs. 11–14 mm). *Lacmellea edulis* es otra especie presente en Colombia que se puede confundir con *L. abbreviata*, pero ambas se pueden separar con facilidad por el tamaño de la corola y forma de los frutos, ya que en *L. edulis* el tubo de la corola tiene una longitud entre 14–17 mm y los frutos son elípticos, mientras que en *L. abbreviata* el tubo varía entre 19–22.5 mm de longitud y los frutos son subglobosos.


**Agradecimientos.** Se agradece a los curadores y directores de los herbarios JAUM, HUA, MEDEL, MO, UDBC, WAG por permitir el acceso a sus colecciones.

**Literatura Citada**


A New Species of *Taxiphyllum* (Musci: Hypnaceae) from Sri Lanka

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**Abstract.** A new species, *Taxiphyllum townsendii* Ochyra & Ireland (Hypnaceae, Musci), is described from Sri Lanka. The species was earlier known under the name *Plagiothecium ceylonense* Broth. ex Dixon, but this name was not validly published and therefore a new name is needed. *Taxiphyllum townsendii* is similar in many ways to the common eastern North American species, *T. deplanatum* (Bruch & Schimp ex Sullivant) M. Fleischer, but differs by its larger, often oblong-lanceolate leaves that are abruptly or gradually short- or long-acuminate; much longer and narrower mid-leaf cells; short-rectangular, very broad basal leaf cells that form a distinct 1- to 2-seriate strip at the leaf insertion; and a prominent angular group of large quadrato to short-rectangular cells that extend up the margins by four to 10 cells. *Taxiphyllum subretusum* (Thwaites & Mitten) O’Shea is transferred to the genus *Phyllodon* Schimper as *P. subretusus* (Thwaites & Mitten) Ochyra & Ireland and the name is lectotypified. The validity of the name *Entodon isopterygioides* (Dixon) Dixon is discussed and this name is considered to be validly published.


While studying the genus *Plagiothecium* Schimper in Africa, the first author obtained from Clifford C. Townsend (K) two specimens of a moss collected in 1973 in Sri Lanka, which superficially resembled members of that genus. Two species of *Plagiothecium* have hitherto been recorded from Sri Lanka: *P. subglaucum* Thwaites & Mitten and *P. ceylonense* Broth. ex Dixon (Aheywickrama & Jansen, 1978; O’Shea, 2002). The former is conspecific with *P. necheroideum* Schimper. The specimens supplied by Townsend proved to be different from this species, but they clearly match the original collection of *P. ceylonense*.

The name *Plagiothecium ceylonense* was used by Broth. on the herbarium label of a plant collected in October 1901 by Robert Wright (Wright 3798) and distributed in “Bryotheca E. Levier.” However, there was no description on the label, nor was this species name mentioned for the Musci in either edition of *Die natürlichen Pflanzenfamilien* (Broth.ers, 1908, 1925). This name was subsequently used by Dixon (1915) for five specimens of mosses collected in 1913 by C. H. Binstead on Ceylon. The compilers of *Index Muscorum* (Wijk et al., 1967) considered the name *P. ceylonense* to have been validated in Dixon (1915). However, careful analysis of the entry dealing with this species indicates the name was not validly published. This text (Dixon, 1915: 294) states: “*Plagiothecium ceylonense* Broth. ined. Rock in stream, deeply shaded, near Hagkala (222), det. Broth. by stream, &c., N. E. (353, 359, 369); shaded rock near stream, Namoya (424), a robust form with stems 4 in. long, and leaves less denser and less complanate than usual.”

Some early botanists used “form” as a term similar to the modern term “taxon,” so that the “robust form” would be the species itself, but here it seems clear that it only represents number 424 from Namoya that is a “robust form.” Therefore, we believe that the brief description in Dixon (1915) applies only to the [unnamed] variant (forma?) that the Binstead 424 specimen represents. In his 1915 paper, Dixon described seven new species jointly with Broth.ers (*Fissidens aberrans* Broth. & Dixon, *Macromitrium assimile* Broth. & Dixon, *Bryum ceylonense* Broth. & Dixon, *Camptocaula thamnotiodes* Broth. & Dixon, *Acanthocladium ceylonense* Broth. & Dixon, *Taxithelium binsteadii* Broth. & Dixon, and *Vesicularia caloblasta* Broth. & Dixon), and from this it seems clear Dixon had no intention of validating Broth.ers” manuscript name.

After examining the original Wright material of *Plagiothecium ceylonense*, the Binstead specimens reported by Dixon (1915), as well as the two recent Townsend collections, we conclude that they all represent a single distinct species of *Taxiphyllum* M. Fleischer, instead of *Plagiothecium*, based on the

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revised generic concept of *Taxiphyllum* and *Plagiothecium* proposed by Iwatsuki (1963, 1970) and Robinson (1974). These two genera share a complanate-foiliate habit and a short, double costa, which prompted some authors to keep them together in the family Plagiotheciaceae (e.g., Szafran, 1961; Nyholm, 1965; Lawton, 1971; Smith, 1978; Noguchi, 1994), while Grout (1932) merged them and considered *Taxiphyllum* a subgenus of *Plagiothecium*. However, except for a similar habit and costa, *Taxiphyllum* has little else in common with *Plagiothecium* and the Plagiotheciaceae as defined by Buck and Ireland (1985). The lack of a differentiated stem epidermis, nondecurrent leaves, and presence of foliose pseudo-paraphyllia preclude the new species from inclusion in *Plagiothecium*. On the other hand, these features suggest its relationship lies with the *Hypnaeaceae*, in *Taxiphyllum* as Fleischer (1923) originally proposed when establishing that genus. This family placement of *Taxiphyllum* has recently gained wider acceptance by various bryologists (e.g., Iwatsuki, 1963; Crum & Anderson, 1981; Buck, 1998; Ochyra et al., 2003; Zhang & He, 2005).

**Taxiphyllum townsendii** Ochyra & Ireland, sp. nov.  
TYPE: Sri Lanka. Central Prov.: Nuwar Eliya Dist., on rocks in ravine of Nanu Oya, just outside Nuwar Eliya, 17 Mar. 1973, C. C. Townsend 73/1393 (holotype, E; isotype, KRAM). Figure 1.


Species hae *Taxiphyllum deplanata* (Bruch & Schimpex Sullivan) M. Fleischer similis, sed ab eo folis longioribus plerumque oblongo-lanceolatis et cellulis in medio laminae longioribus angustioribusque, basi breviorebus dilatatisque 1- vel 2-seriatis, marginibus cellulis angularibus majoribus 3- ad 5-seriatis quadratis vel oblongis alam distinctam formantisibus facillime distinguiwit.

Plants medium-sized to fairly large, soft, forming extensive, thin or dense mats, lustrous, pale green to yellow-green, becoming brownish green with age; stems creeping, to 6 or occasionally 10 cm, irregularly branched, mostly complanate-foiliate or occasionally terete, not or sparsely radiculous ventrally with scattered fascicles of light brown, smooth, unbranched rhizoids, transverse section rounded to elliptical, consisting of (1 to 2)(to 3) rows of smaller cortical cells with yellow, thickened walls, surrounding 2 to 3 rows of enlarged, thin-walled, hyaline medullary cells; central strand small and distinct or indistinct, sometimes absent; pseudoparaphyllia foliose, triangular; axillary hairs sparse, filiform, with 1 or 2 short, brownish basal cells and a single, elongate, hyaline distal cell. Stem and branch leaves similar, the stem leaves sometimes only somewhat larger, not or little changed and somewhat shrivelled when dry, slightly distant to close and overlapping, wide- or erect-spreading to imbricate, complanate and appearing disjunctive, but arranged in more than 2 rows, nondecurrent, smooth, straight, symmetric, concave, 1.8–2.1 × 0.5–0.9 mm (width near leaf middle), becoming somewhat narrowed to the insertion, oblongo- to ovate-lanceolate or lanceolate, usually abruptly narrowed to an acute, broad, or filiform apex of varying length or, less often, gradually slenderly long-acuminate; margins plane, sharply serrate or serrulately distally, remotely and weakly serrulate to nearly smooth in the proximal part; costa faint, short and double, usually with 1 branch longer, or often lacking; laminal cells smooth or minutely prurulose at both ends on adaxial surface, thin-walled, nonporose, linear-flexuose, with sharp, long-acuminate tips, 80–140 × 5–7 μm (width at mid-leaf), becoming somewhat shorter and wider, oblong-hexagonal near leaf apex and 40–70 × 7–10 μm at leaf base; alar cells quadrate, oblate, or some short-rectangular, 15–20 × 15–25 μm, thin- to somewhat firm-walled, arranged in 3 to 5 rows, forming a prominent group extending up the margins by 4 to 10 cells; cells at the insertion hexagonal to oblong, 30–50 × 15–20 μm, thin-walled, forming distinct 1- to 2-seriate strips at the leaf base, sharply demarcated from the adjacent laminal cells. Sex organs and sporophytes unknown.

**Habitat and distribution.** *Taxiphyllum townsendii* is an epiphytic moss growing on shaded rocks by and in streams and waterfalls. The species is endemic to Sri Lanka, where it occurs in the mountainous region in the south-central part of the island.

**IUCN Red List category.** No additional information on biology and size of the populations of *Taxiphyllum townsendii* is available. Therefore, the species is included in the category Data Deficient (DD) according to IUCN Red List categories and criteria (IUCN, 2001). However, the discovery of the species at several sites may indicate that it is not rare in the region.

**Etymology.** This species is named in honor of Clifford C. Townsend (1926–), the eminent British bryologist who rediscovered it in Sri Lanka and has contributed much to the knowledge of the taxonomy and distribution of mosses in various parts of the globe.
Figure 1. *Taxiphyllum townsendii* Ochrya & Ireland. —A. Habit, dry. —B. Portion of branch, moist. —C–H. Leaves. —I, J. Leaf apices. —K. Mid-leaf cells at margin. —L, M. Angular cells. —N–Q. Pseudoparaphyllia. A, F–H, J, L, N, O drawn from the paratype (*Wright 3798*, KRAM); B–E, I, K, M, P, Q drawn from the isotype (*Townsend 73/1393*, KRAM). Scale bars: a = 1 mm (B); b = 1 cm (A); c = 1 mm (C–H) and 100 μm (I–Q).
Discussion. Taxiphyllum townsendii is recognized from its congeners by its leaf areolation. The mid-leaf cells are linear-flexuose, 80–140 × 5–7 µm, and the alar region forms a prominent group of large, mostly square cells, 15–20 × 15–25 µm, with four to 10 cells extending upward along the margins. In addition, the basal leaf cells differ markedly from the adjacent laminal cells, being much shorter and wider, hexagonal to oblong, 30–50 × 15–20 µm, and forming a distinct strip along the leaf insertion composed of one or two rows of cells. As is the case with the majority of Taxiphyllum species, its stems are complanate-foliate. Occasionally the branches are terete-foliate.

Taxiphyllum townsendii is one of the largest species of the genus, with plants as long as 10 cm. In Asia, Taxiphyllum is represented by about eight species, some of which have not yet been critically evaluated. Five distinct and well-defined species are known from Japan (Noguchi, 1994) and mainland Asia (Zhang & He, 2005), but none match T. townsendii in morphological and anatomical characters. Taxiphyllum arcuatum (Bosch & Sande Lecoste) S. He, T. alternans (Cardot) Z. Iwatsuki, and T. taxirameum (Mitten) M. Fleischer are morphologically different from T. townsendii in having poorly differentiated alar cells. Taxiphyllum caspidifolium (Cardot) Z. Iwatsuki has prominent alar cells, but the distinctly juleous habit and shorter and wider laminal cells (80–100 × 7–9 µm) make it very distinct from all other congeners, including T. townsendii. The fifth species, T. aomoriense (Beshereelle) Z. Iwatsuki, is a strongly complanate moss with markedly distichous leaves and apices turned down toward the substratum. This characteristic habit, coupled with its much shorter cells (65–85 × 6–7 µm), differentiates it from T. townsendii. The other two continental species, T. inundatum Reimers and T. giraldii (Müller Hallensis) M. Fleischer, are poorly known taxa that have no differentiated alar cells or only poorly developed ones; they appear to be closely related to T. taxirameum. The Malaysian T. punctulatum M. Fleischer is described by Fleischer (1923) as having very small leaves, 0.7–0.8 × 0.3 mm, with very short, narrow laminal cells, 30–40 × 4–5 µm. Finally, T. maniae (Renaud & Paris) M. Fleischer, which is known from India, Malaysia, and New Guinea, is conspecific with T. taxirameum (O’Shea et al., 2003).

Taxiphyllum townsendii seems to be most similar to T. deplanatum (Bruch & Schimper ex Sullivant) M. Fleischer, primarily an eastern and southwestern North American plant (Ireland, 1969) that is also known from Mexico and Honduras (Ireland & Buck, 2009). The two species share a similar leaf shape, although T. deplanatum generally has shorter leaves, averaging 1.3–1.7 mm long. Its plants are usually complanate with the leaves arranged in two rows, giving them a characteristic appearance of being regularly plaited or braided with apices turned slightly downward. This species is very distinct from T. townsendii in its shorter, wider mid-leaf cells that are 50–90 × 5–12 µm, possessing a smaller alar group with smaller cells at the leaf insertion.


Taxonomic notes. There are three other species of Taxiphyllum known from Sri Lanka (O’Shea, 2002): T. taxirameum (Mitten) M. Fleischer, T. subretusum (Thwaites & Mitten) O’Shea, and T. isopterygioides (Dixon) W. R. Buck. The leaf areolation readily separates T. townsendii from T. taxirameum, a pantropical and subtropical species that is common and widely distributed in Asia. The median leaf cells are variable in T. taxirameum, ranging in length from 40–125 µm, but they average only 50–70 µm, and are usually prorate and shortly acute, rounded, slanted, or truncate at both ends rather than smooth, sharp, and long-acuminate. The alar cells are only slightly differentiated and form a small group composed of one to three rows, with only one to five cells in the marginal row, and the cells at the leaf insertion are not markedly larger from the laminal cells above the base. In addition, the leaves are rigid, not or only somewhat overlapping, and usually far apart rather than being soft, close, and overlapping.

The other two Sri Lankan species, Taxiphyllum subretusum and T. isopterygioides, actually do not belong within Taxiphyllum. Taxiphyllum subretusum has ligulate leaves that are broadly obtuse and coarsely, often doubly, dentate at the apex with margins above mid-leaf having distinctly prorate distal cells and lacking differentiated alar cells. These features are all typical of the genus Phyllopond Schimper and accordingly this species is transferred to that genus.

It should be noted that such a relationship of this species was first suggested by Fleischer (1923) and later Tixier (1968) when they placed it in the genus Glossadelphus M. Fleischer, which is congeneric with Phyllocladon (Buck, 1987).

Taxiphyllum isotyperygoideus has a very complante habit and broadly ovate, ecostate leaves that are broadly rounded-obtuse to broadly acute at the apex, serrate in the distal part, and distinctly constricted at the base, with numerous large, subhyaline cells at the base forming a prominent alar group. These features suggest this species belongs to Entodon Müller Hallensis. This species was originally described as Taxithelium isotyperygoideus Dixon (Dixon, 1915), and it was subsequently transferred to Entodon by Dixon (1933). The compilers of Index Muscorum (Wijk et al., 1962) treated E. isotyperygoideus as a nomen nudum, but they overlooked the parenthetical author citation “Dixon” in Dixon’s (1933: 27) paper, and this represents an indirect reference to the basionym, Taxithelium isotyperygoideus. Therefore, E. isotyperygoideus (Dixon) Dixon should be considered a validly published name.

Acknowledgments. We are grateful to Cliff Townsend for allowing us to study his collection from Sri Lanka. Thanks are also due to Bill Buck (NY) and Len Ellis (BM) for arranging specimens on loan, to John McNeill (E) for valuable discussion of the nomenclatural matters, and to Halina Bednarek-Ochyra for her illustrations. This work was financially supported by the Polish Ministry of Science and Higher Education through grant No. 2 PO4G 043 29 to the senior author.

Literature Cited


Validation of the Hybrid Flowering Cherry *Prunus ×incam* (Rosaceae)

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**Abstract.** The name *Prunus ×incam* Ingram ex R. Olsen & Whittemore is validated here. Introduced as a cultivated variety in 1947, Ingram's name *Prunus ×incam* has been in use as a nomen nudum in horticultural literature and the nursery trade for artificial crosses involving the parent taxa *P. incisa* Thunberg × *P. campanulata* Maximowicz. *Prunus ×incam* is an early flowering tree with two or three flowers in each persistent involucral, spreading sepals, and pink, deeply emarginate petals. Ingram’s original introduction, the cultivated variety ‘Okame,’ is the most widely grown form.

**Key words:** Okame cherry, Prunus, Rosaceae.

*Prunus* L. (Rosaceae Jussieu), with some 200 species, is a ubiquitous component of the cultivated flora in temperate zones, including species that are important as fruit, nut, and ornamental crops. The most important group of ornamentals in the genus are the flowering cherries of *Prunus* subg. *Cerasus* (Miller) Focke sect. *Pseudocerasus* Koehne, a group of small trees from eastern Asia with very showy white or pink flowers (Rehder, 1940).

The Chinese species *Prunus campanulata* Maximowicz historically has attracted the attention of horticulturists because of its early flowering (early to mid-March) and the striking deep pink coloration of its petals. However, *P. campanulata* is a species of southern China, Taiwan, and possibly also the Ryukyu Islands of Japan, although the species may have been introduced here by man (Ohwi et al., 1984; Li & Bartholomew, 2003). Its use in temperate climates is limited by its sensitivity to winter cold, since it can only be relied upon to survive winters in U.S. Department of Agriculture (USDA) hardiness zones 8 (annual minimum temperatures above −12°C) and warmer (Cathey, 1990).

Plants combining desirable characteristics of *Prunus campanulata* with greater cold tolerance have been produced by crossing *P. campanulata* with *P. incisa* Thunberg, the Fuji cherry, a more cold-tolerant species. *Prunus incisa* is native to Japan in central Honshu on the slopes of Mt. Fuji, Mt. Hakone, and Mt. Yatsuzan, and through the Southern Alps (Flower Association of Japan, 1982; Ohwi et al., 1984). It is one of the alpine cherries surviving to zone 5 (−28°C) that flowers in early April in the north temperate zone (Ingram, 1948; Dirr, 1998; Kuitert & Peterse, 1999). The hybrid was first produced ca. 1942 by English breeder Collingwood Ingram, who pollinated *P. incisa* stigmas with pollen collected from *P. campanulata* growing in the temperate house of the Royal Botanic Gardens, Kew (Ingram, 1942, 1948, 1970).

Ingram presented his best *Prunus incisa × P. campanulata* hybrid to the Royal Horticultural Society on April 15, 1947, reported first as *P. incisa × campanulata* var. Okame by the Gardeners’ Chronicle (1947), but recorded by the Royal Horticultural Society, which conferred the plant an Award of Merit as *Prunus × incam* var. ‘Okame’ (Royal Horticultural Society, 1947a, b). The cultivar, and hybrid epithet, quickly became established in the British horticultural trade, receiving an Award of Garden Merit from the Royal Horticultural Society for its outstanding performance in British gardens only seven years after introduction (Fletcher, 1954). The plant was introduced to the United States before its public release, when American horticulturist Henry Skinner brought plants directly from Ingram’s garden to the Morris Arboretum, University of Pennsylvania, in 1946 (Meyer & Lewandowski, 1985). Further introductions into the United States and other countries have made this plant widely available in the international horticultural trade. Currently, *P. ×incam* ‘Okame’ is a popular, widely used cultivar in temperate areas throughout the world with annual minimum temperatures above −23°C (USDA hardiness zone 6). Recently, additional *P. ×incam* cultivars (e.g., ‘Dream Catcher’ and ‘First Lady’) have entered the trade (Pooler, 2007).

Although the name *Prunus ×incam* is used widely in horticultural literature, nursery catalogs, and other garden-related publications, this binomial has never been validly published. Some publications (e.g., Huxley & Griffiths, 1992) dropped the epithet, using only the cultivar name with the genus (e.g., *Prunus* ‘Okame’), but this has not slowed the use of the epithet in the nursery trade. The introduction of a variant spelling, *Prunus ×incamp*, in England by Boddy (1964) and its use by the Flower Association of Japan (1982) and a few American horticulturists (Dirr, 1998, 2000) has introduced further confusion, with both spellings currently used commonly in the trade.

In view of the continued widespread use of *Prunus ×incam*, and in view of the growing confusion caused by the existence of two well-established variant spellings, it seems appropriate to stabilize the name and its usage by formally publishing it and assigning a type specimen.


Arbor praecox; ramuli hornotini glabri; gemmae 1 ad 3 in quaque axilla. Folia margin argute serrata. Flores 2 ad 3
involucro communi cincti. Sepala patula, 2–3 mm longa; petala carnea, emarginata, ca. 9 mm longa.

Deciduous trees to 8 m tall; bark silvery gray, smooth except for prominent transverse lenticels; young shoots glabrous; buds 1 to 3 per axil; stipules caducous. Petiole 7–12 mm, upper surface villous; glands none or 1 at summit of petiole; leaf blade narrowly obovate or oblanceolate, 47–70 × 22–31 mm, dark green, with 7 to 9 major veins on each side of the midrib, glabrous except for a few inconspicuous villose hairs on both surfaces of major veins and leaf margin, apex slenderly acuminate, base obtuse (seldom acute) or rounded, margins sharply serrate. Inflorescence appearing before expansion of leaves, of 2 or 3 flowers on 3–13 mm pedicels, common peduncle absent or to 3 mm; bracts to 5 mm, several around base of inflorescence, outer bracts brown and scalelike, forming an involucre, inner bracts green, obovate, strongly toothed; involucre persistent in flower. Flower with petals pink, hypanthium and sepals red; hypanthium cylindrical, 5–8 × 2–3 mm, glabrous; sepals triangular, 2–3 × 1.5–2 mm, entire and glabrous, shorter than hypanthium and spreading perpendicularly to it; petals oblong to obovate, deeply emarginate, ca. 9 × 4–6 mm; stamens 4–7 mm, anthers plum, pollen copious and well-formed; style projecting 6–11 mm beyond hypanthium. Fruit not seen, rarely produced.

Discussion. The type specimen came from a plant of Prunus ×incam ‘Okame’ (NA 183555-CL) at the U.S. National Arboretum that traces back, via the Washington Park Arboretum in Seattle, Washington, to the original distribution of Ingram’s cultivar by the Morris Arboretum. There seems to be no valid reason to replace the original, well-established spelling, “incam,” for the later variant “incamp.” It is appropriate to recognize Collingwood Ingram as the author of this epithet, since he was the first to apply the name to this plant (Royal Horticultural Society, 1947a). It is questionable whether Ingram originally intended “Incam” as the epithet of a Latin binomial. In the first publications where it appeared (Royal Horticultural Society, 1947a: 374, 1947b: Ivii), Ingram may have intended “Incam” merely as a shorthand notation of parentage, combining a syllable from each of the parent species. However, P. incam does not fit the definition of a hybrid formula as given in Article 23.6d and H.10.3 of the International Code of Botanical Nomenclature (McNeill et al., 2006). Ingram (1970: 182, 193) casually referred to seedlings of P. incisa × P. campanulata as the Incam grex. In the six decades that have passed since P. incam was first published, incam has come into common use as the Latin epithet for the hybrid P. incisa × P. campanulata. Meyer et al. (1993) cited this taxon as P. ×incam. Fletcher, attributing it to H. R. Fletcher, the author of the 1954 article presenting plants that received awards from the Royal Horticultural Society that year (Fletcher, 1954). However, Fletcher’s publication lacked Latin descriptions, so that the hybrid name was not validated in this publication. Meyer et al. may have overlooked several earlier articles on P. incisa × P. campanulata hybrids (Ingram, 1942, 1948; Royal Horticultural Society, 1947a, b) and the first publication of P. incam (Royal Horticultural Society, 1947a).

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Literature Cited


Alyssum misirdalianum (Brassicaceae), a New Species from Southern Turkey

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ABSTRACT. A new species, *Alyssum misirdalianum* Orcan & Binzet (Brassicaceae), is described from southern Anatolia, Turkey. The new species is restricted to southern Anatolia, in the southern part of Mersin Province. The morphological characters (oblanceolate leaves, obovate and glabrous petals, and ovate siliculae, 6–7 × 3–4.5 mm) support its placement in *Alyssum* L. sect. *Gamosepalum* (Haussknecht) Dudley, and the species appears to be most closely related to *A. corningii* Dudley.

Key words: Alyssum, Brassicaceae, IUCN Red List, Turkey.

The genus *Alyssum* L. (Brassicaceae) includes 89 species in the area covered by the *Flora of Turkey and the East Aegean Islands* (Dudley, 1965). Later studies have added new records (Dudley et al., 1997; Orcan, 1999; Orcan & Misirdali, 2000; Unal & Behçet, 2003; Orcan & Binzet, 2006) and new species (Aytaç & Duman, 2000; Orcan, 2005) to this total. Including the new species described here, the total number of *Alyssum* species in Turkey is increased to 97.

In 2002, a new specimen of *Alyssum* was collected with fruit in the plateau of Finikpman (Mersin Province) in Turkey. After research of the literature (Dudley 1964a, b, 1965; Ball & Dudley, 1996) and comparison of the new material with *Alyssum* specimens deposited at ANK, GAZI, HUB, and the herbarium of Mersin University, we determined that the new specimens were different from all other Turkish specimens and should be described as a new species.

*Alyssum misirdalianum* Orcan & Binzet, sp. nov.

TYPE: Turkey. Mersin Prov.: Finikpman, Deve Koyağı, 1800 m, stony slopes, 30 June 2002, N. Orcan 500 (holotype, ANK; isotypes, GAZI, MO).

Figure 1.

Haec species *Alyssum corningii* Dudley affinis, sed ab eo caule 10–20 cm (non 7–12 cm) alto, foliis oblanceolatis (non linear-lanceolatis), petalis obovatis glabris (non late spathulatis et sparse stellatis) atque fructibus ovatis 6–7 × 3–4.5 mm sparse stellatis (non orbiculari-ovatis 3.5–4 × 2.5–3.5 mm dense stellatis) differt.

Suffrutiaceous, strongly branched perennial; stems erect, 10–20 cm; indumentum dimorphic with 6- to 10-rayed stellate hairs; lepidote hairs ca. 0.25 mm diam. Leaves 5–15 × 2–3 mm, oblanceolate, obtuse or slightly acute, with stellate and lepidote hairs, decreasing in size upward. Inflorescence congested, fruiting raceme elongated, 2–5 cm. Flowers with sepals 3–3.5 mm, ovate, apex acute, margins membranous, with a tuft of long, divergently rayed, stellate hairs at the apex, sepals deciduous in fruit; petals 4–5 mm, obovate, round or truncate, glabrous, constricted below the limbs, claws denticulate; filaments of long stamens 3–3.5 mm, with connate or free appendages, ca. 1.5–2 mm; filaments of short stamens 2–2.5 mm, with connate appendages up to 1.5 mm; styles 2–3 mm, with sparse stellate hairs in the lower half. Siliculae 6–7 × 3–4.5 mm, ovate, truncate-emarginate, with sparse stellate hairs ca. 0.25 mm diam; seeds ca. 1.5 mm, ovoid, brownish green, narrowly winged.

Distribution and habitat. *Alyssum misirdalianum* inhabits stony slopes at an altitude of ca. 1800 m. It is endemic to Mersin Province, Turkey, where it is only known from the type locality.

IUCN Red List category. *Alyssum misirdalianum* is endemic to southern Anatolia, in the Mediterranean region. The specimens were collected in Mersin Province (C5), and the new species is known only from the type locality in an area of approximately 200 km². The population is not in good condition and therefore should be regarded as Endangered (EN) according to IUCN Red List criteria (IUCN, 2001).

**Phenology.** The new species is known to flower in May and June and to fruit in June and July.

**Etymology.** It gives us great pleasure to name the new species after Hüseyin Misirdali, who was Nenmin Orcan’s supervisor during her Ph.D. study.

**Discussion.** *Alyssum misirdalianum* should be placed in section *Gamosepalum* (Haussknecht) Dudley because of its perennial habit, dimorphic sepals, and 2-ovulate locule. *Alyssum tetraestemon* Boissier, *A. thymops* (Huber-Morath & Reese) Dudley, *A. baumgartnerianum* Bornmüller, *A. corningii* Dudley, and *A. lycaonicum* (O. E. Schulz) Dudley, which are distributed in southern Turkey, also belong to section *Gamosepalum*. *Alyssum misirdalianum* is closely related to *A. corningii*, but can be distinguished by

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<tr>
<th>Character</th>
<th><em>A. misirdalianum</em></th>
<th><em>A. corningii</em></th>
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<tr>
<td>Stem length (cm)</td>
<td>10–20</td>
<td>7–12</td>
</tr>
<tr>
<td>Leaf blade</td>
<td>5–15 × 2–3 mm, oblongate, obtuse or acute</td>
<td>6–10 × 0.5–2.5 mm, linear-lanceolate, acute</td>
</tr>
<tr>
<td>Sepals</td>
<td>ovate</td>
<td>ovate-lanceolate</td>
</tr>
<tr>
<td>Petals</td>
<td>obovate, round or truncate, glabrous</td>
<td>broadly spatulate, entire or subretuse, with sparse hairs on claws</td>
</tr>
<tr>
<td>Siliculae</td>
<td>6–7 × 3–4.5 mm, ovate, with sparse stellate hairs</td>
<td>3.5–4 × 2.5–3.5 mm, orbicular-ovate, with dense stellate hairs</td>
</tr>
<tr>
<td>General distribution</td>
<td>South Anatolia (C5)*</td>
<td>Central Anatolia (B4, B5, C4, C5)*</td>
</tr>
</tbody>
</table>

*Regional designations per Flora of Turkey.*
its oblong-obovate leaves (vs. linear-lanceolate), obovate, rotund or truncate, and glabrous petals (vs. broadly spatulate, entire or subretuse, with sparse hairs on claws), and ovate silicula, 6–7 × 3–4.5 mm (vs. orbicular-ovate, 3.5–4 × 2.5–3.5 mm) (Table 1).

The two species can be distinguished by the following key:

1a. Plants 10–20 cm; petals obovate, rotund or truncate, glabrous; silicula ovate, 6–7 × 3–4.5 mm . . . . . . . . . . . . . . . . . . . . . . . . . A. misrdalicanum
1b. Plants 7–12 cm; petals broadly spatulate, entire or subretuse, with sparse hairs on claws; silicula orbicular-ovate, 3.5–4 × 2.5–3.5 mm . . . A. corningii

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Literature Cited


Two New Species of *Stylogyne* (Myrsinaceae) from Brazil

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**ABSTRACT.** During routine identification of material of the genus *Stylogyne* A. DC. (Myrsinaceae), two new Brazilian species, *S. dusenii* Ricketson & Pipoly from the state of Paraná and *S. racemiflora* Ricketson & Pipoly from the state of Amazonas, are described and illustrated and their phylogenetic relationships are discussed.

**Resumen.** Durante el transcurso de identificar material herbarizado perteneciente al género *Stylogyne* A. DC. (Myrsinaceae) se descubrió dos especies nuevas brasileñas del mismo, *S. dusenii* Ricketson & Pipoly proveniente del estado de Paraná y *S. racemiflora* Ricketson & Pipoly proveniente del estado de Amazonas. Se describen, se ilustran ambas especies y se discuten su parentesco.

**Key words:** Amazonas, Brazil, IUCN Red List, Myrsinaceae, Paraná, *Stylogyne*.

The Neotropical genus *Stylogyne* A. DC. (Myrsinaceae) comprises approximately 36 species, and numerous species remain undescribed owing to a lack of adequate material. Understanding the systematic biology of this genus has long been problematic because of its sexual lability. Androdioecious, bisexual, polygamo-dioecious, and dioecious species of *Stylogyne* have been documented (Pipoly, 1989, 1991, 1999; Ricketson & Pipoly, 1997, 2003; Pipoly & Ricketson, 1999, 2000), as well as the consequent morphological variation due to sexual expression. Within the family, *Stylogyne* has often been confused with *Geissanthus* Hooker f. and *Ardisia* Swartz.

During routine identification of Brazilian material of *Myrsinaceae*, two new species of *Stylogyne* were discovered and are described here.

1. *Stylogyne dusenii* Ricketson & Pipoly, sp. nov.

**TYPE:** Brazil. Paraná: Volta Grande, 19 Nov. 1911 (fl.), P. Dusén s.n. (holotype, GH; isotype, S not seen). Figure 1.

Species haec inter congeneros flores 4-meros praeentes inflorescentiae expansae pinnae trium bifiditae paniculatae et laminae foliari secus margines crenatae crenulatavere singulariter distinguenda; quoad laminam secus margines crenatam vel crenulatam *Stylogyneae waringii* Mez arctissime affinis sed ab ea lamina foliari 8–12 × 3.4–4.9 (non 5.5–8.5 × 2.5–3.5) cm, inflorescentiae terminalibus (non lateralisibus) pinnae trium bifiditae paniculatae atque pedicellis 7–7.5 (non ad usque 3) mm longis praecellit distinguatur.

**Shrub or small tree of unknown height; branchlets ca. 2 mm diam., terete, smooth, glabrous. Leaves alternate; blades membranous, elliptic, 8–12 × 3.4–4.9 cm, apically acute, acumens to 1 cm, basally cuneate, midrib channelled adaxially, prominently raised abaxially, secondary veins numerous, brochidodromous, inconspicuously raised adaxially and abaxially, smooth adaxially, inconspicuously punctate and punctate-lineate, glabrous, margins flat, crenate to crenulate; petioles margins, 8–12 mm, slender, glabrous. Bisexual inflorescence terminal, a slender bipinnately compound, open pyramidal panicule, 2.8–3.2 × 6.7–7.4 cm, wider than long, usually shorter or as long as the leaves, branchlets and rachis glabrous, the fertile branches open, loosely congested into 7- to 11-flowered corymbs; peduncle terete, nearly obsolete to 1.3 mm, glabrous; inflorescence bracts absent; inflorescence branch bracts very early caducous, unknown; floral bracts membranous, lanceolate, 0.9–1.1 × 0.2–0.4 mm, apically acuminate, prominently punctate and punctate-lineate, glabrous, margins irregular, minutely erose, hyaline; pedicels slender, terete, 7–7.5 mm, inconspicuously punctate and punctate-lineate, glabrous. Bisexual flowers 4-merous; calyx lobes membranous to chartaceous, widely ovate to orbicular, 0.5–0.7 × 1.1–1.3 mm, apically acute to obtuse, prominently punctate to punctate-lineate, glabrous, margins irregular, minutely erose, hyaline; corolla white, membranous, 4.5–4.8 mm, tube 0.2–0.3 mm, lobes oblong, 4.4–4.3 × 2–2.3 mm, apically broadly acute to obtuse, prominently punctate and

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punctate-lineate, glabrous, margins entire, hyaline; stamens 3–3.6 mm, filaments 1.3–1.8 mm, staminal tube 0.2–0.4 mm, the apically free portion 1.1–1.6 mm, anthers broadly ovoid to oblong, 2–2.2 × 0.7–1 mm, apically apiculate, basally cordate, connective conspicuously punctate; pistil 2.9–3.1 mm, prominently punctate, glabrous, ovary ovate, 1.1–1.3 mm, style 1.5–1.7 mm, prominently punctate and punctate-lineate, ovules 5 to 12. Fruits unknown.

Distribution. *Stylogyne dusenii* is known only from the type collection, from Paraná, Brazil, located between 800 and 900 m in elevation.

Ecology and IUCN Red List category. The new species was collected from primary dense forest and cerrado vegetation; this vegetation type experiences a dry season from April to August. Given that the Volta Grande Dam has created a significant reservoir and interrupted the Grande River, the protection the area affords does not outweigh the susceptibility of the ecosystem to fires and to further development, since the region is located between two large interstate highways, just northeast of Curitiba in Brazil. Therefore, given the precarious habitat, its proximity to major development, and the species being known only from one collection not seen for 97 years, the taxon should be considered Critically Endangered (CR B1a) according to IUCN Red List criteria (IUCN, 2001).

Etymology. The new species is named for the collector, Per Karl Hjalmar Dusén (1855–1926).

Discussion. *Stylogyne dusenii* is unique among the 4-merous members of the genus, with its open, expanded, pinnate to bipinnate inflorescences and crenate to crenulate leaf blade margins. *Stylogyne dusenii* is most closely related to *S. warmingii* Mez, because of their shared crenate to crenulate leaf margins, but *S. dusenii* differs by its larger leaf blades (8–12 × 3.4–4.9 cm), its inflorescences terminal and pinnate to bipinnate, and its longer pedicels (7–7.5 mm long). *Stylogyne warmingii* has shorter leaf blades (5.5–8.5 × 2.5–3.5 cm), inflorescences that are laterally positioned and once pinnate, and shorter pedicels (to 3 mm long).
Quoad flores 5-meros inflorescentias laterales necnon laminas foliales chartaceas usque coriaceas species haec cum Stylogyne rodri
gueziana Pipoly primo intuitu confusa est, sed ab ea ramulis pumilae racemosis (non corcybiosis), lobis calycinis delatis (non anguste ovatis) 1.5-1.6 × 1.5-1.6 (sec 1.8-2.2 × 1-1.3) mm, lobis corallinis 3.5-3.7 × 1.2-1.4 (non 3.9-4.5 × 1.5-1.6) mm, denique antheris 3.1-3.2 (non 2.5-3.1) mm longis periacule recognaecitur.

Shrub or small tree 2-6 m, trunk 2.7-3 cm diam., the bark “scrolled scaly” (Junikka, 1994: 20); branchlets 3-5 mm diam., terete, smooth, glabrous. Leaves alternate; blades chartaceous to coriaceous, oblong to elliptic, 7.2-20.3 × 3.4-6.4 cm, apically acute to acuminate, acumen 1-1.5 mm, basally acute, midrib channeled adaxially, prominently raised abaxially, secondary veins numerous, brochidodromous, inconspicuously raised adaxially and abaxially, smooth and waxy adaxially, inconspicuously punctate and punctate-lineate, glabrous, margins flat, entire; petioles canalicate, 8-14 mm, stout, glabrous. Bisexual inflorescences lateral, appearing pseudoterminal, as an open pinnate panicle of racemes, 5.5-12 × 3-11 cm, usually shorter than the leaves, branchlets and rachis glabrous, the few branches open, 10- to 24-flowered racemes; peduncles terete, slender, 2.3-3.5 cm, glabrous; bracts and inflorescence branch bracts unknown; floral bracts membranous, ovate to rounded, 0.7-0.9 × 0.7-0.9 mm, apically obtuse to broadly acute, inconspicuously punctate and punctate-lineate, glabrous, margins irregular, minutely erose, hyaline; mature pedicels slender, terete, 3.2-4 mm, inconspicuously punctate to punctate-lineate, glabrous. Bisexual flowers 5-merous; calyx lobes chartaceous to slightly coriaceous, deltate, 1.5-1.6 × 1.5-1.6 mm, apically acute, prominently punctate to punctate-lineate, glabrous, margins undulate, hyaline, slightly crenate; corolla greenish white, thickly membranous to chartaceous, 4.8-5 mm, tube 1.3-1.5 mm, lobes oblong, 3.5-3.7 × 1.2-1.4 mm, apically broadly acute to obtuse, prominently punctate and punctate-lineate, glabrous, margins entire, hyaline; stamens 4.8-5 mm, filaments 1.8-2 mm, staminal tube 0.2-0.3 mm, the apically free portion 1.6-1.8 mm, anthers narrowly linear to narrowly lanceolate, 3.1-3.2 × 0.4-0.5 mm, apically apiculate, basally narrowly cordate, connective inconspicuously punctate; pistil 4.8-5 mm, prominently punctate, glabrous, ovary ovate, 2-2.2 mm, style 2.8-3 mm, prominently punctate and punctate-lineate, ovules 3 to 7. Fruits unknown.

Distribution. Stylogyne racemiflora is restricted to the Morro dos Seis Lagos area, within the binational Parque Nacional Pico da Neblina, with the type locality noted around 400 m in elevation.

Ecology and IUCN Red List category. The area is characterized by Cretaceous igneous rocks notable for their commercially valuable niobium-containing minerals that occur as intrusions into the pre-Cambrian sandstone of the Guayana Highland. Given the park’s boundary position and the commercial and global strategic value of the naturally scarce niobium, the location is considered one of the best guarded along the Brazil–Venezuela border. As such, the species should be considered of Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001).

Etymology. The specific epithet is in reference to the unique racemose branches of the inflorescence.

Discussion. Stylogyne racemiflora is endemic to the Morro dos Seis Lagos area from numerous collections. It was originally confused with and is most closely related to S. rodriqueziana Pipoly. Both species have 5-merous flowers, glabrous, expanded lateral inflorescences, and chartaceous to coriaceous leaf blades. However, S. racemiflora differs in having an inflorescence of an open pinnate panicle of racemes, broadly ovate calyx lobes (1.5-1.6 × 1.5-1.6 mm), smaller corolla lobes (3.5-3.7 × 1.2-1.4 mm), and longer anthers (3.1-3.2 mm long). Stylogyne rodriqueziana has an inflorescence of an open bi- or tripinnate panicle of corynbs, narrowly ovate calyx (1.8-2.2 × 1-1.3 mm), larger corolla lobes (3.9-4.5 × 1.5-1.6 mm), and shorter anthers (2.5-3.1 mm).

Much of the material of Stylogyne racemiflora was previously regarded as paratypes of S. rodriqueziana (Pipoly, 1991). The original description of S. rodriqueziana is based on the type material W. Rodrigues & Chagas 3092 (INPA, NY). The only portion of the S. rodriqueziana description that needs to be altered is a portion of the discussion that references “racemose branchlets of the panicles” (Pipoly, 1991: 202). However, S. rodriqueziana is clearly characterized by an open bi- or tripinnate panicle of corynbs.

Paratypes. BRAZIL. Amazonas: Mpio. São Gabriel da Cachoeira, Morro dos Seis Lagos, 00°20'N, 066°45'W, 400 m, 30 Sep. 1990 (st.), B. Nelson 2077 (INPA, MO), (fl.), B. Nelson 2142 (INPA, MO), (st.), B. Nelson 2150 (INPA, MO), (fl.), B. Nelson 2354 (INPA, MO), 2603 (INPA, MO).

Literature Cited

New Species of *Lachemilla* (Rosaceae) from South America

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**Abstract.** Two new species of *Lachemilla* (Focke) Rydberg (Rosaceae) from the Andes of Ecuador and Colombia are described and illustrated. *Lachemilla llanganatensis* Romoleroux, from Ecuador, is characterized by its loosely ascending habit, sparsely short-hispid indumentum, presence of entire basal leaves, and ascending to spreading, verticillate stem leaves. The flowers are grouped in cymes of three to six flowers, with spreading sepals and episepals, and the hypanthia are often sparsely hisrate. *Lachemilla kieftiana* Romoleroux, from Colombia, is distinguished by its stoloniferous habit and basal leaves in rosettes with subreniform to 3-lobed, sericeous blades. The flowers are grouped in cymes of three to 10 flowers, subsessile, floral bracts free, with ascending sepals and episepals, and the hypanthia are mostly sericeous.

**Resumen.** Se describen e ilustran dos nuevas especies de *Lachemilla* (Focke) Rydberg (Rosaceae) de los Andes de Ecuador y Colombia. *Lachemilla llanganatensis* Romoleroux, del Ecuador, se caracteriza por su hábito ascendente, pubescencia en particularmente hispida, presencia de hojas basales enteras, y hojas distales verticiladas con lóbulos foliares ascendentes a horizontales. Flores agrupadas en cimas de tres a seis flores, con sépalos y episépalos horizontales e hipantio esparcidamente hisrado. *Lachemilla kieftiana* Romoleroux, de Colombia, se distingue por el hábito estolonífero y hojas basales en roseta, láminas subreniformes, sericicas. Flores agrupadas en cimas de tres a 10 flores, sésiles o sub-sésiles, brácteas florales libres, y sépalos y episépalos ascendentes e hipantio sericeo.

**Key words:** Andes, Colombia, Ecuador, IUCN Red List, *Lachemilla*, Rosaceae.

*Lachemilla* (Focke) Rydberg is a Neotropical genus of perennial herbs and shrubs with approximately 75 species, occurring from the southern high mountains of Mexico to northern Chile and Argentina. Species diversity is highest in the region from Venezuela to Ecuador (Romoleroux, 2004). *Lachemilla* is recorded as an important and species-rich genus in páramos, where it can form dense stands, and together with other páramo plants serves as source of water. *Lachemilla* was initially described as a section of *Alchemilla* L., a genus distributed in Europe, Asia, and northern Africa (Focke, 1888; Perry, 1929). Rydberg (1908) and Rothmaler (1937), however, treated *Lachemilla* as a genus distinct from *Alchemilla* on the basis of floral differences and geographic distribution. A complete monograph of *Lachemilla* is currently being prepared by the author, since the last published revision was that of Perry (1929). Preliminary molecular studies on *Lachemilla* have shown that *Lachemilla* is monophyletic and that it is closely related to *Alchemilla* and *Aphanes* L. (Gehrke et al., 2008).

The purpose of this paper is to describe two new species of *Lachemilla* from the Andes of Ecuador and Colombia. The following new species were discovered during comprehensive study of the genus.

1. *Lachemilla llanganatensis* Romoleroux, sp. nov. **TYPE:** Ecuador. Tungurahua: Cordillera de Llanganates, Páramo de Jaramillo, 78°22’W, 1°10’S, 4000–4250 m, 2 Nov. 1984, S. Laegaard 53287 (holotype, AAU; isotype, QCA). Figure 1.

Haec species quoad indumentum hispidum etiam folia caullna reducta vaginas lobatam verticillatas formantia *Lachemillae hispidae* (L. M. Perry) Rothmaler similis, sed ab ea habitu laxe ascendentis, pubescentia sparsiss breviterque hispida, praesentia foliorum basaliy, lobis distalis foliorum caulinarum ascendentibus vel patentibus, sepalis et episepalis patentibus atque hypanthio intero et achenes basaliiter plenamque sparsim hisratus distinguantur.

Subshrubs; stems loosely ascending, slightly branched at apex, sparsely short-hispid. Basal leaves usually present, blades obovate in outline, 3- to 5-lobed at apex, 4.65 × 2.3 mm, coriaceous, margins serrate, sparsely villous mostly on the veins; petioles 1–3 mm; stipules usually present, 4–8 mm, basally adnate to petioles, free at the apex, membranous, brown. Stem leaves reduced, adnate with stem stipules to form verticillate, lobed sheaths, sheath lobes 6 to 9, spreading at maturity, deltate-lanceolate, 3.5 × 1.2 mm (3/4 to 5/6 of the entire sheath length),

coriaceous, margins strongly revolute. Inflorescences of terminal and axillary glomerulate 3- to 6-flowered cymes; floral bracts lobed, ascending; pedicels 0.1–0.4 mm, hirsute, or absent. Flowers 1.7–2.3 mm; hypanthium turbinate to globose at maturity, 1–1.5 × 0.8–1.2 mm, appressed-villous outside, glabrous or sparsely hirsute within, with reddish glands at base of hairs; episeals and sepals spreading to curved or
slightly connivent at maturity, green, abaxially pilose to hirsute, adaxially glabrous; epispals 4, deltate, 0.3–0.55 × 0.2–0.4 mm; sepals 4, ovate-deltate, 0.7–0.8 × 0.4–0.6 mm; stigmas subclavate. Achenes 2, ovoid-globose, 0.9–1.2 × 0.7–0.8 mm, surface slightly reticulate, usually sparsely hirsute at base.

**Distribution, habitat, and phenology.** Lachemilla llanganatensis is known from the Cordillera de los Llanganates, in the east-central Ecuadorian Andean region, from 3950–4350 m. It has been found growing in windswept open rocky areas and in bunchgrass páramo with *Swallenchoila* McChure spp. and other *Lachemilla* spp. The species was collected in flower in November.

**IUCN Red List category.** *Lachemilla llanganatensis* should be classified as DD (Data Deficient) according to IUCN Red List criteria (IUCN, 2001). The species has been found in a limited area of distribution, which suggests that it is a rare taxon. It is possible, however, that the species still persists in nearby areas with similar habitats.

**Etymology.** The specific epithet of *Lachemilla llanganatensis* is derived from the Cordillera de los Llanganates, where the type was collected. The Cordillera de los Llanganates is known for being difficult to access and is the subject of Incan legends.

**Relationships.** *Lachemilla llanganatensis* resembles *L. hispida* (L. M. Perry) Rothmaler in its hispid indumentum and reduced stem leaves that form verticillate lobed sheaths. However, *L. llanganatensis* differs in its loosely ascending habit, short-hispid indumentum, the presence of basal leaves, the spreading to curved stem leaf lobes, the spreading sepals and epispals, and the sparsely hirsute internal basal part of the hypanthia and achenes.

**Paratypes.** ECUADOR, Tungurahua: Cordillera de los Llanganates, upper steep rocky part of Cerro Hermoso, 1°9'S, 78°21'W, 4100 m, 11 Nov. 1980, L. Holm-Nielsen & J. Jaramillo 28449 (AU); Páramo de Jaramillo, 12 km NW of Cerro Hermoso, 1°13'S, 78°17'W, 4350 m, 13 Nov. 1980, L. Holm-Nielsen & J. Jaramillo 28831 (AU), Tungurahua-Napo: shoulder of Cerro Hermoso, 1.5 km W of the summit, 1°13'S, 78°18'W, 3950 m, 12 Nov. 1980, L. Holm-Nielsen & J. Jaramillo 28739 (AU).

2. *Lachemilla kieftiana* Romoleroux, sp. nov.

**TYPE:*** Colombia. Magdalena: Sierra Nevada de Santa Marta, SE slopes, Hoya del Rio Donachui, Laguna de Calocribe (E of Mecolacca), páramo 3600–3700 m, 30 Sep. 1959, J. Cuatrecasas & R. Romero-Castanedo 24554 (holotype, U; isotype, NY). Figure 2.

Haece species quod habitum, indumentum etiam foliorum formam *Lachemilla uniflora* Maguire similis, sed ab ea folis majoribus, hypanthio extus pro parte maxima sericeo atque epispals brevioribus distinctur.

Herbs stoloniferous; branches decumbent, ± sericeous-villosus. Basal leaves in rosettes, blades sub-reniform in outline, slightly 3-lobed, 8–12 × 15–21 mm, chartaceous, lateral lobes occasionally bilobed, margins crenulate-serrate, abaxially sericeous mostly on the veins, adaxially sericeous-villosus to sparsely villous; petioles 8–20 mm; stipules 4–7 mm, basally adnate to petiole, free and acute at the apex, membranous, entire, brown. Stem leaves absent or reduced, 3-parted, 5–6.5 × 1.5–3 mm, adnate to the stipular lobes at base; stipular lobes 3–5 × 1.2–2 mm, deltate, spreading to curved. Inflorescence of axillary and terminal, glomerulate, 3–to 10-flowered cymes; floral bracts lobed, ascending or spreading; pedicels to 0.5 mm, or absent. Flowers 1.5–2.3 mm; hypanthium elongate to urceolate at maturity, 0.7–1.3 × 0.5–0.8 mm, glabrescent at base to sericeous at apex outside, glabrous within, reddish brown; epispals and sepals ascending, brownish red, abaxially sparsely sericeous, adaxially glabrous; epispals 4, deltate, 0.6–0.7 × 0.25–0.35 mm; sepals 4, deltate-ovate, 0.75–1 × 0.5–0.6 mm; stigmas clavate. Achenes 3 to 5, globose-ovoid, 0.8–1 × 0.6–0.8 mm, surface slightly reticulate-bullate, glabrous.

**Distribution, habitat, and phenology.** *Lachemilla kieftiana* is only known from the Sierra Nevada de Santa Marta in Colombia, between 3350 and 3700 m, where it grows in open páramo and scrub vegetation. The species has been collected in flower in September.

**IUCN Red List category.** *Lachemilla kieftiana* should be classified as DD (Data Deficient) according to IUCN Red List criteria (IUCN, 2001). The species has been found in a limited area of distribution, which suggests that it is a rare taxon. It is possible, however, that the species persists in nearby areas with similar habitats.

**Etymology.** The name of the species honors Bert Kieft, a former Ph.D. student at Utrecht University, who collected, studied, and identified many specimens of Andean Lachemilla.

**Relationships.** This new species is similar to *Lachemilla uniflora* Maguire in habit, indumentum, and form of the leaves. However, *L. kieftiana* differs by having larger leaves and cymes of three to 10 flowers. In *L. uniflora*, flowers are solitary or occasionally in few-flowered cymes of three to 10 flowers, the hypanthia mostly glabrous, and the epispals shorter than those of *L. kieftiana*. 
Paratypes. COLOMBIA. Magdalena: Sierra Nevada de Santa Marta, “Vallejito de la Laguna Perdida, entre la fila la Cumbre y la Cuchilla la Cimarrona,” 3350 m, O. Rangel 13925 (U); Caserio de San Sebastián, Bellavista, 3500 m, O. Rangel 1985 (NY).

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Literature Cited


A New Species of *Catolesia* (Asteraceae, Eupatorieae) from Bahia, Brazil

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**Abstract.** *Catolesia* D. J. N. Hind is an endemic, previously monotypic genus (Asteraceae, Eupatorieae) from the campos rupestres of Bahia, Brazil. A second species for the genus, *C. huperzioides* Roque, H. Robinson & A. A. Conceição, is recognized and described here. It is distinguished from *C. mentiens* D. J. N. Hind principally by the well-organized terminal synflorescence composed of (7)8 to 12 capitula, of which one is central and larger, its shorter leaves (4–5 mm vs. 7–19 mm in *C. mentiens*), its white corolla (vs. pink), and the pappus (a brief crown to 0.1 mm vs. mostly absent). *Catolesia huperzioides* is known only from the municipality of Mucugê and is probably endemic to the Chapada Diamantina Region of Bahia, Brazil.

**Key words:** Brazil, *Catolesia*, Compositae, Gyptidinae, IUCN Red List.

*Catolesia* D. J. N. Hind was recently described (Hind, 2000b) as a monotypic genus for the tribe Eupatorieae (Asteraceae) based on the taxon *C. mentiens* D. J. N. Hind. The genus exhibited obvious affinities with the subtribe Gyptidinae, especially in its spiral insertions of leaves, the biseriate and not imbricate involucres, the paleaceous receptacle, the narrowly funnelform corolla tubes, and the eppaposome cypsela with more or less procumbent upper margins to the carpodium (Hind, 2000b).

The subtribe Gyptidinae of the tribe Eupatorieae is distributed mostly in eastern South America, with its greatest taxonomic diversity in the campos rupestres of Brazil. Of the 29 genera and ca. 135 species in the subtribe, 13 genera are exclusively Brazilian and nine are restricted to the state of Bahia (Hind & Robinson, 2007).

The taxonomy of the Gyptidinae has recently been discussed by Hind (1999, 2000a, b; Hind & Robinson, 2007), and three informal groups were recognized within the subtribe. *Catolesia* falls clearly into Hind’s second group with “many-flowered capitula, densely spirally inserted leaves and many with variously defective pappus setae” (2000b: 944). According to Hind, *Catolesia* and *Agriantus* Martin ex DC. are the only genera in the subtribe that possess paleaceous receptacles. However, *Agriantus* differs by its pubescent stems, scale-like leaves that are densely prominently veined and without any hint of succulence, (2)3- to 5-seriate phyllaries, cladav style branches, and setiform pappus.

The new taxon is described and illustrated and ecological information is provided. The data presented here are based on literature revisions and an analysis of *Catolesia* collections and types available at ALCB, HUEFS, and US. Morphological studies using an Olympus SZH10 stereomicroscope (Olympus, Tokyo, Japan) were carried out on dry material.


Hace species a *Catolesia mentiente* D. J. N. Hind synflorescentia terminali ex capitulis aggregatis sessililibus biformibus constante, foliis brevioribus (4–5 mm longis), corollis albis et pappo breviter coroniformi ca. 0.1 mm longo semper praeente distincta.

Candelabriform shrub 0.6–0.9 m; stems 0.4–1 cm diam., glabrous, branched from base, 6 to 8 branches pseudowhorled beneath old synflorescences, densely leafy in upper half, leaf blades lost on older stem but sheaths persistent. Leaves densely spiraled, imbricating...
Figure 1. *Catoleia huperzioides* Roque, H. Robinson & A. A. Conceição. —A. Fertile habit. —B. Synflorescence on the apex of the branch showing eight capitula, with the central one significantly larger. —C. Detail for the lanceolate, somewhat succulent leaf with a cluster of three glandular dots shown at right. —D. Receptacle and involucre of a peripheral capitulum. —E. Receptacle and involucre of the central capitulum. —F. Outer phyllary. —G. Inner phyllary. —H. Palea. —I. Floret. —J. Papillose apices of two corolla lobes. —K. Stamen, showing appendage and collar. —L. Floret dissected to show the nectary surrounding the styril base. —M. Cypsel with a short dentate to laciniate corinaform pappus. Drawn from the holotype *A. A. Conceição & P. D. Corvalho 1804* (HUEFS).

cate, sessile, simple, concolorus, lanceolate, slightly succulent in appearance, blades 4–5 × 0.7–0.9 mm, adaxially glabrous and pitted with 1 or an assemblage of glandular dots, abaxially glabrous, midrib carinate in both sides, blade margins in distal half undulate, apices acute, pungent and incurved. Synflorescences terminal, corymbose, more than 200 in a single plant, each 0.5–1 cm, 1–1.5 cm diam., hemispheric, sur
rounded by leaves subequal to the capitula; each synflorescence with (7)8 to 12 capitula, with 1 capitulum central and larger by its width and additional florets. Capitula homogamous, discoid, cylindric, sessile, the peripheral capitula 6–7 mm, 2–3 mm diam., the central capitulum 6–7 mm, ca. 5 mm diam.; bracteoles 3 to 5 per capitulum, leaflike, thick, linear, 4–5 × ca. 0.5 mm, outer surface and margins glandular-punctate in the epidermal pits, margins entire, ciliate, apices acute, mucronate. Involute campanulate, phyllaries biseriate, cream, 17 to 20, distant, subequal, outer phyllaries 8 to 10, persistent, slightly keeled, with base inflated, lanceolate, 4–4.5 × ca. 0.5 mm, glabrous, margins slightly sinuate with stipitate-glandular cilia, apices acute, inner phyllaries 9 to 10, easily falling, slightly keeled, with base inflated, lanceolate, ca. 5 × 0.8–1.2 mm, margins with stipitate-glandular cilia, apices acute; receptacle convex, alveolate, glabrous, paleaceous, paleae 4 to 6, scattered among flowers, deciduous, slightly keeled, with base inflated, linear to spatulate, 4–5 × 0.5–0.7 mm, glabrous, margins with stipitate-glandular cilia, apices acute. Flowers bisexual, ca. 10 in peripheral capitula and 26 to 30 in central capitulum, 4.5–5.5 mm, corolla white, actinomorphic, 2.5–3 × ca. 1 mm, glabrous, corolla lobes 5, narrowly triangular, ca. 0.5 mm, papillose outside, margins involute; anther cylinder included within corolla.

Table 1. Morphological differences between Catolesia huperzioides Roque, H. Robinson & A. A. Conceição and C. mentiens.

<table>
<thead>
<tr>
<th>Characters</th>
<th>C. mentiens</th>
<th>C. huperzioides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf shape</td>
<td>narrowly oblanceolate</td>
<td>lanceolate</td>
</tr>
<tr>
<td>Leaf size (mm)</td>
<td>7–19 × 1.1–2.1</td>
<td>4–5 × 0.7–0.9</td>
</tr>
<tr>
<td>Capitula</td>
<td>in loose groups at branch apices, capitula similarly sized, pedunculate</td>
<td>a synflorescence with (7)8 to 12 congested at branch apices, the central capitulum notably larger, all capitula sessile</td>
</tr>
<tr>
<td>Florets</td>
<td>ca. 20, corolla pink</td>
<td>ca. 10 in peripheral capitula and 26 to 30 in central capitulum, corolla white</td>
</tr>
<tr>
<td>Pappus</td>
<td>absent or very rarely with minute abortive setae on apical callus</td>
<td>short dentate to laciniate crown ca. 0.1 mm long</td>
</tr>
</tbody>
</table>
throat, oblong, ca. 1 mm, apical anther appendages triangular, ca. 0.2 mm, as long as wide, apices rounded, anther collar prominent and distinctly wider than filament; style ca. 3 mm, style branches linear to filiform, ca. 1.5 mm, papilllose, nectary present. Cypselae 1.5–2 mm, 5-ribbed, glabrous; carpopodium inconspicuous; pappus a short dentate to laciniate crown ca. 0.1 mm.

Habitat and distribution. Catolesia huperzioides was collected from campos rupestres, at the summit and slopes of the Serra do Esparrancado from 1450–1700 m, where there is frequent mist in the morning. The plants are found growing in sandy soil between rocks among herbs and shrubs. The new species is known only from the municipality of Mucugê and is probably endemic to the Chapada Diamantina Region of Bahia, Brazil.

IUCN Red List category. According to the available information about this species, it can be considered Critically Endangered (CR B1ab; B2ab) according to IUCN Red List criteria (IUCN, 2001) because of its restricted distribution (only one locality).

Etymology. The specific epithet alludes to the vegetative similarity of the new species to Huperzia mooreana (Baker) Holub (Lycophtya, Lycopodiaceae), a very common species in the Serra do Sincorá that is also found in the Chapada Diamantina Region.

Discussion. Catolesia huperzioides has all of the characteristics that distinguish the genus. The plant is a candelabrum shrub, poorly branched at the base, moderately branched in the upper half, and pseudo-whorled beneath old inflorescences; the leaves are slightly succulent and lack any nonglandular trichomes; the inflorescences are terminal and corymbose; and the receptacle is paleaceous. However, C. huperzioides has several interesting characters that distinguish the species. The principal differences include the leaves that are lanceolate with pungent and incurved tips (vs. narrowly oblanceolate, rather blunt, and not incurved at all in C. mentiens); smaller leaf blades (4–5 mm vs. 7–19 mm in C. mentiens); the capitula that form a highly congested terminal synflorescence composed of (7)8 to 12 capitula, sessile, congested, with the central capitulum markedly larger with twice as many florets (vs. the synflorescence in C. mentiens that is also composed of several capitula [10(to 12), rarely few (4)] but these more diffuse, similarly sized, and conspicuously pedunculate); and the cypsela with a short, coroniform pappus (vs. seta absent or abortive) (Table 1).

Catolesia huperzioides was collected in the same type of habitat as C. mentiens, in the campos rupestres of the Chapada Diamantina Region. Given the taxonomic diversity of the Gypsidinae in the campos rupestres, the discovery of the new species further supports the habitat as a major center of diversity for the subtribe within the state.


Acknowledgments. Special thanks to Natanael Nascimento and Daniela Guimarães for the line drawing in Figure 1; to the curators of ALCB, HUEFS, and US for making specimens available; and to the manuscript reviewers for their useful comments.

Literature Cited
Eleocharis gonzaleziae (Cyperaceae), a New Species from Northern Mexico

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Abstract. Eleocharis gonzaleziae D. J. Rosen, a new species from the high plateau of northern Mexico, is described from the state of Durango and illustrated. Taxonomic notes on the new species are provided, including a comparison to a morphologically similar species, E. bolanderi A. Gray.

Resumen. Eleocharis gonzaleziae D. J. Rosen, una nueva especie del Altiplano del México norteño, se describe del estado de Durango y se ilustra. Las notas taxonómicas sobre la nueva especie se proporcionan, incluyendo una comparación a una especie morfológicamente parecida, E. bolanderi A. Gray.

Key words: Cyperaceae, Eleocharis, IUCN Red List, Mexico, subspecies Truncatae.

Eleocharis R. Brown is a worldwide genus of about 200 species and about 600 published names and with a concentration of taxa in tropical America (González-Elizondo & Tena-Flores, 2000). Eleocharis is characterized by bladeless leaf sheaths, its inflorescence comprising a single spikelet at the summit of the culm, bisexual flowers, and a fruit (achene) bearing a persistent style base or tuberole. The structural simplicity of Eleocharis morphology and lack of phylogenetically informative characters make it one of the most taxonomically difficult genera in Cyperaceae (González-Elizondo & Tena-Flores, 2000). Eleocharis includes many difficult species complexes in need of taxonomic revision involving species that have never been clearly defined (Smith, 2001).

Eleocharis was first treated comprehensively by Svenson (1929, 1932, 1934, 1937, 1939), representing the first attempt to critically compare Old World and New World species. Svenson’s (1929) worldwide monograph included a conservative infrageneric classification of 11 series and six subspecies. A more recently proposed infrageneric classification (González-Elizondo & Peterson, 1997) comprises four subgenera, seven sections, eight series, and seven subspecies.

Eleocharis subsp. Truncatae Svenson is strictly an American group belonging to subgenus Eleocharis, section Eleocharis, series Eleocharis (González-Elizondo & Peterson, 1997), and is currently in need of revision throughout its range (Smith et al., 2002; González-Elizondo & Reznicek, 2005). Eleocharis subser. Truncatae is distinguished by its truncate, indurate upper sheaths with a sometimes prominent tooth or apiculate projection and its trigonous achenes (Svenson, 1929; González-Elizondo & Peterson, 1997). In Mexico, subspecies Truncatae is currently represented by ca. 10 species (McVaugh, 1933; Espejo Serna & López Ferrarí, 1997; Strong & González-Elizondo, 2000) and includes a taxonomically difficult species complex involving E. montevidensis Kunth and its many forms, allied species (e.g., E. dombeiana Kunth, E. ignota S. González & Reznicek), and several undescribed taxa (González-Elizondo & Reznicek, 2005; González-Elizondo, pers. comm.).

Recent study of material belonging to subspecies Truncatae collected during a field trip in the Mexican state of Durango has led to the discovery of a remarkably distinct, yet undescribed species.

Eleocharis gonzaleziae D. J. Rosen, sp. nov. TYPE: Mexico. Durango: Mpio. Durango, W of roadside of MEX Hwy. 23, betw. Mezquital & Durango, ca. 26 km S of Durango, 23°53’08.2”N, 104°30’01.8”W, 1845 m, 16 Sep. 2005, D. J. Rosen 3507 with S. González-Elizondo, R. Carter, R. Guaglianone, P. Peterson, A. Torres (holotype, CIIDIR; isotypes, MICHO, MO, TAES, TEX, VSC, WIS), Figure 1.

Hace species Eleocharis bolanderi A. Gray simillimia, sed ab ea culmis elatis, vaginis foliariis distalibus dente conspicuo instructis, spiculis angustioribus, squamis angustioribus pallidioribus et achenis minoribus differt.

Perennial, densely tufted; roots fine, fibrous, mostly drab brown; rhizomes caudex-like, mostly hidden by culms and roots, short, 2.1–2.8 mm diam., hard, cortex persistent, internodes very short, scales not evident. Culms subterete, often prominently blunted-ridged when dry, 31–41.5 cm × 0.5–0.6 mm, internally spongy, light green, fragile and brittle when dry. Distal leaf sheaths persistent, not splitting, proximally brown, pinkish, or stramineous, distally stramineous, longitudinally ridged, apex truncate, callose, brown-tined, prominent tooth present, the free portion 0.4–

doi: 10.3417/2007167


0.6 mm long. Spikelets ovoid, 5–7 × 1.2–1.5 mm, apex acute; proximal scale persistent and amplexicaul, entire, broadly rounded, the distal portion hyaline-erose; subproximal scale with flower; remaining floral scales loose, ascending in fruit, midrib regions stramineous, marginally dark purplish to dark brown, ovate to lanceolate, 1.7–2.3 × 0.8–0.9 mm, apex entire, acute, hyaline. Flowers with perianth
Table 1. Morphological comparison of Eleocharis gonzaleziae and E. bolanderi.

<table>
<thead>
<tr>
<th>Characters</th>
<th>E. gonzaleziae</th>
<th>E. bolanderi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Culm height (cm)</td>
<td>31–41.5</td>
<td>10–30</td>
</tr>
<tr>
<td>Distal leaf sheath tooth</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>Spikelet width (mm)</td>
<td>1.2–1.5</td>
<td>2–3</td>
</tr>
<tr>
<td>Floral scale width (mm)</td>
<td>0.8–0.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Floral scale color</td>
<td>stramineous, marginally dark</td>
<td>dark brown to blackish, midrib stramineous or greenish</td>
</tr>
<tr>
<td></td>
<td>to dark brown</td>
<td></td>
</tr>
<tr>
<td>Achen dimensions (mm)</td>
<td>0.8–0.9 × 0.5–0.6</td>
<td>0.9–1.2 × 0.7–0.8</td>
</tr>
</tbody>
</table>

Habitat and distribution. Eleocharis gonzaleziae grows mixed with other species of Eleocharis in standing water in deep soils at 1845 m above sea level. It is possibly an endemic of the Mexican Plateau region in the state of Durango and is currently known only from the type collection.

IUCN Red List category. Fieldwork in 2007, in the region of the type locality, failed to yield discovery of any additional populations of Eleocharis gonzaleziae. For now, it seems sufficient to assign a conservation status as DD (Data Deficient) according to IUCN Red List criteria (IUCN, 2001).

Etymology. The name of the species is dedicated to my generous colleague, friend, and sedge authority, M. Socorro González-Elizondo, founder and Curator of the Herbarium, CIDIR Unidad Durango, Instituto Politécnico Nacional.

Relationships. Eleocharis gonzaleziae most closely resembles E. bolanderi A. Gray of the northwestern United States. Previous reports of E. bolanderi (as E. montevidensis var. bolanderi (A. Gray) V. E. Grant) by Espejo Serna and López Ferrar (1997) in Mexico are based on specimens of E. montevidensis s.l. with thick rhizomes (González-Elizondo, pers. comm.). Eleocharis gonzaleziae differs from the other slender-culmed species of subspecies Truncatae in the Mexican high plateau in having achenes with a broadly truncate apex and a sunken, apiculate tubercle. Table 1 provides a comparison of characters between E. gonzaleziae and the morphologically similar E. bolanderi.

Acknowledgments. I am grateful to Richard Carter, Socorro González-Elizondo, E. Rosa Guagianone, Paul Peterson, and Abraham Torres Soto for their help and companionship in the field. I am also grateful to Galen Smith for helpful discussion about Eleocharis bolanderi and E. gonzaleziae, and Tony Reznicek for preparing the Latin diagnosis and reviewing the manuscript. The comments of Mark Strong, Victoria C. Hollowell, and an anonymous reviewer were helpful in preparation of the final manuscript. Special thanks to Neva Mikulicz for preparing the illustration. Support for travel was provided by the Frank W. Gould Award for Graduate Student Research in Plant Systematics.

Literature Cited
Ruella saccata, a New Species of Acanthaceae from Bolivia

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Abstract. Ruella saccata Schmidt-Lebuhn & E. Tripp, a new species of Acanthaceae from Beni, Bolivia, with a highly distinctive corolla morphology, is described as new to science. The novelty resembles and is related to R. brevifolia (Pohl) C. Ezcurra, but differs in the presence of a pronounced corolla pouch, a longer corolla with a narrower orifice, and a spreading to procumbent habit. Its differences from and similarities to other species in the genus are also discussed, and an updated key to the red-flowered Bolivian species of Ruellia L. is presented.

Resumen. Ruella saccata Schmidt-Lebuhn & E. Tripp, una nueva especie de Acanthaceae de Beni, Bolivia, que tiene una corola morfolóxicamente muy distintiva, es descrita como nueva para la ciencia. La nueva especie se asemeja y está relacionada a R. brevifolia (Pohl) C. Ezcurra, pero se distingue por tener una corola más larga con un orificio más estrecho y una bolsa pronunciada en la misma, así como por presentar un hábito extendido y procumbente. Las diferencias y semejanzas de la nueva especie a otras en el género también son discutidas, y una clave actualizada para las especies bolivianas de Ruellia L. de flores rojas es presentada.

Key words: Acanthaceae, Andes, Bolivia, hummingbird pollination, IUCN Red List, Ruellia, Ruelleae, Ruellioideae, South America.

The genus Ruellia L. (Acanthaceae), with ca. 300 species, is particularly diverse in regions of western South America that host an impressive diversity of hummingbirds. It has been suggested that the diversification of some 330 species of hummingbirds began between 12 and 17 million years ago (Ma) and was partly driven by the Andean uplift (Bleiweiss, 1998a). This hummingbird diversity probably helps to explain species richness in some groups of plants (Bleiweiss, 1998b). One lineage in the Physiruellia clade of Ruellia (sensu Tripp, 2007; section Physiruellia Lindau) may be such an example. Centered on the widespread and morphologically variable R. brevifolia (Pohl) C. Ezcurra, this lineage contains at least 40 species (Ezcurra, 1989) that are distributed across portions of eastern Brazil, northern Argentina, Paraguay, Uruguay, Bolivia, Peru, Ecuador, and Colombia. A large portion of the species in this lineage, including the new taxon we discuss below, is adapted to pollination by hummingbirds. Among these species are R. chartacea (T. Anderson) Wasshausen, R. gracilis Rusby, R. haenkeana (Nees) Wasshausen, R. longipedunculata Lindau, R. pearcei Rusby, R. raizana (Nees) Lindau, and R. sanguinea Grisebach. Although species in this clade are morphologically distinguishable by both vegetative and floral traits, they show little genetic divergence, suggesting that the lineage may be young in age. A simple molecular clock approach estimated the most recent common ancestor of Ruellia to be approximately 9–14 Ma (Tripp, 2007), thus the age of this particular lineage may be even younger. It seems plausible that a mutualistic relationship with hummingbird pollinators, in combination with the Andean orogeny and other geological and climatological events, may have led to some level of diversification in one or both groups of organisms.

During fieldwork in 2000, a population of a red-flowered Ruellia was discovered on the flank of a hill directly south of the Bolivian town of Rurrenabaque. The plants were initially identified as Ruellia cf. brevifolia, as this species is known to be common, widely distributed, morphologically variable, and shows the herbaceous habit of and approximately the same corolla size as the new population. Closer examination, however, revealed several striking differences from R. brevifolia, particularly in corolla morphology and growth form. Even though recent, regional taxonomic treatments are available for the genus in Bolivia as well as some surrounding areas (Ezcurra, 1993a, b; Wasshausen & Wood, 2003, doi: 10.3417/2008021

2004), the newly discovered plant was not among the species known from Bolivia or other countries of southern South America. After a revision of the relevant literature and some 1000 specimens of *Ruellia* available to the second author, we concluded that the plant represented a new, undescribed species. The present paper describes the novelty and discusses its presumed relationships to other species of the genus.

**Ruellia saccata** Schmidt-Lebuhn & E. Tripp, sp. nov.  
**TYPE**: Bolivia. Dept. Beni: José Ballivián Prov., abajo de una colina directo al sur de Rurrenabaque, 14°27′S, 67°32′W, 250 m, 8 Sep. 2000, A. N. Schmidt-Lebuhn 60 (holotype, LPB; isotypes, GOET, US). Figures 1, 2.

Hence species *Ruellia brevifolia* (Pohl) C. Eucara affinis, sed ab ea corridis ventralibus saccatis 23–30 mm longis ad orificium constrictoribus et habitu procumbente differt.

Perennial herb to ca. 50 cm tall; stems weakly erect, soon spreading horizontally and ± procumbent, internodes 3–9 cm, glabrous. Leaves petiolate; margins subentire to weakly crenulate; petioles 0.5–2.5 cm, moderately pilose with white, unduly curved trichomes to 1 mm; leaf blades ovate, 3.5–9.5 × 1.5–4.5 cm, ca. 1.5–2.5 × as long as wide, base broadly attenuate to rounded, apex attenuate, adaxially glabrous, abaxially glabrous except for scattered, straight, white trichomes along the veins and margins, these to ca. 0.25 mm, cystoliths on both leaf surfaces, these simple, slender, ca. 0.2–0.5 mm; secondary veins 5 to 8 on each side of the midrib, arching toward the apex, clearly visible especially adaxially. Inflorescences of cymes in the axes of leaves, only 1 per node of the main axis; peduncles 5–10 cm; pedicels of subcymes ca. 0.3–2.3 cm; inflorescences consisting of up to 10 flowers, peduncles and pedicels moderately pilose with somewhat unduly oriented, straight, white trichomes up to ca. 0.25 mm; bracteoles linear, 1-veined, 2.10–0.5×1 mm, pedicels 2–4 mm, densely pubescent with straight, white trichomes up to 0.1 mm. Flowers with calyces of 5 sepals, these green, subulate, 1-veined, 7–9 mm, basally connate, with the lobes 6–7.5 mm long, sepals densely pubescent with straight, white trichomes up to ca. 0.1 mm, mostly eglandular with a few glandular; corollas 23–30 mm, red, ventricose, moderately pubescent with straight trichomes and stalked glands to 0.2 mm, the narrow expanded portion of corolla tube curved, 5–6 × 1–2 mm, the expanded throat slightly curved, 15–20 mm, its basal portion inflated to 12 mm with a pronounced ventral nectar-bearing saccus or pouch, throat constricted to 4–5 mm at the orifice, lobes emarginate, subequal, 2–3 × ca. 2 mm, appearing as a continuation of the throat; stamens with 1 pair to 1 mm longer than the other, filaments ca. 27–29 mm, basally connate in pairs, with downward-pointing, mostly eglandular trichomes, these sparser to nearly glabrous on apical portions, some flowers with a dorsal staminode (i.e., representing a fifth stamen), adnate to corolla ca. 0.5 mm above filament fusion, staminode to 15 mm, glabrous, fused filament sheath (curtain) adnate and enclosing nearly all of unexpanded portion of tube; anthers 2-theccous with equal, parallel thecae, purple, 2.5–3 × ca. 0.6 mm, level with the orifice of the corolla or exerted to 5 mm, connective tissue of thecae glandular with very shortly stalked glands, pollen (Fig. 2) with reticulate exine, ca. 70 µm diam.; ovules densely puberulent and sparsely glandular with shortly stalked glands on the uppermost portion; styles purple, 30–32 mm, sparsely pubescent with straight trichomes and stalked glands ca. 0.1 mm, stigma bifid, ventral lobe ca. 0.5 mm longer than dorsal lobe; capsules club-shaped, green with a dark reddish tinge at the tip and along the sutures when maturing, light brown when mature, ca. 12–16 mm, the sterile portion ca. 5–8 × 1–2 mm, the seed-bearing portion ca. 7–8 × 3–4 mm, apex attenuate; ovules 12 per capsule; seeds dark brown, flat, ca. 2–2.5 mm diam., with hygroscopic trichomes restricted to the margins.

**Distribution.** Currently, only one population located on the western flank of a hill directly south of Rurrenabaque is known. Due to the inaccessibility of the site, little can be said about population size both in terms of number of individuals and area. At most, a few dozen plants were observed clustered in patches along part of the path, but it is conceivable that the population extends to inaccessible parts of the cliff, or even that more populations could be found in other parts of the poorly explored hill ranges on both sides of the Rio Beni.

**Ecology.** The plants occupy very steep slopes and cliffs along a path following the water pipeline supplying Rurrenabaque, frequently rooting in cracks on the rocky cliff surface. The area is moist throughout the year, and the surrounding forest is semi-deciduous to evergreen. Conditions are relatively shady due to tree cover, but the plants seem to have an affinity for light gaps. Flowering time is at the end of the dry season, which extends from late May to September at the type location. Although no direct pollinator observations have been made, the shape, size, and brilliant red color of the corolla suggest that the plants may be adapted to pollination by hummingbirds. A nectar sample from *Ruella saccata* included in a previous study (Schmidt-Lebuhn et al., 2007; as "R. aff. brevifolia") was relatively dilute with a concen-
The concentration of 15 g/100 ml and contained mostly sucrose (70%), thus showing a composition observed in many trochilophilous (hummingbird-pollinated) species.

**IUCN Red List category.** Due to the low number of plants observed at the type locality, only one specimen was collected, thus no paratypes exist. The new species is therefore assigned a conservation status as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

**Etymology.** The specific epithet describes the conspicuous, pouch-shaped protrusion or saccus evident at the base of the corolla throat.
Discussion. *Ruella sacculata* is notably similar to the widely distributed and variable *R. brevifolia*. Both species share the ventricose corolla with a very narrow basal tube and inflated throat, but the novelty is distinct by its pronounced ventral pouch and more constricted orifice (Fig. 1). In addition to corolla shape, *R. sacculata* differs from *R. brevifolia* by its procumbent growth (vs. erect) and longer corollas (23–30 mm vs. usually up to 20 mm). The tendency of the new species to grow horizontally is likely an adaptation to its habitat—the steep, rocky hillside that hosts the only population known to date.

Molecular data (E. Tripp, unpublished data) place *Ruella sacculata* in the highly derived and unresolved clade that is centered around *R. brevifolia* (Physiruella clade; Tripp, 2007). In addition to molecular data, species in the Physiruella clade of *Ruella* are characterized by seeds with hygroscopic trichomes that are restricted to the margins (vs. covering the entire seed surface; Ezcura, 1993b; Tripp, 2007). *Ruella sacculata* morphologically resembles other closely related species in this clade, including *R. gracilis*, *R. pearcei*, and *R. ruziana*, especially with regard to herbaceous growth form and approximate corolla dimensions, color, and shape, especially the reduced lobes. It is again distinguished from these three species (and other red-flowered Bolivian *Ruella*) by its remarkable corolla pouch as well as other features identified in the key below. The highly specialized corolla, with a very restricted orifice and the nectar-bearing pouch, is to our knowledge unique among New World *Ruella*.

Another extraordinary feature observed in some flowers of *Ruella sacculata* is the occasional presence of a staminode that occupies the dorsalmost position in the flower and represents the fifth member of this whorl. It has been observed in two of 20 examined flowers. The presence of a staminode is remarkable in that most other species of *Ruella* examined to date are known to have only four stamens (see Nees, 1847a, b; also, staminodes were recently discovered in multiple flowers in a population of *R. bourgaei* Hemsley in Jalisco, Mexico; see E. A. Tripp & C. Kiel 428 [RSA]). Staminodes are known from some of the remaining ca. 47 genera in tribe Ruellieae (e.g., see Wood, 1995, and Deng et al., 2006, for examples of staminodes in *Strobilanthes* Blume). Staminodes are known and can be common elsewhere in the family, in lineages outside of Ruellieae (Mcdade et al., 2000).

The key to (red-flowered) Bolivian *Ruella* from Wasshausen and Wood (2004) is altered below to accommodate the novelty.

1a. Corolla (excluding lobes) 41–60 mm; lobes > 5 mm
1b. Corolla (excluding lobes) up to 40 mm; lobes < 5 mm
2a. Corolla tube very gradually expanding from base, widest at opening of mouth; plant an erect perennial; *R. haenkeana*
2b. Corolla tube abruptly expanding from base, widest in middle; plant a scrambling or vining perennial; *R. inflata*
3a. Flowers solitary and subsessile or on short, leafy peduncles; *R. sanguinea*
3b. Flowers borne on richly branched, axillary peduncles that are devoid of leaves or leaflike bracts; *R. gracilis*
4a. Leaves narrowly lanceolate to linear, < 1 cm wide; *R. pearcei*
4b. Leaves broadly oblong, ovate, or lanceolate, at least 2 cm wide; *R. ruziana*
5a. Calyx lobes glabrous, oblong-lanceolate, usually > 10 mm at anthesis; *R. longipedunculata*
5b. Calyx lobes pubescent or glabrous, long attenuate from base, < 10 mm at anthesis; *R. gracilis*
6a. Corolla 31–40 mm, gradually widened from base; leaves narrowly oblong-elliptic, often violet abaxially; *R. pearcei*
6b. Corolla up to 30 mm, abruptly widened from a shortly cylindrical base; leaves variable but commonly ovate or elliptic, not violet abaxially; *R. ruziana*
7a. Plants weakly erect, spreading horizontally to procumbent; corolla clearly saccate, 23–30 mm; *R. sacculata*
7b. Plants erect; corolla not saccate, rarely the back of the throat somewhat convex in *R. brevifolia*, < 20(–25) mm; *R. sacculata*
8a. Leaves densely pubescent, at least 5 cm wide; inflorescence hisrate; *R. ruziana*
8b. Leaves glabrous to weakly pubescent, < 5 cm wide; inflorescence glabrous to weakly pubescent; *R. brevifolia*
Acknowledgments. We thank the Bolivian authorities for the collecting permit that allowed for the discovery of this new species. The curatorial staff at GOET, LPB, and US made their duplicates available for study. We are grateful to Amanda Labadie for her careful illustration of Figure 1, to Tom F. Daniel, Cecilia Ezcurra, Lucinda A. McDade, Dieter Wasshausen, and John R. I. Wood for helpful discussions about the new species; to Uwe Braun for proofreading the Latin diagnosis; and to José Zúñiga for improving the Spanish abstract. Alexander N. Schmidt-Lebuhn’s field trip in 2000 was partly funded by the Deutsche Akademische Austauschdienst (DAAD) and the Friedrich-Ebert-Stiftung (FES). Erin A. Tripp’s lab and SEM work was supported by Duke University, Department of Biology, and a National Science Foundation Doctoral Dissertation Improvement Grant to P. Manos and E. A. Tripp (DEB-0608363). We are grateful for constructive criticism of an earlier version of the manuscript from John R. I. Wood and an anonymous reviewer.

Literature Cited


La Sect. *Obtusifolii* del Género *Lonchocarpus* (Leguminosae, Papilionoideae, Milletieae) para Mesoamérica

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**ABSTRACT.** A revision of the species of *Lonchocarpus* Kunth sect. *Obtusifolii* (Bentham) M. Sousa (Leguminosae, Papilionoideae, Milletieae) is presented for Mesoamerica. Of the 12 recognized species, five that are new to science, *L. canoensis* M. Sousa, *L. foevolatus* M. Sousa, *L. paucinerius* M. Sousa, *L. sylvicola* M. Sousa, and *L. velizii* M. Sousa, are here described and illustrated. The Mesoamerican species are compared in a key. The series *Obtusifolii* Bentham is lectotypified with *L. rugosus* Bentham, and a new combination is made elevating the series to sectional rank. Section *Obtusifolii* is characterized and distinguished from section *Densiflori* Bentham. Assessments of the conservation status (IUCN) are made for each taxon.

**Key words:** IUCN Red List, Leguminosae, *Lonchocarpus*, Mesoamerica, sect. *Obtusifolii*.

El género *Lonchocarpus* Kunth (Leguminosae, Papilionoideae, Milletieae) comprende alrededor de 180 especies de los trópicos de América, con una especie en las costas occidentales de África ecuatorial. La sect. *Obtusifolii* (Bentham) M. Sousa incluye alrededor de 27 especies; Mesoamérica con 12, de las cuales 11 son endémicas; México (en el área fuera de la región mesoamericana) con 11, de las cuales 10 son endémicas; Sudamérica con sólo cinco, de las cuales cuatro son endémicas.

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Pittier (1917) propuso la ser. *Impressinervi* Pittier, que caracterizó en su clave, la cual corresponde muy bien a un grupo más o menos bien definido de especies de *Lonchocarpus*; pero no necesariamente todas las especies que Pittier incluyó. Desafortunadamente, Pittier ubicó mal las series y secciones que propuso, invirtiéndolas en su revisión, al colocarlas en un rango superior o inferior al que deberían corresponder, y siendo ambos rangos secundarios, según McNeill et al. (2006: Art. 4.1), no se consideran válidamente publicadas (Art. 33.9 y 33.10). Pittier (op. cit.) incluyó en su ser. *Impressinervi* dos secciones, *Philenopteri* Pittier y *Spongopteri* Pittier, que consecuentemente, también no fueron válidamente publicadas. Bentham (1860) propuso la ser. *Obtusifolii*, que aquí elevamos de rango a sección, para incluir a este grupo, al no poder usar los nombres propuestos por Pittier.

**TRATAMIENTO TAXONOMICO**


La sect. *Obtusifolii* se caracteriza por: corteza interior que frecuentemente no exuda resina rojiza al corte, en ocasiones sí; hojas con arreglo helicoidal en el tallo; estípulas más largas que ancas, grandes, generalmente patentes a reflexas, frecuentemente persistentes; hojas pelosas, epungeadas, en ocasiones foveoladas; foliolos con el ápice obtuso a emarginado, en ocasiones acuminados, nervaduras frecuen-
tamente realizadas, camptódromas o craspedódromas; brácteas y bractéolas alargadas, las bractéolas lejanas al cálix sobre el pedicelo, generalmente opuestas, en ocasiones alternas. Flores con mecanismo floral valvar; cálix lóbado, ligeramente zigomorfo, peloso; corola pelosa, generalmente epunteada, raramente translúcido linear-punteada, las alas con sus ápices patentes, respecto a la quilla. Legumbres indehiscentes, los márgenes aquiloados a nervados, sin alas ni surcos. Plántulas frecuentemente con los cotiledones epigéos, en ocasiones hipogéos; foliolos (1)3- a 5-foliolados, opuestos, en un caso catáfilos alternos.

La sect. Obtusifoli es cercana a la sect. Densiflori Bentham, sección lectotipificada y caracterizada por Sousa (2005). Ambas secciones difieren por los siguientes caracteres:

1a. Folíolos con las nervaduras secundarias rectas y resolviéndose hasta el margen (craspedódromas).
   2a. Órganos vegetativos con pelosidad largo-pilosa con tricomas hasta 1.4 mm de largo; estípulas 13-15 × 2-3 mm (en la base) de ancho; hojas 9- a 11-folioladas; legumbres hasta 21 cm de largo.
   3a. Folíolos (1.5-4.5-9) × (1-3-4-5) cm; nervaduras laterales 14 a 23; flores 9-10 mm de largo.
   8. L. philophyllus Standley & Steyermark

1b. Folíolos con las nervaduras secundarias curvadas y resolviéndose casi paralelamente hasta cerca del margen (camptódromas).
   4a. Apéndices de los folíolos acuminados a caudados, los márgenes generalmente aplanados.
   5a. Estípulas 6-7 mm de largo, semipersistentes; nervaduras secundarias 15 a 17; pedicelos 3-4 mm de largo; bractéolas 1.5-2 mm de largo; flores 10-12 mm de largo, la lámina del estandarte 11-13 mm de ancho; ovario 6-7-ovulado...
   6. L. lasiotropa F. J. Hermann

1b. Folíolos obsoles a emarginados, los márgenes generalmente revolutos.
   6a. Órganos vegetativos con pelosidad largo pilosa.
   7a. Hojas 9- a 21(27)-folioladas, nervaduras foliares terciarias realizadas en el haz e impresas en el envés; estípulas (4-6) × 15-19 mm de largo.
   10. L. rugosus Bentham

1b. Hojas 7-9-folioladas, nervaduras foliares terciarias no realizadas en el haz ni impresas en el envés; estípulas 4-5 mm de largo.
   7. L. paucinervis M. Sousa

8a. Legumbres (2.1-2.5-3.2) cm de ancho, glabros.
   8b. Legumbres 1.4-1.9 cm de ancho, pelosas.
   9a. Folíolos 1.5-2.4(2.6) cm de ancho; flores ca. 6 mm de largo.
   12. L. velizii M. Sousa
   9b. Folíolos 0.6-1.6 cm de ancho; flores 7-11 mm de largo.
   10a. Hojas (13)15- a 19-folioladas, folíolos forcelados en el envés...
   4. L. forcolatus M. Sousa

1b. Inflorescencias densifloras; floración tardía; flores 10-11 mm de largo; legumbres aplanadas, tomentosas...
   1. L. canoensis M. Sousa

1b. Inflorescencias paucifloras; floración de coetáneas a tardía; flores 7-9 mm de largo; legumbres con las valvas abombadas a la altura de las semillas, velutinas...
   5. L. fuscoaparareus Brandegee

1. Lonchocarpus canoensis M. Sousa, sp. nov. TIPO: Honduras. Francisco Morazán: Mpio. Tegucigalpa, Río Las Canas, 2.5 km del Tablón, 14°02’N, 89°10’O, 1020 m, 18 sep. 1996, J. Linares 3507 (holotipo, MEXU; isótipos, EAP, MEXU). Figura 1.

Haece species Lonchocarpus hidalgoensis Lundell proxima, sed ab eo foliolum foliolis paucioribus (7 ad 9[ad 11] vs. 11 ad 19), vexilllum lamina adaxialiter dense (vs. sparsum vel modice) sericea trichomatis bruineo-lutolos e leguminose minore (3.5-4.2 × 1.5-1.7 cm vs. 5.2-9.5 × 1.8-2 cm) differt.
Árboles ca. 5 m; corteza interior sin producir fluido resinoso al corte; ramas moderadamente ferrugineotomentulosas, pronto glabrescentes. Hojas con arreglo helicoidal en el tallo; estípulas 1.3–1.5 × ca. 0.8 mm (en la base), triangular-atemudadas, erectas, pronto caducas; pecíolo 1.2–2.5 cm, canaliculado; hojas 7–9(11)-folioladas, foliolos (1.5–)2.2–3.7(–4.7) × (0.8–)1.1–1.4(–1.6) cm, elípticos a angostamente oblongo-ellípticos en ocasiones angostamente obovatados, la base obtusa a redondeada, frecuentemente comisada, algo asimétrica, los márgenes revolutos, el ápice obtuso a redondeado, subcoriáceos, foveolados con puntaciones translúcidas, en el haz glabros y foveolados, en el envés moderadamente pardo-amarrillento tomentuloso a tomentosos sobre las nervaduras; nervatione campódroma, nervaduras primaria y secundarias impresas en el envés, las nervaduras laterales 9 a 10. Inflorescencias 5–7 cm, paniculadas, en ocasiones simples y axilares, densifloras, floración tardía, pedunculadas; pedúnculo floral 1.5–2 mm; pedicelos 1.8–2.5 mm; bractéolas 0.8–1 mm, lanceoladas, opuestas, del 1/3 superior al ápice del pedicelo. Flores 10–11 mm; caliz ca. 2.5 mm, densamente marrón-cobrizo serícico, epundeado, zigomorfo, el diente central carinal ca. 1.5 mm, triangular-agudo; corola púrpura, epundeada, la lámina del estandarte ca. 9 mm de ancho, orbicular, moderada a densamente pardo-amarrillento serícico adaxialmente, glabra abaxialmente; ovario 5(6)-ovulado. Legumbre 3.5–4.2 × 1.5–1.7 cm, elíptica, indehiscente, atenuada en la base, obtusa y rostrada en el ápice, lateralmente compresa, cartácea, densamente pardo-amarrillento tomentosa, margen vexilar nervado, el carinal angostamente aquillado; semillas (innudadas) 1 por fruto.

Distribución y hábitat. Esta especie se localiza en Honduras, en la cuenca alta del Río Choluteca, siendo el río Las Canoas uno de sus afluentes, drena al Golfo de Fonseca. Raripio en selvas bajas caducífolias con vegetación circundante de bosques de encinos y pinares. Esta especie vive en altitudes alrededor de 1020 m.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus canoensis debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie sólo conocida de un área muy restringida.

Fenología. La floración ocurre a mediados de septiembre y la fructificación a comienzos de diciembre.

Etimología. El epíteto hace énfasis en la localidad de la cual, sólo se conoce.

Discusión. Lonchocarpus canoensis es cercana a L. hidalgensis del oriente de México, pero en L.
más grandes (13–15 mm de largo vs. 7–11 mm), y la uña del estandarte es notoriamente más larga (3–4[–6] mm vs. 1–3 mm).

**IUCN. Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus costaricensis* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie poco colectada y de distribución restringida.


4. **Lonchocarpus foveolatus** M. Souza, sp. nov.

Hace especies a congenera mesoamericana ad *Lonchocarpum* sect. *Obtusifolii* pertinimenes foliis 13- ad 19-foliolatis, foliolis angustis abaxialiter foveolatis, flore 8–9 mm longo atque legume trichomatibus brunoce-cupreis sericeo distinguuntur.

Árboles 12–25 m, caducifolios; corteza interior con fluido resinoso al corte; ramas jóvenes ferrugíneo a pardo-amarillento sericeas a tomentulosas, los tréboles hasta 0.3 mm, posteriormente glabrescentes. Hojas con arrollado helicoidal en el tallo; estípulas anchoamente triangulares ca. 1 × 1.2 mm (en la base), erectas, pronto caducas; pecíolo 2–2.5 cm, acostillado-sulcado; hojas (13)15- a 19-folioladas; foliolos 1.5–3.5 × 0.6–1.6 cm, elípticos a ligeramente ovados, rara vez ligeramente obovados, la base ligeramente cuneada y en ocasiones ligeramente asimétrica, los márgenes algo revolventos, el ápice obtuso en ocasiones emarginado, subcoriáceas, con puntuaciones pelúcidas que corresponden a fóvolas en el envés, esparcidamente pardo-amarillento sericea por el haz y más densamente de pardo-amarillento a ferrugineosericeo en el envés; nervación camptódroma, nervationaria primaria y secundarias impresas en el envés, las nervationes laterales 10 a 14. Inflorescencias 2–3 cm, paniculadas, erectas, pedunculadas a casi sésiles hasta 1 cm, densífloras; floración coetánea; pedúnculo floral 1.5–1.7 mm; pedícelos 1–1.2 mm; bractéolas 1–1.2 mm, lanceoladas a lineares, opuestas, distantes del 1/3 superior al ápice del pedicelo. Flores 8–9 mm; cálix ca. 2 mm, ligeramente zigomorfo, epunitado, densamente marrón-cobrizo sericeo, dentado, el diente vexilar central prominente ca. 1.3 mm, triangular-agudo; corola lila a morada, estandarte reflexo, la lámina ca. 7 mm de ancho, oblata, cónica, todos los pétalos adaxialmente pardo-amarillento-cobrizo sericos; ovario 4(6)-ovulado. Legumbre 4.5–7 × 1.4–1.5 cm, indehiscente, elíptica a oblonga, aplanada, cartácea, la base atenuada a subsésil, el ápice atenuado, rostrado, obtuso, las valvas lisas, pardo ferrugíneo-cobrizo sericeas, los márgenes rectos, el vexilar y carinal nervados; semillas (inmaduras) 1 a 2 por fruto.

**Distribución y hábitat.** Esta especie es conocida sólo en la Meceta Central de Chiapas, como elemento de bosques caducifolios, primarios y alterados; sobre suelos rojo-aríldos. Esta especie vive en altitudes entre 1100 a 1400 m.

**IUCN. Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus foveolatus* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de distribución restringida, que prospera en un tipo de vegetación sujeto a una gran alteración.

**Fenología.** La floración se presenta de la primera quincena de mayo a principios de junio y la fructificación a mediados de agosto.

**Etimología.** El epíteto hace notar a las fóvolas, presentes en el envés de las hojas.

**Nombre vulgar.** Jit ‘it ul (Tzeltal, A. Méndez Ton 6064); mabatue (E. Martínez S. et al. 24739).

**Discusión.** Esta especie es característica por sus numerosos foliolos por hoja (13 a 19), lo largo de sus foliolos (0.6–1.6 cm), las fóvolas muy características de sus hojas; flores 8–9 mm de largo y legumbres pardo ferrugíneo-cobrizo sericeas.


Esta especie es endémica de Veracruz, México, dentro del área fitogeográfica de la *Flora Mesoamericana*, en selvas bajas caducifolias. Especie característica por sus escasas y separadas flores en las inflorescencias; sus hojas chicas con foliolos angostos; así como sus frutos angostos, con las valvas abombadas a la altura de las semillas.

**IUCN. Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus fuscopurpureus* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie distribuida en áreas discontinuas por presión de
alteración a su hábitat, principalmente por la agricultura.

Material representativo. MÉXICO. Veracruz: M. Sousa 3660, 3710 (MEXU), F. Ventura A. 15194 (ENCB, MEXU).


Ilustración: Holdridge y Poveda, 1975: 352 (como Lonchocarpus sp.).

Árboles grandes de selvas medianas a altas, subperenifolias. Las relaciones de esta especie están con el grupo de Lonchocarpus hedyosmum Miquel y L. margariensis Pittier, de Sudamérica; en Mesoamérica es afín a L. sylvicola (véase discusión de ésta especie).

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus lasiopotrips debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, pero habita selvas con fuerte presión de uso por la ganadería y agricultura.


Figura 3.


Hae species Lonchocarpus pilosus M. Sousa et L. crassisperrn Poopendiek ut videtur affinis, sed a hoc partibus vegetativis trichomatibus usque ad 1.8 mm longis pilosis, pedunculo pedicellisque brevioribus atque calyce epunctato, ab illo foliarietum campodromae distinctur.

Árboles ca. 17 m; corteza interior sin fluido resinoso al corte; ramas jóvenes esparcida a muy esparcida y largamente pilosas, los tricomas hasta 1.8 mm, pronto glabras. Hojas con arreglos helicoidales en el tallo; estípulas 4-5 × ca. 1 mm (en la base), estríadas, reflexas, caducas; pecíolo 1.7-2.5 cm, canaliculado, hojas 7-9 folioladas; foliolos (1.5-)2.5-5.5 × 0.7-1.4 cm, elípticos a angostamente oblóngos, base obtusa, en ocasiones ligeramente asimétrica, los márgenes marcadamente revolutos, el ápice obtuso, mucronado en ocasiones emarginado, cartáceos a subcoriáceos, algo coedicados, en el haz glabros, en el envés esparcida y largamente pilosos principalmente en la nervadura primaria y los márgenes; nervación campódroma, nervaduras primaria y secundarias impresas en el envés, las nervaduras laterales 7 a 9. Inflorescencias 2.5-5 cm, panículadas, en ocasiones simples y axilares, densíflores, floración tardía, pedunculadas; pedúnculo floral 1.3-2.1 mm; pedicelos 1.3-2 mm; bractéolas 0.8-1.2 mm, lanceolado-oblongas a lineares, opuestas, del 1/2 al 1/4 superior del pedicelo. Flores 8-9 mm; cáliz ca. 2.2 mm, atropurpúreo, moderadamente marrón-cobrizo sericeo, epun-teado, zigomorfo, el diente central carinal ca. 1.6 mm, triangular-agudo; corola rojo-púrpura, epunteada, la lámina del estandarte ca. 7 mm de ancho, orbicular, cóncava, densamente marrón-cobrizo sericeo adaxialmente, glabra abaxialmente; ovario 5-ovulado. Legumbre desconocida.

Distribución y hábitat. Esta especie es conocida sólo del tipo en Petén, Guatemala, en la cima de un cerro, en vegetación de selvas medianas a altas con sapotáceas.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus paucinervis debe considerarse como: en peligro (EN), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie sólo conocida y recolectada en una ocasión, que habita en selvas con presión de alteración.

Fenología. La floración ocurre a finales de septiembre, sin que se tengan colecciones de material en fruto.

Etimología. El epíteto se refiere a las pocas nervaduras laterales con que cuentan sus folíolos.

Discusión. Especie aparentemente cercana a Lonchocarpus pilosus, con la que comparte el mismo tipo de largos tricomas pilosos, pero a la vez la nervación de los folíolos de L. paucinervis es campódroma y la de L. pilosus es eraspédroma. También tiene relación con L. crassisperrn Poopendeck, de la Guayaquil venezolana, pero la pelosidad consiste de tricomas cortos (hasta 0.5 mm de largo) de pilosos a tomentosos, también hay varias diferencias en los pedúnculos florales (2.8-3 mm de largo vs. 1.3-2.1 mm), pedicelos (2.8-3 mm de largo vs. 1.3-2 mm), y cáliz (transluído linearpunteado vs. epunteado).


Esta especie se conoce de selvas bajas caducifolias en climas cálido-secos, se distribuye desde Guatemala a Costa Rica. Cercana a *Lonchocarpus eriocarinalis* de México, pero *L. phlebophyllum* cuenta con (3)5-folíolos por hoja (vs. 7 a 19), pétalos epunteados (vs. densamente punteado-linear translúcidos), y legumbre subcoriácea (vs. generalmente suberosa).
IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus phlebophyllus debe considerarse como: casi amenazado (NT), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie de amplia distribución, pero su hábitat está sujeto a presión de alteración.


Ilustración: Sousa, 1986: 729, fig. 3.

Esta especie es endémica de Nicaragua; muy característica por la nérvarción craspépídio de sus foliolos, su pelosidad es largamente pilosa, sus estípulas de gran tamaño, reflexas y semipersistentes y su legumbre de gran tamaño, densamente ferruginoso-velutina. Aún se desconocen las flores.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus pilosus debe considerarse como: vulnerable (VU), de acuerdo al criterio de Lista Roja (IUCN, 2001); especie de distribución restringida, con escasas colectas.


Esta especie es de las más variables y de amplia distribución en el género, sus variabilidades se agrupan en unidades discretas que, hasta ahora, no presentan simpatría, y Sousa (2003) las clasifica en subespecies. Las diferencias de las subespecies se contrastan con la siguiente clave:

CLAVE DE LAS SUBESPECIES DE Lonchocarpus rugosus

1a. Estípulas pronto caducas, tricomas de brotes vegetativos hasta 1.2 mm de largo.

2a. Foliolos hasta 1.6 cm de ancho; legumbre hasta 1.9 cm de ancho, valvas lisas, márgenes rectos; plántulas con los cotiledones hipogéos…….

10b. L. rugosus Bentham subsp. gillyi (Lundell) M. Sousa

2b. Foliolos hasta 4 cm de ancho; legumbres hasta 3 cm de ancho, valvas rugosas sobre las semillas, márgenes constrictos; plántulas con los cotiledones epigéos……. 10a. L. rugosus Bentham subsp. rugosus (Lundell) M. Sousa

1b. Estípulas persistentes; tricomas de brotes vegetativos hasta 2 mm de largo.

3a. Foliolos hasta 2 cm de ancho, lóbulo central carinal del cálix ligeramente más largo que los laterales o casi tan largo como ellos; plántulas con los cotiledones epigéos……. 10d. L. rugosa Bentham subsp. stipteaeus M. Sousa

3b. Foliolos hasta 4.5 cm de ancho, lóbulo central carinal del cálix mucho más largo que los laterales; plántulas con los cotiledones epigéos……. 10c. L. rugosus Bentham subsp. rugosus


Ilustración: Witsberger et al., 1982: 155, fig. 55 (como Lonchocarpus rugosus Bentham).

Esta subespecie tiene la distribución más brega del país, habiendo áreas más templadas, siendo frecuente en bosques de encinos y pinares, aunque también se presenta en selvas caducifolias, en altitudes de 100–1300(–1550) m. Se distingue por su legumbre ancha con las valvas rugosas a la altura de las semillas y sus plántulas con los cotiledones epigéos.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus rugosus subsp. apricus debe considerarse como: precaución menor (LC), de acuerdo al criterio de Lista Roja (IUCN, 2001); subespecie abundante de amplia distribución; que prospera en varios hábitats.


Ilustración: Sousa, 2008: 125, fig. 1.

Her mann (1943) sinonimizó a *Lochocarpus gilly* Lundell dentro de L. rugosus Bentham, sin proponer alguna nueva categoría infraespecífica, argumentando la gran variabilidad (como el tamaño de los fóliolos) de L. rugosus, sin embargo, L. gilly, si bien aquí, la consideramos parte de L. rugosus, tiene características propias y distintivas como sus fóliolos pequeños y lo angosto de sus legumbres (véase para otros caracteres la clave de subespecies). Esta subespecie tiene su distribución de Veracruz, México, a Colombia, sin que se le conozca en Panamá.

IUCN, Categoría de la lista Roja. El estado de conservación de *Lochocarpus rugosus* subsp. gilly debe considerarse como: preocupación menor (LC), de acuerdo al criterio de la Lista Roja (IUCN, 2001); subespecie de amplia distribución de Veracruz, México, a Colombia, sin que se le conozca en Panamá.


La subespecie *Lochocarpus rugosus* subsp. *rugosus* es casi endémica de la provincia fisiográfica de la Península de Yucatán, sobre suelos calizos. Se caracteriza por el largo de sus tricomas en los órganos vegetativos, estípulas persistentes; el lóbulo carnal central del caliz mucho más largo que los laterales y sus plántulas con los cotiledones hipogeos. IUCN, Categorías de la lista Roja. El estado de conservación de *Lochocarpus rugosus* subsp. *rugosus* debe considerarse como: preocupación menor (LC), de acuerdo al criterio de la lista Roja (IUCN, 2001); subespecie sólo conocida de una provincia fisiográfica, pero abundante y muy frecuente.


Ilustración: Sousa, 2008: 130, fig. 2.

pílosa, sus enormes estípulas reflexas y persistentes y sus plántulas con los cotiledones epígeos.

IUCN, Categoría de la Lista Roja. El estado de conservación de Lonchocarpus rugosus subsp. stipalaceus debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); las selvas en que se encuentra ésta subespecie están en riesgo de extinción.


Hace especies inter congeneres mesoamericanos ad Lonchocarpum sect. Obtusifolii, pertenecientes a los foli- lors con nervationes camptodromas apicem attenuatam vel brevem acuminatam L. lasiophyli F. J. Hermann simillima, sed ab eo stipulis brevioribus non caducis, nervis secundaria- ris 9 ad 11, pedicellis bracteolis floribusque brevioribus, vexillii lamina angustius atque ovario 3- ad 5-ovulato distribuit.

Árboles ca. 10 m; corteza inferior sin fluido resinoso al corte; ramas jóvenes moderadamente pardo-amarillento sericás, posteriormente glabras. Hojas con arrollamiento helicoidal en el tallo; estípulas 0.4–0.5 mm, triangulares, patentes, pronto caducas; pecíolo 2–3 cm, acostillado-sulcado; hojas 9–11-folioladas; foliolos (2.5–3×6–1.2–2.3 cm), lanceolados a elíptico-oblongos, la base obtusa, los márgenes ligeramente revolutos a aplanados, el ápice atenuado a corno acuminado, subcoriáceas, las áreas internervias translúcidas, el haz glabro y brillante, el envés moderadamente pardo-amarillento sericós; nervationes camptódromas, nervationes primaria y secundaria ligeramente impresas en el envés, las nervationes laterales 9 a 11. Inflorescencias 7–10.5 cm, axilares, simples, erectas, pedunculadas, el pedúnculo 1.5–2.5 cm, floración coetánea; pedúnculo floral 1.1–1.2 mm; pedicelos 1.7–2 mm; bracteolas 0.3–0.4 mm, lanceoladas, opuestas, del 1/3 superior al ápice del pedicelo. Flores 9–10 mm; caliz ca. 2 mm, ligeramente zigomorfo, epunitado, densamente marrón-cobrizo sericós, dentado, el diente vexilar central prominente 1.2–1.3 mm, triangular-agudo; corola guinda; estándarte reflexo, la lámina 7.5–8 mm de ancho, oblata, las alas en el ápice patentes respecto a la quilla, todos los pétalos adaxialmente canescente-sericós; ovario 3- a 5-ovulado. Legumbre desconocida.


Hace especies Lonchocarpus castiliae Standley proxima, sed ab eo foliolos latiofítoros, florescentia coetanae, floribus brevioribus atque legumine serico angustiore distinguunt.

Árboles 8–20 m; caducífolios; corteza escamosa, la interior sin fluido resinoso al corte; ramas jóvenes moderada y diminutamente ferrugíneo-sericás, pron- to glabras. Hojas con arrollamiento helicoidal en el tallo; estípulas 2.5–3.1 mm, lanceolado-aleznadas, erectas, pronto caducas; pecíolo 4–5 cm, acostillado-sulcado; hojas 7–9-folioladas; foliolos (2.5–4.5–7.5×1.5–2.4–2.6) cm, angosto a rara vez anchamente elípticos, en ocasiones obovados, la base cuneada, frecuentemente isométrica, los márgenes algo revolutos, el ápice obtuso a atenuado, acuminado con los márgenes rectos, subcoriáceos, foveolados, con las áreas internervias translúcidas, algo discoloros, el haz glabro excepto pardo-amarillento serico sobre las nervationes primaria y secundaria, el envés esparcidamente pardo-amarillento a ferrugíneo-exstriguloso, papiloso; nervationes camptódromas, nervationes primaria y secundaria impresas en el envés, las nervationes laterales 11 a 13. Inflorescencias 3–7 cm, paniculadas, floración coetana, pedunculadas; pedúnculo floral 0.8–1 mm, delgado; pedicelos 1–

1.4 mm; bractéolas 0.6–0.8 mm, lanceoladas, subpuestas, patentes, en el 1/3 superior del pedicelo. Flores ca. 6 mm; cáliz 1.8–2 mm, densamente pardo-amarillento seríceo, epunteado, zigomorfo, el diente central carinal ca. 1 mm, triangular-agudo; corola rojiza, epunteada, la lámina del estandarte 5–5.5 mm de ancho, oblata, cóncava, densamente pardo-amarillento seríceo adaxialmente, glabra abaxialmente;
ovario 4(5)-ovulado. Legumbre (2.7–)4–6.5 cm con una semilla, 7.5–8.3 cm con 2 ó 3 semillas, con 4 ó 5 semillas 14–16 × (1.4)–1.6–1.9 cm, elíptica a oblongo-elíptica, indehiscente, atenuada en la base, corto estipitada, obtusa y rostrada en el ápice, aplanada, ligeramente constricta sobre los márgenes entre las semillas, subcoriácea, moderada a densamente pardo-amarillento sericea, margen vexilar nervado, el carinal angostamente aquilado; semillas 1 a 2(3 a 5) por fruto, 7–8 × 3.5–4.5 × ca. 2.6 mm, castaño claro.

**Distribución y hábitat.** Esta especie es propia del área Sur de la península de Yucatán, en Belice (Distr. Cayo) y Guatemala (Distr. Petén), en selvas medianas subcaducifolias a subperennifolias, riparia, en laderas, sobre suelos de origen calizo, en altitudes entre 250 a 550 m.

**IUCN, Categoría de la Lista Roja.** El estado de conservación de *Lonchocarpus velizii* debe considerarse como: vulnerable (VU), de acuerdo al criterio de la Lista Roja (IUCN, 2001); especie conocida en un área fisiográfica, cuya vegetación esta sujeta a fuerte presión de alteración.

**Fenología.** La floración se presenta a mediados de junio y la fructificación de julio a octubre.

**Etimología.** El epíteto se dedica a Mario Velíz Pérez (1964–) guatemalteco, nacido en Zacapa, quien ha contribuido grandemente al conocimiento de la flora de su país, particularmente en el área montañosa.


**Discusión.** Especie cercana y simpátrica a *Lonchocarpus castilloi*, de la que difiere por que en *L. velizii* sus foliolos 1.5–2.6 cm de ancho (vs. 0.6–1.5 cm), la floración coetánea (vs. tardía), flores ca. 6 mm de largo (vs. 8–9 mm), y legumbres seríacas (vs. glabras) y (1.4–1.6–1.9 cm de ancho (vs. 2.1–3.2 cm).

**Paratipos.** BELICE. Cayo: Bencue Viejo, bordering Río Mopan, E. Contreras 7168 (L, MEXU); Los Altos Hill, Augustine, G. R. Proctor 29893 (II, L). GUATEMALA. PETEN: Tikal, around Aguada Tikal, 14 June 1959, C. L. Landell 16078 (L, MEXU); entrada a Yaxhá, M. Velíz 7490 (BIGU, MEXU); a 3.5–4 km del camino de terracería del cruce hacia Yaxhá, M. Velíz y J. Velíz 12491, 12492 (BIGU, MEXU); sitio arqueológico Yaxhá, M. Velíz y J. Velíz 12495 (BIGU, MEXU).

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**Literatura Citada**


Eight New Species of Lauraceae from Ecuador, Peru, and Panama

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ABSTRACT. Eight new species of Lauraceae from Andean South America and Panama are described and illustrated. Two belong to the genus Cinnamomum Schaeffer, C. lanigerum van der Werff and C. formicarium van der Werff & Lorea-Hernández, both from Ecuador; one species belongs to Ocotea Aublet, O. pacifica van der Werff, from Ecuador and Colombia; and five belong to Pleurothyrium Nees, P. bilocellatum van der Werff, P. cordatum van der Werff, and P. obscurinerve van der Werff from Ecuador, P. pacense van der Werff from Peru, and P. triflorum van der Werff from Panama.

Keywords: Cinnamomum, Colombia, Ecuador, IUCN Red List, Lauraceae, Ocotea, Panama, Peru, Pleurothyrium.

During the continuing botanical exploration of Andean South America and adjacent Panama, several Lauraceae have been collected that did not match known species. Two of those species (Ocotea pacifica van der Werff and Pleurothyrium obscurinerve van der Werff) were collected for the Flora of Sanama project (Los Ríos Province, Ecuador). A floristic inventory of the Cordillera del Cóndor in Ecuador yielded two species of Pleurothyrium Nees (P. bilocellatum van der Werff and P. cordatum van der Werff), while fieldwork in Cordillera de Yanachaga (Peru) and in lowland rainforest on the Atlantic slope of Panama led to the discovery of two new species of Pleurothyrium. Finally, among recent collections from central Ecuador, two new species of Cinnamomum Schaeffer were found. These discoveries demonstrate that our knowledge of the flora of Andean South America and adjacent Panama is still incomplete. Further collecting efforts will almost certainly result in finding additional undescribed species of Lauraceae.

CINNAMOMUM

The Neotropical species of Cinnamomum were recently revised by Lorea-Hernández (1996), who recognized 47 species. The number of Paleotropical species of Cinnamomum is much higher: Rohwer (1993) gave a total number of species of about 350. Cinnamomum has bisexual flowers with nine 4-celled stamens (infrequently six 4-celled and three 2-celled stamens) and conspicuous staminodia with a sagittate apex. The fruits are seated in a shallow or rather deep cupule, with the tepals frequently, but not always, persisting on the margin of the cupule. Common vegetative characters among the Neotropical species are the presence of domatia in the axils of the basal secondary veins and tripliveined leaves. Cinnamomum differs from Ocotea in its well-developed staminodia; in Ocotea staminodia are either lacking or small, stipitiform, always without a sagittate apex. A similar clear difference between Cinnamomum and Persea Miller, another genus with nine 4-celled stamens and bisexual flowers, is lacking, partly because Persea is so variable. Most species of Neotropical Persea have unequal tepals, with the outer three smaller than the inner three, whereas in Cinnamomum tepals are equal. Domatia and tripliveined leaves do not occur in Persea. However, a number of species with equal tepals, bisexual flowers, large staminodia, and pinnately veined leaves without domatia are difficult to place. Traditionally, the species in this group with persistent tepals are placed in Persea, while those with caducous tepals are placed in Cinnamomum. I accept these concepts and also acknowledge that more studies are needed to establish monophyletic genera or species groups.


Species nova quae a congenensi ramulis fistulosis valde angulatis et foliis magnis recedit. Trees, to 20 m; twigs sharply angular, thick, to 1.5 cm diam., hollow, occupied by slow-moving, nonaggressive ants, stems covered with appressed hairs when young, the hairs matted and remaining as patches on older parts, eventually becoming sparse; terminal buds densely appressed pubescent. Leaves alternate, elliptic to broadly elliptic, 28–40(–60) × 14–28 cm, base acute to obtuse, apex obtuse to acute (often damaged due to the large size of the blade),

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abaxially minutely tomentulose, glabrescent with age, adaxially glabrous, pinnately veined, secondary veins in 7 to 12 pairs, midrib and secondary veins slightly impressed adaxially, raised abaxially, domatia lacking; petioles 3–7 cm, canaliculate, with the same indument as the twigs. Inflorescences 15–25 cm, paniculate-cymose, in the axils of leaves, glabrous or nearly so; pedicels 2.5–3.5 mm, glabrous. Flowers green, ca. 3 mm diam.; tepals 6, equal, elliptic, ca. 2.5 mm, glabrous on the outer surface, pubescent on
the inner surface, with an abscission line near the base; stamens 9, 2.3–3 mm, filaments pubescent, anthers glabrous, outer 6 stamens 4-celled, inner 3 stamens 2-celled and with 2 globose glands near the base; staminodia present, 1.5–2 mm, filament pubescent, the tip triangular-sagittate; pistil 2–3 mm, glabrous, style about as long as the ovary, receptacle cup-shaped, glabrous inside. Immature fruit ca. 10 × 7.5 mm, ellipsoid, cupule cup-shaped, ca. 11 × 7 mm, tepals not persisting in fruit.

Discussion. The new species is very distinct due to its large leaves (to 40–60 cm long), the fistulose and sharply angled twigs, and the densely flowered, glabrous inflorescences. The hollow center in the fistulose twigs can range from 5–7 mm in diameter. Other characters of the new species infrequently found in Neotropical *Cinnamomum* species are the absence of domatia, tepals not persistent in fruit, the inner three stamens 2-celled, and pinnately veined leaves. The flowers have an unpleasant odor, reminiscent of urine.

IUCN Red List category. *Cinnamomum formicarium* is known from very few collections and is therefore listed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).


2. *Cinnamomum lanigerum* van der Werff, sp. nov. TYPE: Ecuador. Carchi: Espejo, Faldas del Cerro Golondrinas Henhoura, 00°51’N, 78°07’W, 2300–2400 m, 20 Aug. 1994, W. Palacios 12721 (holotype, QCNE; isotypes, AAU, HBG, MO, NY, US). Figure 2.

Species nova Cinnamomo floccosum van der Werff similis, sed ab eo floribus pubescentibus, indumentum foliorum lanuso et petiolis longioribus (usque ad 1.5 cm, nec 0.5 cm) recedit.

Small tree, to 8 m; twigs angular, solid, densely pubescent, the indument covering the surface completely, light brown, the hairs short, curled, stems glabrescent with age; terminal buds densely pubescent as the young twigs. Leaves alternate, broadly ovate-elliptic to elliptic, 8–15 × 5–11 cm, stiffly chartaceous, base obtuse to rounded, apex obtuse or acute, margin flat, young leaves adaxially moderately densely pubescent with short, curled hairs, soon becoming glabrous and lustrous, abaxially densely woolly pubescent, the curled hairs completely covering the surface, the hairs becoming light brown on older leaves but not wearing off, domatia lacking; secondary veins in 4 to 6 pairs, impressed adaxially and raised abaxially, the older leaves somewhat bullate, the basal 2 pairs of secondary veins crowded near the base of the leaf; petioles 10–14 mm, canaliculate or flat above. Inflorescences 5–15 cm, in the axils of leaves, paniculate-cymose, rather densely tomentose, the surface largely covered. Flowers green, 4–5 mm diam.; pedicels ca. 1 mm, tomentose, much shorter than the flowers; tepals 6, equal or the outer 3 slightly shorter, 2.5–3 × ca. 1 mm, pubescent on both surfaces, half-erect at anthesis and spreading in older flowers, with an abscission line near the base and breaking off in old flowers; stamens 9, outer 6 4-celled, inner 3 2-celled, 2.5–3 mm, filaments pubescent, ca. 1.5 mm, anthers glabrous, inner 3 stamens with 2 round glands near the base; staminodia present, ca. 1.5 mm, filament pubescent, the glabrous apex triangular-sagittate, wider than the filament; pistil glabrous, ca. 3 mm, ovary round, ca. 1 mm, style slender, ca. 2 mm; receptacle cup-shaped, with a few appressed hairs inside. Fruits not known.

Discussion. *Cinnamomum lanigerum* is closely related to *C. floccosum* van der Werff from northern Peru. The two species share the impressed venation, a dense indument, leaves with an obtuse or rounded base, and presence at relatively high altitudes. They differ as follows: *C. lanigerum* has pubescent flowers, short pedicels (much shorter than the flowers), petioles at least 10 mm long, and a woolly indument on the abaxial leaf surface, while *C. floccosum* has glabrous flowers, pedicels as long as the flowers or slightly longer, petioles ca. 5 mm long, and a shaggy indument on the abaxial leaf surface (hairs mostly straight, 0.5–0.7 mm long). Less closely related is *C. palaciosii* van der Werff, also from rather high altitudes (ca. 3000 m) in Ecuador; it has large (to 25 cm), triplicate leaved, impressed midrib and secondary veins, an indument of more or less straight hairs, and glabrous flowers.

Although most species of *Cinnamomum* have all stamens 4-celled, the presence of two locules on the inner three stamens is not rare. Lorea-Hernández (1996) recognized 47 species in his revision of Neotropical *Cinnamomum* and, of those, 12 had inner stamens with two locules. In *C. floccosum* the inner stamens have two or four locules with the upper pair greatly reduced.

IUCN Red List category. This species is known only from the type collection and is listed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).
Ocotea

Ocotea is the largest genus of Lauraceae in the Neotropics, with an estimated 300 species (Rohwer, 1993). It is an assemblage of species characterized by having paniculate-cymose inflorescences and flowers with nine 4-celled stamens with the locelli arranged in two superposed pairs. Ocotea has been and still is the holding place for many species that do not fit in any of the other, better-defined genera ("Ocotea is the dustbin
of the Perseeae,” Rohwer, 1993: 382). Rohwer (1986) published an overview of Ocotea based on an extensive study of type specimens and included keys to species or species groups. This publication has greatly increased our understanding of Ocotea. Since then, an estimated 60 additional species of Ocotea have been published by various authors. A synopsis of the 102 Central American species, including a key, was published by van der Werff (2002). A phylogenetic analysis of the genera of Lauraceae (Chanderbali et al., 2001) strongly suggested that Ocotea in its current concept is polyphyletic and consists of at least five species groups. The new species described below is one of many new ones from northern South America; its description is needed for the preparation of the Lauraceae treatment for the florula of Cerro Samana in Ecuador.

3. Ocotea pacifica van der Werff, sp. nov. TYPE: Ecuador. Pichincha: along rd. Nanegal–Palmitopamba, 1200 m, 10 July 1991, H. van der Werff, B. Gray & G. Tipas 12269 (holotype, QCNE; isotype, MO). Figure 3.

Species nova Ocotea stenoneurae Mez & Pittier similis, sed ab ea tepalis intus sparse pubescentibus, basi foliorum plana, staminodis dense pubescentibus et fructu ellipsoido recedit.

Tall trees, to 45 m; twigs densely brown tomentulose, the surface completely covered when young, indument sparser with age, solid; terminal buds densely brown tomentulose. Leaves alternate, elliptic to obovate, 9–21 × 3–8 cm, chartaceous, gradually narrowed toward the base, but not decurrent on the petiole, flat or faintly inrolled near the base, the tip shortly acuminate, adaxially glabrous except for some pubescence on the midrib, abaxially sparsely to moderately pubescent, the hairs appressed or ascending, axillary tufts of hairs lacking, venation immersed adaxially, raised abaxially, tertiary venation scalariform, lateral veins 9 to 12 on each side; petioles 5–10 mm, flat on the upper surface. Inflorescences 9–23 cm, cymose-paniculate, in the axils of distal leaves, densely tomentulose, the surface not visible. Flowers funnel-shaped, the base gradually narrowed in the petioles; pedicels ca. 2 mm; tepals ca. 1.5 mm, half-erect, densely pubescent on the outer surface, sparsely pubescent on the inner surface, the stamens more visible; stamens 9, all 4-celled, 0.8–1 mm, outer 6 with the cells opening inrostrate, inner 3 with cells opening extrorse, filaments pubescent, ca. 1/3 as long as the anther, anthers glabrous; staminodia representing whor 4 present, stipitiform, ca. 0.45 mm, pubescent; pistil ca. 2 mm, glabrous, style ca. 0.5 mm; receptacle deep, pubescent inside. Fruit ca. 3.5 × 1.8 cm, ellipsoid, cupule near maturity shallowly cup-shaped, ca. 15 × 8 mm, less mature cupules relatively deeply cup-shaped.

Discussion. Ocotea pacifica is so named because of its distribution in lowland or premontane forest from 50–1200 m on the Pacific side of the Andes. The taxon has been confused with O. stenoneura Mez & Pittier, and duplicates of most collections, including the type collection, have been distributed under that name. The two species differ as follows: O. pacifica has the inner surface of the petals sparsely pubescent, with most of the surface visible, the base of the leaves are flat or nearly so and scarcely decurrent on the petiole, the staminodia are densely pubescent, the fruit is ellipsoid and the cupule is cup-shaped, while O. stenoneura has the inner surface of the tepals densely pubescent, with the surface not visible, the base of the leaves are strongly decurrent and inrolled, the staminodia are sparsely pubescent, the fruit is round or nearly so and the cupule is a flat plate. Ocotea stenoneura has also a glaucous abaxial leaf surface. Although the staminodial character is difficult to see, differences in leaf base, fruit shape, and cupule shape allow identification without problems. The new species is known from Colombia and Ecuador, while O. stenoneura is only known from Costa Rica and Panama.

IUCN Red List category. Ocotea pacifica is known from several collections in Ecuador and Colombia and occurs in several protected areas. Given this distribution, it is listed as Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001).


PLEUROTHERIUM

Pleurothium is a medium-sized, Neotropical genus of 48 species characterized by the strongly
enlarged glands at the base of the inner stamens. The glands conspicuously protrude between the outer stamens in some species, while in others they become united, forming a pillow-like mass surrounding the stamens. All previously described species in Pleur-
Werff (1993), who recognized 40 species. Since then, three additional species have been described. In this contribution five species are added, one of which is the first in the genus with 2-celled stamens. Three novelties are known from Ecuador only, one from the Pacific side of the Andes and the other two from the Cordillera del Cóndor, the fourth species is only known from Panama, and the fifth was recently collected in central Peru.


Species nova quae a congeneris staminibus bilocellatis recedit.

Tree, to 12 m; twigs angular, solid, sparsely or very sparsely pubescent with short, spreading, white hairs, terminal buds densely pubescent, the hairs spreading. Leaves alternate, elliptic, 10–18 × 4–7 cm, very sparsely pubescent when young, soon becoming glabrous, but some short, erect hairs persisting along the major veins, base flat, acute, apex acute, lateral veins 6 to 9 on each side, reticulation weakly raised adaxially, more so abaxially, domatia lacking; petioles 1–1.7 cm, terete, glabrous or with some appressed hairs. Inflorescences 5–8 cm, red, in axils of bracts or in axils of leaves, paniculate-cymose. Flowers cream, 3.5–4.5 mm diam.; pedicels 4–5 mm; tepals 6, equal, ca. 2 × 1 mm, with some appressed hairs outside and some small papillae on the inner surface, appearing almost glabrous, spreading in young flowers, becoming reflexed in older flowers; stamens 9, all 2-celled, outer 6 with a very short filament attached at the base of the tepals, anther flat, bent upward and pressed against the enlarged glands, the locelli introrse-apical, inner 3 stamens ± columnar with the apex enlarged and bent outward, the locelli extrorse-apical; glands enlarged and separating stamens from each other, but not forming a pillowlike mass and enclosing the stamens; staminaodia not seen; pistil 1–1.5 mm, style very short, stigma conspicuous. Cupule shallowly cup-shaped, with a broad hat-shaped rim with a scalloped edge, ca. 2.5 cm diam. when dry; fruit ellipsoid, ca. 2 × 1.5 cm.

Discussion. Traditionally, the number of locelli (two vs. four) has been used as a character defining genera. Some genera, however, can be readily recognized by vegetative characters or characters of the tepals, and in these genera the number of locelli and number of stamens is often found to be variable (van der Werff & Richter, 1996). Examples of such genera in the Neotropics are Caryodaphnopsis Airy Shaw (with opposite, often trilobed leaves and strongly unequal tepals) and *Persea* (group with unequal tepals), both of which have the majority of their species with 4-locular stamens and a few with 2-locular stamens. In other cases, generic pairings differing only in number of locelli are still recognized, such as *Mezilaurus* Kuntze ex Taubert and *William-odendron* Kubitzki & H. G. Richter, *Ocotea/Rhodostemonodaphne* Rohwer & Kubitzki and *Endlicheria* Nees, as well as *Litsea* Lamarec and *Lindera* Thunberg. The new species described above could thus be placed in a new genus or included in *Pleurothyrium* as the only 2-locular species among the other 4-locular species. I prefer the latter position; the enlarged glands and the position of the inflorescences partly in the axes of bracts indicate a placement in *Pleurothyrium*.

IUCN Red List category. This species is known from two collections, made from the same tree, and is listed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).


Species nova quae a congeneris foliis ellipticis rigidis characeis basi cordatis recedit.

Trees, to 15 m; twigs terete, solid, densely brown tomentulose, the surface fully covered; terminal buds densely brown tomentulose. Leaves alternate, evenly distributed along the twigs, elliptic to elliptic-oblong, 12–21 × 4.5–8 cm, stiffly chartaceous, base cordate to rounded, lamina flat, apex acute to acuminate, adaxially glabrous, venation slightly impressed, abaxially appearing glabrous but covered with fine, tightly appressed, light-colored hairs, the midrib and major veins with brown, spreading hairs, midrib and lateral veins raised, dark reticulation contrasting with the light lamina, lateral veins 8 to 14 pairs, weakly loop-connected in the distal half of the leaf; petioles 1.5–3 cm, brown tomentulose as the twigs, canaliu-
late. Inflorescences 5–12 cm, paniculate-cymose, densely brown tomentulose, in the axils of bracts. Flowers 6–7 mm diam., white; pedicels ca. 4 mm; tepals 2–3 mm, ovate-elliptic, spreading at anthesis, outer 3 tepals tomentulose on the outside, inner 3 tepals with a triangular, basal, tomentulose patch, otherwise papillose, inner surface of the tepals papillose; stamens 9, all 4-locular, outer 6 with a short (ca. 0.3 mm) filament, the anther twice as long, bent toward the center of the flower, the locelli in 2
pairs, lateral, at maturity the anthers raised above the
glands; inner 3 stamens barely raised above the
glands, the anther bent outward, the locelli lateral;
glands at base of the inner stamens enlarged, growing
outward between the outer stamens, but not surround-
ing those and not fused in a pillowlike mass;
staminodia not seen; pistil ca. 1 mm, densely
pubescent, ovary gradually narrowed into the style,
receptacle deeply cup-shaped, pubescent inside. 
Fruits and cupules not known.
Discussion. *Pleurothyrium cordatum* can be easily recognized by its elliptic, stiffly chartaceous leaves with a cordate base. A few species of *Pleurothyrium* also have leaves with a cordate base, but these species (*P. insigne* van der Werff, *P. maximum* O. C. Schmidt) have large (20–60 cm long), obovate leaves, gradually narrowed toward the base and at the base abruptly cordate or rounded. *Pleurothyrium panurensis* (Meisn.) Mez and *P. bifidum* Nees have a similar finely appressed indument on the abaxial leaf surface, but those species differ in having the outer stamens completely enclosed by the enlarged glands. The pubescent pistils and the rather small flowers with the outer stamens separated by the enlarged glands, but not surrounded by them, are also useful characters.

**IUCN Red List category.** *Pleurothyrium cordatum* is known only from the type collection and is listed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).


Species nova *Pleurothyrio inmerso* van der Werff similis, sed ab eo ovario pubescent, floribus majoribus (7–9 mm, non 5 mm diam.) et glandulis basi staminum internorum liberiis (non confluentibus) recedit.

Small tree, to 15 m; twigs terete, solid, moderately but inconspicuously appressed pubescent; terminal buds densely appressed pubescent. Leaves alternate, elliptic, 5.5–13 × 2.5–5.5 cm, papyraceous, base acute to obtuse, apex acuminate, acumen to 1 cm, flat, adaxially glabrous and gland-dotted, abaxially glabrous or with a few appressed hairs, axillary tufts of hairs lacking, venation immersed on both surfaces, lateral veins ca. 7, but scarcely visible; petioles 7–10 mm, narrowly canaliculate on the upper surface. Inflorescences 3–5.5 cm, in the axils of bracts or leaves, with 2 to 6 flowers, sparsely appressed pubescent, the indument denser distally. Flowers 7–9 mm diam., white or yellowish; pedicels ca. 5 mm; petals 6, spreading to somewhat reflexed at maturity, papillose on both surfaces, elliptic, ca. 3 mm; stamens 9, all 4-celled, outer 6 with the anther bent inward and the locelli lateral; glands at the base of the inner stamens strongly enlarged and grown outward, surrounding the stamens, but not fused; pistil glabrous, ca. 2 mm, style half as long as the ovary; receptacle cup-shaped, appressed pubescent inside. Immature fruit ellipsoid, ca. 1.7 × 1.3 cm, cupule trumpet-shaped, with a double margin, the outer margin somewhat spreading and exceeding the inner margin.

Discussion. Distinctive vegetative characters for *Pleurothyrium obscurinerve* are the thin leaves with very inconspicuous venation and gland dots on the adaxial surface. With the exception of *P. inmersum* van der Werff, all other species of *Pleurothyrium* have chartaceous or firmly chartaceous leaves with readily visible venation. However, *P. inmersum*, endemic to Costa Rica, differs from *P. obscurinerve* in its smaller flowers (ca. 5 mm vs. 7–9 mm diam.), pubescent ovaries, pubescent inner surface of the tepals (vs. papillose inner surface of the tepals), and the glands and stamens that form a domelike structure in the center of the flower with the glands strongly enlarged and fused (vs. glands that are enlarged but free and stamens raised above the glands, not forming a domelike structure). Cupules and fruits are not yet known for *P. inmersum*. Another close relative is *P. glabritepalum* van der Werff, known from Chocó, Colombia, and Esmeraldas, Ecuador; this species has relatively thin leaves, gland-dotted on the adaxial surface, with the same shape as *P. obscurinerve* and short (2–4 cm), few-flowered (1 to 3 flowers) inflorescences. There are, however, clear differences between the two species: *P. glabritepalum* has brown tomentose or tomentulose twigs, flowers ca. 13 mm in diameter, a sparse, erect indument on the abaxial leaf surface, and clearly visible venation on the abaxial leaf surface.

**IUCN Red List category.** *Pleurothyrium obscurinerve* grows at altitudes of 400–600 m. Specimens without flowers would almost certainly not be recognized as *Pleurothyrium*; fruiting specimens would very likely be placed in *Licaria* due to the double-margined cupule.

**IUCN Red List category.** *Pleurothyrium obscurinerve* is known from a few collections along the lower western slope of the Andes in Ecuador and is listed as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).


7. *Pleurothyrium pascense* van der Werff, sp. nov. TYPE: Peru. Pasco: Oxapampa, Distr. Huanacambie, Zona de amortiguamiento del Parque Nac. Yanachaga-Chenillén, Sector Tunqui–Agua Salada, 10°16’47”S, 75°32’31”W, 1480 m, 26 Sep. 2007, A. Monteagudo, A. Peña,
Figure 6. Holotype of Pleurothyrium obscurinerve van der Werff.

J. Mateo, V. Flores & C. Rojas 15339 (holotype, MO). Figure 7.

Species nova Pleurothyro trianae (Mez) Rohwer affinis, sed ab eo ramulis inflorescentiisque dense pubescentibus trichomatibus erectis, nervis secundaris et tertiaris in pagina inferiori elevatis et venatione brochidodroma recedit.

Tree, to 18 m; twigs solid, angular, densely brown pubescent, the hairs erect, covering the surface
completely, wearing off with age; terminal buds densely brown pubescent, the hairs erect and covering the surface completely. Leaves alternate, elliptic, 13–19 × 5–8 cm, subcoriaceous, base acute, apex obtuse or shortly acute, mature leaves glabrous adaxially, young leaves moderately pubescent adaxially, mature leaves with scattered, erect hairs abaxially, these much denser along the midrib and secondary veins; major veins slightly impressed adaxially, prominently raised abaxially; tertiary veins parallel, raised abaxi-
ally, secondary veins 15 to 20 on each side, arching upward near the margin and loop-connected; petioles 9–19 mm, flat or shallowly canalicate, with a similar indument as the twigs. Inflorescences 7–12 cm, narrowly paniculate-cymose, densely brown pubescent, the hairs erect and completely covering the surface, in the axils of bracts, above last year’s mature leaves and below the current year’s immature leaves. Flowers densely pubescent, yellow-green, ca. 6 mm diam.; pedicels very short, ca. 1 mm, flowers appearing almost sessile; tepals equal, ca. 3 mm, the margin slightly recurved, the inner surface densely papillose with a few hairs mixed in; outer 6 stamens ca. 1 mm, glabrous, the anther curved toward the pistil, 4-celled, but occasionally 1 or 2 locelli not developed; inner 3 stamens straight, 4-celled, filaments with a few hairs, otherwise glabrous; glands at the base of the inner stamens enlarged, protruding between the stamens, free, not fused in a disc; staminodia of whorl IV not seen; pistil ca. 2 mm, glabrous, style ca. 1 mm; receptacle deep, glabrous inside. Fruits and cupule not known.

Discussion. The affinities of *Pleurothyrium pascense* are with a small group of species characterized by the presence of half-erect tepals, these often with a recurved margin, and stamen glands that are enlarged but not fused in a disc. Neither brochidodromous venation nor the erect indument on the abaxial leaf surface have been reported for any of the other species in this group. The raised, scalariform tertiary venation is also a distinguishing character for the new species. Four species in this group are fairly common: *P. parviflorum* Ducke, a lowland species of flooded forests with glabrous leaves and fistulose twigs from Bolivia, Brazil, Ecuador, and Peru; *P. trianae* (Mez) Rohwer, known from Venezuela, Colombia, Ecuador, and northern Peru, with appressed pubescence on twigs and inflorescences and usually with fistulose twigs; and *P. cuneifolium* Nees and *P. poepigii* Nees, two similar species with minute indument on twigs and leaves, fistulose twigs, and large (to 30 cm) leaves. The last two species have a wide distribution and occur in the Cordillera de Yanachaga in Peru. The remaining species in this group are rarely collected and poorly known: *P. acuminatum* van der Werff is known from a few collections in the lowlands of northeastern Peru (Janero Herrera) and adjacent Brazil; *P. amapoense* C. K. Allen is known with certainty only from the type collection made in Amapa, Brazil; *P. intermedium* (Mez) Rohwer, which has a sparse, appressed indument, is a lowland species collected a few times in Acre, Brazil, Bolivia, and Peru; *P. undulatum* (Meisner) Rohwer, which has glabrous leaves, is only known from the type collection made in the lower Rio Negro in Amazonian Brazil; and *P. amplifolium* (Mez) Rohwer is only known from the Glaziou type collection from Rio de Janeiro. In leaf characters the new species resembles *P. vasquezii* van der Werff, a lowland species from eastern Peru with spreading tepals, larger glands, and inflorescences clustered in the axils of bracts at the tips of the branches.

*IUCN Red List category. Pleurothyrium pascense* is known only from the type collection and is listed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

8. *Pleurothyrium triflorum* van der Werff, sp. nov.

*TYPE:* Panama. Colón: Tekc Cominco Petaquilla mining concession, 08°49′56″N, 080°41′05″W, 250 m, 7 Mar. 2008, G. McPherson 20452 (holotype, PMA; isotype, MO). Figure 8.

Species nova *Pleurothyrio glabriepalio* van der Werff similis, sed ab eo tepalis aequalesibus intus dense papillosis et laminis subtus glabris recedit.

Tree, to 18 m; twigs terete, minutely brown tomentulose, glabrescent; terminal buds densely brown tomentulose. Leaves alternate, elliptic or slightly obovate, 6–12 × 2.5–4.5 cm, chartaceous, base and apex acute, axially glabrous, axially glabrous or with some curved hairs along the major veins; midrib and secondary veins slightly impressed, tertiary venation immersed axially, midrib and secondary veins raised, tertiary venation immersed abaxially, secondary veins 5 to 7, the distal ones loop-connected; petioles 9–16 mm, flat above, with an indument similar to the twigs. Inflorescences 1–1.5 cm, 3-flowered, in the axils of bracts immediately below the terminal buds, densely brown tomentulose. Flowers 8–10 mm diam.; pedicels ca. 3 mm; tepals equal, rotate, ca. 3.5 × 2 mm, the outer surface brown tomentulose, inner surface densely grey papillosae; stamens 9, all 4-celled, the locelli lateral, glands strongly enlarged, fused or nearly so, forming a disc ca. 3 mm diam. surrounding the stamens; receptacle pubescent inside; ovary globose, the lower 2/3 pubescent. Fruit and cupule not known.

Discussion. Several other species of *Pleurothyrium* have few-flowered inflorescences like *P. triflorum.* Among those are *P. glabriepalio,* which differs in having unequal tepals, the inner surface of the tepals glabrous, and a pilose indument on the abaxial leaf surface, and *P. pauciflorum* van der Werff & Hammel, which differs in its larger leaves (16–35 cm) with 14 to 20 pairs of lateral veins and an erect indument on the abaxial leaf surface. The inflorescences of *P. pauciflorum* are not strictly 3-flowered as they are in *P. glabriepalio* and *P. triflorum.*
IUCN Red List category. *Pleurothyrium triflorum* is only known from the type collection and is assessed as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

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Literature Cited


Sorocea carautana (Moraceae): A New Species from Southeastern Brazil

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Abstract. A new species of Sorocea A. Saint-Hilaire, S. carautana M. D. M. Vianna, Carrijo & Romaniuc (Moraceae s. str.), was discovered in the hills of southern Rio de Janeiro in the vicinity of Paraty. The new species resembles S. hilarii Gaudichaud by the similar shape of the leaves, but is clearly distinguished by its longer pistillate pedicel. This new species is endemic to the Atlantic Forest and is threatened due to its restricted geographic area of occurrence.

Sorocea carautana M. D. M. Vianna, Carrijo & Romaniuc, sp. nov. TYPE: Brazil. Rio de Janeiro: Paraty, APA do Caririçu, Morro do Carrapato, 23°01’S, 44°03’W, 150 m, 9 Dec. 1993, R. Marquete 1405 (holotype, RB; isotype, US). Figure 1.

Haece species quoad folium formam ad Soroceam hilarii Gaudichaud proxime accedit, sed ab ea floris laminar pedicello in fructu usque ad 1.7–3.2 cm elongata et folii marginis integris vel pauciispinosus differet.

Shrub or tree, 7–10 m tall, bark smooth, gray to brownish; leafy twigs 1–4 mm diam., sparsely puberulent or glabrous, striate; lenticels conspicuous; leaf scars plane. Leaf lamina oblong to lanceolate, 8.7–12.5 × 2.2–3 cm, slightly unequal, coriaceous, discolorous, apex caudate, acumen not spinulose, base asymmetric, acute to obtuse, margin usually entire, sometimes with few spines; adaxial blade surface glabrous, shiny, abaxial surface sparsely puberulent, opaque; leaf venation brochidodromous, impressed on the midrib adaxially, prominent abaxially, lateral veins in 8 to 13 pairs, tertiary venation mostly reticulate; petiole 5–8 × 0.7–1.5 mm, puberulent; stipules 2–4 mm, puberulent to glabrous, caducous. Staminate inflorescences unknown. Pistillate inflorescences racemose, 10 to 13 flowers per inflorescence, 5.5–8.5 cm, rachis puberulent, carnos; peduncle 3.5–4.5 cm, puberulent. Pistillate flowers 1.2–1.5 mm, upper perianth with a cupuliform ring, sparsely hispidulous, the lower portion mostly densely hispidulous; stigma bifurcate, finely papillate; pedicel 1–1.2 cm, sparsely puberulent to hispidulous, swollen and red in fruit. Fruiting perianth ovoid, 0.5–1 cm, surface smooth, sparsely puberulent, red to black; pedicel elongating to 1.7–3.2 cm, sparsely puberulent to almost glabrous.

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Distribution and habitat. The new species is restricted to the coastal region of Rio de Janeiro State and is known only from the Environmental Protection Area of Cairuçu, in tropical humid forest of the Serra do Mar from elevations of 150–300 m (23°10'–23°23'S, 44°30'–44°51'W).

IUCN Red List category. According to IUCN Red List criteria (IUCN, 2001), this species is considered Critically Endangered (CR B1a) based on its area of occupancy estimated at less than 100 km². The new species is known only from Paraty municipality, Rio
de Janeiro State, where the population is sparsely distributed in the undergrowth of humid forest.

Etiymology. The specific epithet *carautana* was chosen to honor Pedro Carauta, who first recognized this species as possibly new.

Discussion. *Soroea carautana* belongs to *Soroea* subgen. *Soroea* based on the long internodes in the leaf stems, plane leaf scars, inconspicuous axillary buds, distinctly racemose inflorescences (or spicate elsewhere in the subgenus), and bracts that range from subcoriaceous to coriaceous. The new species resembles *S. hilarii* Gaudichaud by the similar shape of the leaves, but is clearly distinguished by the fruiting perianth pedicel length (1.7–3.2 cm vs. to 1.2 cm in *S. hilarii*).

Additional field data show that *Soroea carautana* has smooth bark, a discolorous leaf blade, reddish pistillate peduncles, and nigrescent fruiting perianths. These observations are supported from field data on labels.


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Literature Cited
A New Hysteranthous Species of *Chelonopsis* (Lamiaceae) from Southwest China

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ABSTRACT. A new species, *Chelonopsis praecox* Weckerle & F. Huber (Lamiaceae, Lamioideae) from southwest China, is described and illustrated, and its relationship to morphologically similar species is discussed. *Chelonopsis praecox* differs from the other species of the genus by its characteristic to bear flowers and fruits in springtime and early summer, before the development of leaves during the summer rainy season, while all other *Chelonopsis* species flower during summer or autumn. Prominent distinguishing morphological features are found in the stem bark, leaf size and indumentum, and inflorescences. So far, the species is only known from the northern part of the Shuiou Valley in southwest Sichuan; additional collections are necessary to clarify its full distributional range.

Key words: *Chelonopsis*, China, Himalayas, IUCN Red List, Lamiaceae, Lamioideae.

*Chelonopsis Miquel* (Lamiaceae) includes approximately 16 species distributed in East Asia, and of these, 13 occur in China (Li & Hedge, 1994; Mabberley, 1997). The genus is currently placed in the subfamily Lamioideae (Harley et al., 2004). It was formerly placed in the subtribe Melittidinae, together with five North American genera (*Brazoria* Engelmann & A. Gray, *Warruckia* M. W. Turner, *Macbridea* Rafinesque, *Physostegia* Bentham, and *Synandra* Nuttall) and the monotypic European genus *Melittis* L. (Cantino, 1985; Wagstaff et al., 1995; Turner, 1996). However, Schenck et al. (2008) showed that the above circumscription of the subtribe Melittidinae is polyphyletic. While the North American genera form a monophyletic group, the placement of *Melittis* and *Chelonopsis* needs further investigation.

*Chelonopsis* comprises herbs and shrubs with 2-lipped, white to yellow or purple-red flowers, bearing characteristic anthers with bearded pollen sacs. The 13 species distributed in China have been partly revised for the English version of the *Flora of China* (Li & Hedge, 1994), but a complete revision of the genus is lacking to date.

In this paper, a new species is described that is morphologically similar to *Chelonopsis forrestii* J. Anthony, *C. mollissima* C. Y. Wu, and *C. rosea* W. W. Smith. An overview of the discriminating characters of these four species is provided.

MATERIALS AND METHODS

This study is based on the morphological analysis of plant material collected in the Shuiou Valley, Muli County, Liangshan Prefecture, Sichuan Province, People’s Republic of China, as well as herbarium specimens from the herbarium of the Kunming Institute of Botany, Chinese Academy of Sciences (KUN). A list of the specimens examined is given in Table 1. For the description of the new species, 10 individuals were investigated, and for each individual 10 to 21 leaves were measured, for a total of 128 measurements. Leaf and petiole sizes provided correspond to the interdecile range; minimum and

Table 1. Morphological comparison of *Chelonopsis praecox* with *C. forrestii*, *C. mollissima*, and *C. rosea*.1

<table>
<thead>
<tr>
<th>Character</th>
<th><em>C. praecox</em></th>
<th><em>C. forrestii</em></th>
<th><em>C. mollissima</em></th>
<th><em>C. rosea</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat</td>
<td>dry thickets and streamside thickets; 2000–2400 m; Sichuan</td>
<td>forests and streamside thickets; 2500–3100 m; Yunnan and Sichuan</td>
<td>dry thickets on open slopes in valleys; 1200–2500 m; Yunnan and SW Sichuan</td>
<td>Open thickets; 1500–3100 m; Yunnan</td>
</tr>
<tr>
<td>Habit</td>
<td>shrubs 1–3 m tall stems straw-colored, bark peeling</td>
<td>shrubs 1–2 m tall stems straw-colored to yellow-brown, bark peeling</td>
<td>shrubs ca. 1 m tall branches straw-colored to brown, with longitudinal fissures</td>
<td>shrubs 1–2.5 m tall branches straw-colored to brown, bark not peeling</td>
</tr>
<tr>
<td>Stem indumentum</td>
<td>very densely pilose, few glands</td>
<td>sparsely pubescent to subglabrous</td>
<td>densely pilose, sometimes with branched hairs</td>
<td>densely villous, with glandular hairs</td>
</tr>
<tr>
<td>Leaf shape</td>
<td>leaf blade broadly ovate, base subacute to obtuse, apex short acuminate to acute, sometimes with additional leaflets on petiole</td>
<td>leaf blade ovate-lanceolate, base slightly asymmetrical, acute to rounded or obtuse, apex acute to acuminate</td>
<td>leaf blade ovate, base cordate to subcordate or obtuse to rounded, apex acute</td>
<td>leaf blade broadly ovate, base cordate to rounded, apex acute to acuminate</td>
</tr>
<tr>
<td>Leaf margin</td>
<td>shallowly serrate to serrate-crenate</td>
<td>coarsely serrate-crenate to subacute, ciliate</td>
<td>serrate-crenate to biserrate</td>
<td>serrate-crenate</td>
</tr>
<tr>
<td>Leaf size</td>
<td>(3.8–5.4–9.7–11.2) × (2.7–4.6–8.5) cm</td>
<td>3.6–2.5–4.5 cm</td>
<td>3.0–2.5–5.5 cm</td>
<td>3.9–2.5–5.5 cm</td>
</tr>
<tr>
<td>Leaf indumentum</td>
<td>densely pilose adaxially, very densely pilose and glandular abaxially</td>
<td>sparsely pubescent adaxially, sparsely pubescent and glandular abaxially</td>
<td>densely pilose, sometimes with branched hairs, sometimes with glands</td>
<td>villous and glandular adaxially, densely so mainly along veins abaxially</td>
</tr>
<tr>
<td>Petiole</td>
<td>(1.5–4.8 cm) × 2–3 mm</td>
<td>3.2–5.7 mm</td>
<td>2.8–3.5 mm</td>
<td>1.4–5 cm</td>
</tr>
<tr>
<td>Inflorescence</td>
<td>cymes 1–2-flowered</td>
<td>cymes 1-flowered</td>
<td>cymes 1 to 3-flowered</td>
<td>cymes usually 3-flowered</td>
</tr>
<tr>
<td>Bracteoles</td>
<td>ovate to elliptic, 4–6 mm</td>
<td>linear, 1–5 mm</td>
<td>ovate to oblanceolate, 2–7 mm</td>
<td>mainly linear, 4–8 mm</td>
</tr>
<tr>
<td>Calyx indumentum</td>
<td>densely pubescent with glandular hairs externally, glabrous internally</td>
<td>with sparse white cilia externally, glabrous internally</td>
<td>externally and internally pubescent</td>
<td>pubescent externally, glabrous except for pubescent teeth internally</td>
</tr>
<tr>
<td>Corolla color</td>
<td>creamy white, tinged purple or red-purple spotted</td>
<td>creamy white with purple to purple or red, with purple lines on tube or purple spotted</td>
<td>white with tip of upper lip faint red to rose to red</td>
<td>rose to purple</td>
</tr>
<tr>
<td>Phenology</td>
<td>flowering March–June</td>
<td>flowering June–August</td>
<td>flowering October–December</td>
<td>flowering August–December, fruiting September–December</td>
</tr>
</tbody>
</table>

Results and Discussion

Chelonopsis praecox Weckerle & F. Huber, sp. nov. TYPE: China. Sichuan: Muli Co., Shuiluo Valley, vic. of Lanman village along roadside, 28°19'58.9"N, 100°39'29"E, 2210 m, 15 Mar. 2005 (fl.), C. S. Weckerle & F. K. Huber 050315-1/1 (holotype, Z; isotype, KUN). Figure 1.

Herbaceous species ab omnibus speciebus ceteris generis Chelonopsis Miquel florescentia verna (follis hypanthidis) distincta; itam ex C. forrestii J. Anthony petiolo longior, foliis late ovatis atque bracteolis ovatis ellipticos, atque C. mollissima C. Y. Wu habitu altilore atque calyces intra glabris, atque C. rosea W. W. Smith flore cremeo, atque C. forrestii et C. mollissima foliis majoribus, atque C. forrestii et C. rosea foliis dense pilosis, atque C. mollissima et C. rosea cortice exfoliato atque cynis unifloris differentiatur.

Shrub 1–3 m tall, branches suberect to terete, straw-colored, bark peeling; young branches very densely pilose with few glands. Leaf blade broadly ovate, (3.8–)5.4–9.7(–11.2) × (2.7–)4–6.8(–8.5) cm, base subcordate to cordate, apex short acuminate to acute, densely pilose adaxially, very densely pilose abaxially, glandular (aromatic), margin sallow serrate to serrate-crenate; petiole (1–)1.5–4.8(–6.8) cm, sometimes bearing small leaflets. Inflorescence cymose, solitary or paired, or terminal on leafy axillary branchlets, 1(2)-flowered; bracteoles 2, ovate to elliptic, 4–6 × 2–3 mm, densely pilose. Calyx tubular-campanulate, teeth 5, triangular, apex acute to attenuate, externally densely pubescent, with glandular hairs, internally glabrous, 1.6–1.9 cm long in flower (tube 0.9–1 cm), 1.7–2.3 cm long in fruit (tube 1.2–1.6 cm); corolla creamy white, tinged purple or red-purple spotted, externally densely pubescent, internally glabrous, 2.8–3.5 cm (tube 2.3–2.5 cm), upper lip ca. 3 × 9 mm, entire, middle lobe of lower lip ca. 7 × 3–6 mm, subentire, lateral lobes 2–3 × 5–6 mm; stamens with bearded pollen sacs and puberulent filaments; style equal to 2-cleft. Nutlets straw-colored to brown, oblong, 1–1.4 × 0.2–0.4 cm, winged at apex, finely striate.

Distribution and habitat. Chelonopsis praecox is known only from the northern part of the Shuiluo Valley, Muli County, southwest Sichuan, People’s Republic of China, and is frequently found in streamside thickets at altitudes from 2000–2400 m. Additional collections are necessary to clarify its full distributional range.

IUCN Red List category. Due to the lack of distributional data for Chelonopsis praecox outside the Shuiluo Valley, it seems appropriate to assign a conservation status of Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Chelonopsis praecox has been collected in flower in March and in fruit in June. The species flowers during springtime, while leaves are produced at the beginning of the rainy season starting in the area in June or July.

Etymology. The specific epithet recognizes the characteristic of the new species to bear flowers before leaves, a unique feature in the genus Chelonopsis.

Discussion. The flowering and fruiting season of Chelonopsis praecox is confined to spring and early summer, followed by the development of the leaves during the rainy season. For Chelonopsis, this phenological feature is exclusively found in the new species described here. Therefore, we prepared a holotype consisting of a flowering specimen and a paratype consisting of a leaf-bearing specimen (Weckerle & Huber 050925-1/1 [Z], see Figs. 2 and 3). All other species of Chelonopsis flower and fruit during summer or autumn, when their leaves are fully developed (Hedge, 1990; Murata & Yamazaki, 1993; Li & Hedge, 1994).

Chelonopsis praecox is morphologically similar to C. forrestii, C. mollissima, and C. rosea. However, it is the only species of this group that shows a seasonal pattern of flower and leaf development. From C. forrestii it differs mainly by its habitat at 2000–2400 m (vs. 2500–3100 m), densely pilose stem and leaves (vs. sparsely pubescent), larger leaves and longer petioles, broadly ovate leaf shape (vs. ovate-lanceolate), and ovate to elliptic bracteoles (vs. linear); from C. mollissima it differs by its taller habit (1–3 m vs. ca. 1 m), peeling bark, larger leaves, 1(2)-flowered cymes (vs. 1- to 3-flowered), and the calyx internally glabrous (vs. puberulent); and from C. rosea it differs by its peeling bark, densely pilose leaves (vs. villous), 1(2)-flowered cymes (vs. 3-flowered), and creamy white flowers (vs. rose to purple).

A detailed comparison of the new species with the three morphologically similar species is given in Table 1. The data are based on Li and Hedge (1994) and have been amended according to the herbarium specimens listed in Table 1, particularly for the following characters: habitat, habit, stem indumentum, leaf shape, leaf size, leaf indumentum, petiole, bracteoles, and phylogeny.

Paratypes. CHINA. Sichuan: Muli, Shuiluo Valley, vic. Lanman village in small valley to Shuiluo River, 28°19'50.6"N, 100°39'40.2"E, 2140 m, 25 Sep. 2005 (mature leaves), C. S. Weckerle & F. K. Huber 050925-1/1
Flora of Muli, Southwest China

*Chelonopsis praecox* Weckerle & F. Huber

Collectors: C. Weckerle & F. Huber
Collection No.: 050315-1/1
Date: March 15, 2005
Altitude: 2210 m
Location: Sichuan Prov., Muli County, Shuiluo Valley, Lanman Village (28°19’58.9”N; 100°39’29.0”E); in the vicinity of Lanman along roadside
Habit: Shrub, ca. 1.5 m high
Ethnobotanical Notes: Branches can be put on the fields as fertilizer
Det: C. Weckerle & F. Huber

Figure 1. Holotype of *Chelonopsis praecox* Weckerle & F. Huber (Weckerle & Huber 050315-1/1, Z).
Flora of Muli, Southwest China

_Chelonopsis praecox_ Weckerle & F. Huber

Collectors: C. Weckerle & F. Huber
Collection No.: 050925-1/1
Date: September 25, 2005
Altitude: 2140 m
Location: Sichuan Prov., Muli County, Shuiluo Valley, Lanman Village (28°19’50.6”N; 100°39’40.2”E); in a small valley leading to the Shuiluo River
Habit: Shrub, up to 2.5 m high
Notes: Leaves fragrant (Citrus- or Geranium-like), flowering before rain season
Det: C. Weckerle & F. Huber

Figure 2. Paratype of _Chelonopsis praecox_ Weckerle & F. Huber (Weckerle & Huber 050925-1/1, Z).
Figure 3. Photos of the new species Chelonopsis praecox Weckerle & F. Huber. —A. Longitudinal section of two dry flowers, showing the bearded anthers. —B. Flower. —C. Peeling bark of the stem. —D. Fruits and emerging leaves. —E. Leaves, abaxial view. —F. Leaves, adaxial view. A, B from the holotype C. Weckerle & F. Huber 050315-1/1 (Z); D from the paratype C. Weckerle & F. Huber 040604-2/1 (Z).
Acknowledgments. We thank Sun Weibang and Wu Sugong from the Kunming Institute of Botany for their help with the identification of specimens, Adele Smith from the herbarium of the Royal Botanic Garden Edinburgh for providing photos of type specimens, and Reto Nyffeler from the herbarium of the University of Zurich for critical comments on the manuscript. The project was funded by the Swiss National Science Foundation (PBZHA-104354).

Literature Cited


Chiritopsis jingxiensis, a New Species of Gesneriaceae from a Karst Cave in Guangxi, China

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ABSTRACT. Chiritopsis W. T. Wang (Gesneriaceae) is endemic to China, where the genus consists of 10 species and three varieties. In the course of our floristic investigation of karst caves in Guangxi in 2005, the new species C. jingxiensis Yan Liu, W. B. Xu & H. S. Gao was discovered in a karst cave from the Guangxi Zhuang Autonomous Region of China, and the new taxon is described and illustrated here. This new species is similar to C. mollifolia D. Fang & W. T. Wang in its leaf shape, corolla, and staminodes, but it can be distinguished by its smaller leaves, the lax, 1-branched cymes with one to three flowers, and the capsule that is twice as long as the calyx.

Key words: China, Chiritopsis, Gesneriaceae, Guangxi, IUCN Red List.

Chiritopsis W. T. Wang (Gesneriaceae) is an endemic genus of 10 species and three varieties found exclusively in China. The genus consists of the one species, C. xiuangensis X. L. Liu & X. H. Guo, distributed in Anhui Province; three species and one variety in Guangdong Province; and six species and two varieties in Guangxi Zhuang Autonomous Region. The karst region of Guangxi—Guangdong may be the center of distribution and diversification of Chiritopsis.

In the course of floristic investigation of karst caves in 2005, we discovered a rare plant in Jingxi County, southwestern Guangxi, China, identified as belonging to the genus of Chiritopsis. After consulting local and national floras and relevant literature (Wang, 1981, 1982, 1986, 1990, 1992; Liu & Guo, 1989; Fang et al., 1993; Wang et al., 1998; Li & Wang, 2004; Liu et al., 2006; Wen et al., 2008) as well as herbarium specimens, we determined the plant to represent a new species, which is described here.

Chiritopsis jingxiensis Yan Liu, W. B. Xu & H. S. Gao, sp. nov. TYPE: China. Guangxi Zhuang Autonomous Region: Jingxi Co., on moist limestone rock face in karst cave, 17 Aug. 2005, Yan Liu, Wei-bin Xu & Hai-shan Gao LI260 (holotype, IBK; isotype, PE). Figure 1.

Haec species Chiritopsi mollifolii D. Fang & W. T. Wang affinis, sed ab ea lamina foliari minore (1–2 × 0.5–1 vs. 2–4.5 × 2–4.5 cm) basi attenuata vel cuneata (vs. rotundata vel cordata), cymis semel ramosis (vs. bis terve ramosis), stigmat 2-lobulato (vs. integro) atque capsula calyce 1-plo longiore (vs. subaequilonga) differt.

Herbs perennial, stemless; rhizome 5–15 × 3–4 mm diam. Leaves 7 to 17, basal, carnose, papery when dry; petiole flattened, 6–20 × 1–2 mm, villous; blades obovate or elliptic to suborbicular, 1–2 × 0.5–1 cm, villous, base attenuate to cuneate, margin subentire, apex obtuse to subrounded; lateral veins 2 or 3, inconspicuous. Cymes lax, 2 to 5 per rosette, axillary, 1-branched, each 1–3-flowered; peduncle 3–6 cm, pubescent; bracts 2, opposite, linear-lanceolate, 1–2 × 0.3–0.5 mm, margin entire, pubescent; pedicel 5–15 mm, pubescent. Calyx 5-lobed, dissected to near base, segments narrowly linear-lanceolate, 3–3.5 × 0.5–1 mm, apex acute, externally pubescent, internally sparsely puberulent, margins entire; corolla purplish, 10–13 mm, externally puberulent, internally sparsely puberulent; corolla tube ca. 9 × 4 mm; limb distinctly 2-lipped, white; adaxial lip ca. 2 mm, 2-parted to base, lobes 2.5–3 mm wide; abaxial lip 3–4 mm, 3-parted to near middle, lobes rounded-ovate, 3–3.5 mm wide; stamens 2, adnate to 2.5–3 mm above corolla base; filaments lanceolate-subulate, 3–4 mm, ± genculate near middle, glabrous; staminodes 2, ca. 1.5 mm, glabrous, linear, apex capitate, adnate to 1.5–2 mm above corolla base. Disc annular, ca. 0.7 mm in height, glabrous; pistil ca. 8 mm, ovary narrowly ovoid, 2–3 × ca. 1 mm, puberulent; style 5–6 mm, puberulent; stigma obturadiformis, ca. 0.5 mm, 2-lobed. Capsule ellipsoid, 6–8 × 1.5–2 mm, twice as long as calyx.

doi: 10.3417/2008014

Distribution and ecology. *Chiritopsis jingxiensis* is known only from one population on moist limestone rock face in a karst cave in Jingxi County, southwestern Guangxi, China, at ca. 900 m.

*IUCN Red List category.* The new species has an estimated population size of fewer than 250 mature individuals and is known only from one site. We therefore assess *Chiritopsis jingxiensis* as Critically Endangered (CR) according to IUCN Red List criteria (IUCN, 2001).

*Phenology.* *Chiritopsis jingxiensis* has been collected in flower from July to September and in fruit from August to October.
Table 1. Morphological comparison of Chiritopsis jingxiensis, C. mollifolia, and C. xiuningensis.

<table>
<thead>
<tr>
<th></th>
<th><strong>C. jingxiensis</strong></th>
<th><strong>C. mollifolia</strong></th>
<th><strong>C. xiuningensis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf blade (cm)</td>
<td>1–2 × 0.5–1</td>
<td>2–4.8 × 2–4.5</td>
<td>2–9 × 1–6</td>
</tr>
<tr>
<td>Leaf base</td>
<td>attenuate to cuneate</td>
<td>rounded to cordate</td>
<td>widely cuneate, shallowly cordate to subrounded</td>
</tr>
<tr>
<td>Cymes</td>
<td>2 to 5, single-branched, with 1 to 3 flowers</td>
<td>cymes 4 to 10, 2- or 3-branched, with 7 to 20 flowers</td>
<td>cymes 1 to 7, 1- or 2-branched, with 2 to 10 flowers</td>
</tr>
<tr>
<td>Corolla limb</td>
<td>distinctly 2-lipped, with the adaxial lip ca. 2 mm, the abaxial lip ca. 3–4 mm</td>
<td>distinctly 2-lipped, with the adaxial lip ca. 2.2 mm, the abaxial lip ca. 3 mm</td>
<td>obscurely 2-lipped, with the adaxial lip ca. 3 mm, the abaxial lip ca. 2 mm</td>
</tr>
<tr>
<td>Staminodes</td>
<td>apex capitate</td>
<td>apex capitate</td>
<td>apex not capitate</td>
</tr>
<tr>
<td>Disc</td>
<td>amular</td>
<td>amular</td>
<td>2-lobed</td>
</tr>
<tr>
<td>Stigma</td>
<td>2-lobed</td>
<td>not divided</td>
<td>not exceeding calyx</td>
</tr>
<tr>
<td>Capsules</td>
<td>twice as long as calyx</td>
<td>not exceeding calyx</td>
<td>not exceeding calyx</td>
</tr>
</tbody>
</table>

**Etymology.** The specific epithet commemorates Jingxi County, the type locality for the new species.

**Relationships.** Chiritopsis jingxiensis is similar to *C. mollifolia* D. Fang & W. T. Wang in its leaf shape, corolla, and staminodes, but it can be distinguished by its smaller leaves (1–2 × 0.5–1 cm vs. 2–4.8 × 2–4.5 cm), attenuate to cuneate leaf base (vs. rounded to cordate), cymes two to five, 1-branched, with one to three flowers (vs. cymes four to 10, 2- or 3-branched, with seven to 20 flowers), 2-lobed stigma (vs. not divided), and capsules that are twice as long as the calyx (vs. not exceeding calyx). Table 1 summarizes the morphological differences between *C. jingxiensis* and two similar species.


**Acknowledgments.** We thank Fa-nan Wei (IBK) and Ching-I Peng (HAST) for their help in preparing the paper; we also thank Shun-qing He (IBK) for the handsome drawing. This study was supported by the Western Program for Fostering Personal Ability, Chinese Academy of Sciences (2007), to Yan Liu (IBK) and the Fundamental Research Fund of Guangxi Institute of Botany (GZY 09004) to Wei-bin Xu (IBK).

**Literature Cited**


Impatiens cornutisepala (Balsaminaceae), a New Species from Guangxi, China

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ABSTRACT. A new species from Guangxi Province, Impatiens cornutisepala S. X. Yu, Y. L. Chen & H. N. Qin, is described for the Balsaminaceae in China. It is similar to I. dicentra Franchet ex Hooker f. in the 1-flowered peduncle and the lobes of the lateral united petals that are terminated by a long filamentous bristle. However, the new species differs from the latter in its narrowly elliptic to ob lanceolate leaf blade, the smaller lateral sepals with entire margins and a prominent green cornute appendage dorsally, the spur of the lower sepal that is entire at the tip, and its differing leaf epidermis micromorphology. The micromorphology of seeds and pollen under SEM is presented.

Key words: Balsaminaceae, China, Guangxi, Impatiens, IUCN Red List.

The genus Impatiens L. belongs to the family Balsaminaceae, which contains two currently recognized genera, the small Hydrocrca Blume and the prolific Impatiens. This genus contains about 850 species (Grey-Wilson, 1980; Fischer, 2004) distributed mainly in the Old World, throughout much of tropical Africa (including Madagascar), India, southwestern Asia, southern and central China, and Japan. There are also a few species that extend into the northern temperate zones of Europe and North America (Grey-Wilson, 1980).

In the last floristic treatment of Impatiens in China (Chen, 2001; Chen et al., 2008), 220 species were recognized, the majority from southwestern China in Yunnan, Sichuan, Guizhou, Xizang (Tibet), and Guangxi. Since 2001, several new species and varieties have been published from Yunnan, Guangxi, and Zhejiang (Jin & Ding, 2002; Huang et al., 2003; Yu et al., 2007). However, the high diversity and insufficient fieldwork on Impatiens suggest that additional new species await discovery.

The first author carried out numerous field explorations in southern China from 2004 to 2007. The species described here was confirmed as new after detailed comparison with previously described species.


Species ob pedunculo uniflorum et lobulis petalorum lateralis cornutus apice in trichomata longa desinetes Impatiens dicentra Franchet ex Hooker f. similis sed ab ea folis angustis ellipticis vel obovatis ellipticis, sepaliu lateraliibus parvis margine integris dorsali appendiculis corniformibus viridibus praeditis atque calicis apice integro differt.

Annual herb, (30–)60–80 cm tall, glabrous; stems erect, branched, lower nodes swollen with numerous fibrous roots. Leaves submembranous, alternate, petiolate or uppermost subsessile; petiole 0.5–2 cm; leaf blades narrowly elliptic to oblanceolate, 12–15 × 3–5 cm, apex acuminate to cuspidate, base orbicular to cordate, with many stipitate glands scattered at the base, margin crenate, teeth mucronate, lateral veins in 5 to 7 pairs, arcuate, midvein abaxially prominent. Inflorescence in upper leaf axils, solitary, 1-flowered, peduncle 2–3 cm, glabrous, bracteate above middle; bracts solitary, elliptic-ovate, 1–2 mm, entire, persistent. Flowers yellow, 4–5 cm; lateral sepals 2. ovate, 4–5 × 2–3 mm, apex acuminate, dorsally with a green spinelike appendage 2–3 mm, base with reddish patches; lower sepal infundibuliform, ca. 2 cm, mouth truncate, apex acute, reddish striate, base gradually narrowed into spur; spur 1–1.5 cm, incurved, apex not bilobed; dorsal petal reniform, 1.2–1.5 × 1.8–2 cm, base truncate, apex curved abaxially to a cusp, dorsally with a green nuero ca. 5 mm, abaxially with a green spinelike crest or appendage ca. 5 mm, base with reddish patches; lateral united petals not clawed,
Figure 2.  *Impatiens cornutisepala* S. X. Yu, Y. L. Chen & H. N. Qin. A–D. SEM images of seeds. —A. Entire view to show the shape of the seed. —B, C. Partial view to show the reticulate ornaments. —D. Partial view to show the ornaments in the lumina. E–G. SEM images of pollen grains. —E. Polar or short equatorial view to show the shape of the pollen grain and its four colpi. —F. Long equatorial view to show the shape of the pollen grain. —G. Partial view to show the reticulate ornaments. H, I. Light photomicrographs of epidermis cells. —H. Adaxial epidermis to show the cells and stomata. —I. Abaxial epidermis to show the cells and stomata. J, K. *Impatiens denticera*, light photomicrographs of epidermis cells. —J. Adaxial epidermis to show the cells and stomata. —K. Abaxial epidermis to show the cells and stomata. A–I from S. X. Yu 4023 (PE); J, K from S. X. Yu 4093 (PE).
ca. 2 cm, 2-lobed; upper petal of the lateral united petals ovate-lanceolate, 5–7 mm, upper part with reddish patches, apex acuminate into long filamentous trichomes; lower petal dolabridiform, 1.2–1.5 cm, incurved, inner margin curled, with small auricle, apex abruptly narrowed into long filamentous trichomes; stamen filaments, 2–3 mm linear; anthers small, ca. 5 mm, apex obtuse; ovary 4–5 mm, fusiform, erect, apex acuminate, glabrous. Capsule 2–2.5 cm, cylindrical, many-seeded, acuminate, glabrous; seeds ca. 3.33 × 2.83 mm, with a length/width ratio of 1.18, orbicular-ovoid, brown, obviously reticulate (Fig. 2A–D).

Pollen grains (P [polar length] × E1 [long equatorial length] × E2 [short equatorial length]) 14.3 (13.8–14.6) × 27.8 (27.2–28.1) × 16.7 (16.3–17.5) μm, tetracolpate, colpi long, thin, exine with reticulate ornamentation, dense granules in lumina (Fig. 2E–G).

Distribution and ecology. *Impatiens cornutisepala* is endemic to northeastern Guangxi Province, China, recorded so far only from Quanzhou County. The plants were found in a moist valley in Jiaojing village from 1000–1300 m elevation, in association with *Plea Lindley*, *Elatostema J. R. Forster & G. Forster*, *Carex L.*, an unidentified bamboo species, and other grasses.

IUCN Red List category. The population covers an area of about 1000 m² and includes approximately 500 to 600 individuals. According to IUCN Red List criteria (IUCN, 2001), *Impatiens cornutisepala* should be categorized as Critically Endangered (CR).

Phenology. The new species was observed in flower from July to October and in fruit from August to November.

Etymology. The specific epithet *cornutisepala* is from the Latin and refers to the lateral sepals with their green comute appendages.

Leaf anatomy. The leaf epidermis of the two species, *Impatiens cornutisepala* (Fig. 2H, I) and *I. dicerca* Franchet ex Hooker f. (Fig. 2J, K), are both irregular, with stomata on both sides of the leaf. The stomata are anomocytic, and the guard cell outlines are subbicurcular. However, the anticlinal walls of the adaxial epidermis differ: wavy or sinuous in *I. cornutisepala*, but with deeper crenulations in *I. dicerca*. In contrast, on the abaxial epidermis, the cell walls of the two species both seemed deeply crenulate, but the stomatal density (SD) and stomatal index (SI) (Dilcher, 1974) differ: *I. cornutisepala*: SI (adaxial epidermis) = 7.32%–9.46%, SI (abaxial epidermis) = 17.84%–22.4%; *I. dicerca*: SI (adaxial epidermis) = 2.61%–4.27%, SI (abaxial epidermis) = 33.72%–38.41%.

Taxonomic relationships. *Impatiens cornutisepala* is morphologically similar to *I. dicerca* in its single-flowered peduncles and in the lobes of the lateral united petals that are tipped by long hairlike processes. However, the two species differ in the narrowly elliptic to oblanceolate leaves (vs. ovate to ovate-lanceolate in *I. dicerca*), smaller lateral sepals (4–5 × 2–3 mm) with entire margins and conspicuous dorsal spinelike appendages (vs. larger sepals [7–9 × 5–6 mm] with crenate margins and no dorsal spinelike appendages in *I. dicerca*), and the spur of the lower sepal that is entire at the tip (vs. bilobed in *I. dicerca*).

Three species, *Impatiens macroseptil* Y. L. Chen, *I. siculafer* Hooker f., and *I. cyanantha* Hooker f., are sympatric in Guangxi Province with *I. cornutisepala*. These four species are readily distinguished by their reproductive and vegetative characters in the following key.

**KEY TO FOUR SPECIES OF IMPATIENS IN GUANGXI PROVINCE, CHINA**

1a. Inflorescences in upper leaf axils, 1- to 2-flowered, flowers red or yellow ............................. 2

1b. Inflorescences in upper leaf axils, racemes, 3- to 7-flowered, flowers yellow or purple ................................................................. 3

2a. Flowers yellow, apices of lateral united petals with trichomes ............................... *I. cornutisepala*

2b. Flowers yellow, apices of lateral united petals entire ............................................. *I. macroseptil*

3a. Flowers golden yellow, lower sepal narrowly funneliform ..................................... *I. siculafer*

3b. Flowers purple, lower sepal widely funneliform ................................................. *I. cyanantha*

**Paratypes.** CHINA. Guangxi: Quanzhou Co., Jiaojing, in valley near river, ca. 1200 m, 18 Nov. 2007, W. B. Xu 200711183a (IBK, MO).

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Literature Cited


A New Species of *Epimedium* (Berberidaceae) from Hubei, China

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ABSTRACT. A new species of *Epimedium* L. (Berberidaceae), *E. shennongiaensis* Yan J. Zhang & J. Q. Li, is described and illustrated from the Shennongjia National Nature Reserve, Hubei Province, China. The new species is distinctive and assigned to series *Davidiideneae* Stearn of section *Diphyllon* (Komarov) Stearn because of its large flowers and petals with expanded lamina and elongated spurs. Based on corolla characteristics, it is similar to *E. epsteinii* Stearn but is distinguished by its compact rhizomes, narrowly ovate and acuminate inner sepals (1.5–1.9 × 0.7–0.9 cm), and petals slightly shorter or nearly as long as the inner sepals with straight spurs (1.5–1.7 cm).

Key words: Berberidaceae, China, *Epimedium*, Hubei, IUCN Red List.

*Epimedium* L., as a temperate genus of Old World distribution, is the largest genus of herbaceous Berberidaceae with ca. 57 species distributed broadly from Japan to Algeria, China, where 47 species have been reported and the evolution of *Epimedium* has continued without interruption probably since the origin of the genus, is not only the richest in species of *Epimedium*, it is the only region where new species continue to be found (Ying, 2001; Stearn, 2002; He & Xu, 2003; Guo et al., 2007).

The new species was collected from Muyuping, Shennongjia National Nature Reserve, Hubei Province, China, on 2 May 2004, when it was flowering; it was then transplanted into the Wuhan Botanical Garden, Chinese Academy of Sciences, also in Hubei Province. It appears most closely related to *Epimedium epsteinii* Stearn, but differs from the latter in its rhizomes, leaflets, and perianth.


Species nova *Epimedium epsteinii* Stearn affinis, sed ab eo rhizomatibus compactis, foliis basi profunde cordatis, sepalis interioribus angustae ovatis apice acuminatis atque petalis sepalis interioribus paulo brevioribus vel aequilongis calcaribus strictis differt.

Flowering stems 18 cm or longer, bearing 2 opposite leaves or a single leaf; rhizome compact, 4.5–8 mm diam. Basal and cauline leaves with 3 leaflets; leaflets narrowly ovate, 6.5–11.2 × 3.7–6.1 cm, apex acuminate, margin spinose-serrate, base deeply cordate with a narrow sinus, lobes of the terminal leaflet equal and acute, those of the lateral leaflets very unequal with the inner lobe smaller and acute, and the outer one much larger and acute, coriaceous, persisting as green all winter, glossy adaxially, glaucous abaxially when mature and glabrate with scattered, minute, erect hairs. Inflorescence simple, racemose, few-flowered, with 8 to 22 flowers, 10–17 cm; pedicels ca. 2–2.7 cm, glabrous or sometimes glandular. Flowers large, 3–3.8 cm diam.; outer sepals soon falling, green or purple, outer pair oblong, to 4 mm, inner pair broadly ovate with white margins, to 5 mm; inner sepals narrowly ovate, white, 1.5–1.9 × 0.7–0.9 cm, apex acuminate; petals slightly shorter or nearly as long as inner sepals, deep purple; spur subulate, straight, 1.5–1.7 cm, expanded at base into lamina 5–6 mm high; stamens enclosed by the upward corolla extension, ca. 4 mm; filaments white, ca. 1 mm; anthers ca. 3 mm, pale yellow; pollen yellow. Capsule ca. 1 cm.

Habitat and distribution. *Epimedium shennongiaensis* is found in forests and on valley slopes at ca. 1500 m elevation in Muyuping, Shennongjia National Nature Reserve, Hubei Province, China.

IUCN Red List category. *Epimedium shennongiaensis* is assessed as a taxon of Least Concern (LC) according to IUCN Red List criteria (IUCN, 2001).

Phenology. The new species is known to flower in May in the field and in late March to mid April in cultivation.

Etymology. The specific epithet refers to the type locality.

Discussion. Stearn (2002) established section *Diphyllon* (Komarov) Stearn, which comprised all the Chinese species of *Epimedium* except for *E. koreanum* Nakai, and he divided the section into four series.

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based on corolla characteristics. *Epimedium shennongjiaensis* belongs to series *Davidianae* Stearn of section *Diphyllon*, which is characterized by large flowers and petals with expanded lamina and elongated spurs. Stearn (2002) ascribed 10 species to series *Davidianae*, differentiated mostly by rhizome morphology, leaflet number and morphology, and inflorescence and corolla characteristics. Recently,
Guo et al. (2007) reported *E. pseudowushanense* B. L. Guo and placed the new species in series *Davidianae*, bringing the total number of species in series *Davidianae* to 12.

Among the 12 species of series *Davidianae*, *Epimedium shennongjaeis* presents greatest affinity with *E. epsteinii* from Hunan Province in their similar flower form. However, *E. shennongjaeis* is distinguished by its compact rhizomes (vs. creeping and slender in *E. epsteinii*), narrowly ovate and acuminate inner sepals (vs. ovate and acute), and petals slightly shorter or nearly as long as the inner sepals with straight spurs (vs. petals a little longer

than the inner sepals with slightly curved spur). In addition, *E. shennongjaeis* has leaflets with the base deeply cordate and with a narrow sinus (vs. shallowly cordate with the lobes separated by moderately wide sinus) and the lobes of the terminal and lateral leaflets are acute (vs. rounded except for the larger lobes of lateral leaflets which are acute).

In general, *E. shennongjaeis* is a distinct species that can be distinguished from the other species of series *Davidianae* by its compact rhizome, leaflet number and morphology, simple inflorescence, flower color, and shape and size of inner sepal and petal.

**KEY TO SPECIES OF EPIMEDIUM SER. DAVIDIANAE**

1a. Leaflets 5, rarely 3.
   2a. Inner sepals reddish, ca. 4 × 1 mm; spur of petals much longer than inner sepals, 10–15 mm long ...
       3a. Rhizome compact, 4.5–8 mm diam. ....... *E. shennongjaeis* Yan J. Zhang & J. Q. Li
   2b. Inner sepals pale sulphur yellow, ca. 11 × 4 mm; spur of petals slightly longer than inner sepals, ca. 13 mm long ...
       3b. Leaflets 3.

1b. Leaflets 3.
   3a. Inflorescences racemes.
      4a. Rhizome compact, 4.5–8 mm diam. ....... *E. shennongjaeis* Yan J. Zhang & J. Q. Li
      4b. Rhizome long-creeping, 1–3 mm diam.
         5a. Leaflets broadly ovate or almost orbicular, 1.3–2.5 × 1.2–2.5 cm ....... *E. pauciflorum* K. C. Yen
         5b. Leaflets ovate or narrowly ovate, 3–11 cm long.
            6a. Spur of petals much longer than inner sepals.
               7a. Inner sepals cymbiform, reddish, ca. 6 × 2.5 mm, apex obtuse; petals pale yellow ...
               7b. Inner sepals elliptic, white, ca. 16 × 8–9 mm, apex shortly acuminate; petals white ...
               7c. Inner sepals ovate or broadly ovate, 9–12 × 4–5 mm ...
            6b. Spur of petals a little longer than inner sepals, or almost as long as inner sepals.
               8a. Inner sepals ovate, ca. 13 × 9 mm, apex acute; petals purple, spur a little longer than inner sepals, 15–16 mm long ...
               8b. Inner sepals lancelolate, 16–19 × 7–9 mm, apex acuminate; petals white, spur almost as long as inner sepals, 15–18 mm long ...
               8c. Inner sepals lancelolate, 16–19 × 7–9 mm, apex acuminate; petals white, spur almost as long as inner sepals, 15–18 mm long ...
   3b. Inflorescences panicules.
      9a. Petals with obvious basal lamina 7–8 mm high.
         10a. Leaflets narrowly ovate, 10–15 × ca. 6 mm, apex acuminate; inner sepals broadly elliptic, reddish, 5–6 × 3–4 mm ...
               9b. Petals with slight basal lamina 2–3.5 mm high.
                  11a. Inner sepals ovate or broadly ovate, 8–13 × 4–8 mm; spur of petals almost as long as or slightly longer than inner sepals, 10–15 mm long ...
                  11b. Inner sepals elliptic, 11–12 × 4–5.5 mm; spur of petals obviously longer than inner sepals, 17–20 mm long ...
         10b. Leaflets lancelolate, 5–7 × 1.2–3 mm, apex long acuminate; inner sepals elliptic or narrowly ovate, pale yellow, 10–12 × 5–6 mm ...
         10c. Leaflets narrowly ovate, 10–15 × ca. 6 mm, apex acuminate; inner sepals broadly elliptic, reddish, 5–6 × 3–4 mm ...

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**Literature Cited**


IUCN, Gland, Switzerland, and Cambridge, United Kingdom.


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