Ampelocissus asekii J. Wen, R. Kiapranis & M. Lovave, a new species of Vitaceae from Papua New Guinea

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Abstract

A new species Ampelocissus asekii J.Wen, R.Kiapranis & M.Lovave of Vitaceae is described from Morobe Province of Papua New Guinea. It is a close relative of A. muelleriana Planch., another endemic of New Guinea and differs from the latter by its densely woolly tomentose lower leaflet surface and much thicker leaflets. The new species is from the mid montane forests, whereas A. muelleriana occurs in the lowland rain forests.

Keywords

Ampelocissus, Ampelocissus asekii, Morobe Province, Papua New Guinea, Vitaceae

Introduction

Ampelocissus Planch. (Vitaceae) consists of ca. 95 species from tropical Asia, Africa, Australia and Central America (Wen 2007). The genus was established by Planchon in 1884 and is characterized by the inflorescences subtended by a tendril, bisexual flowers, and a floral disc usually with ten linear marks on its side (Planchon 1887). Lauterbach (1925) recognized two species of the genus in New Guinea, including the simple-leaved A. arachnoidea Planch. and the trifoliate A. muelleriana Planch. A third species A. acetosa (F. Muell.) Planch. with pedate leaves has been recorded from Papua
New Guinea (Jackes 1984). Nevertheless no specimens of *A. arachnoidea* have been examined by the authors. Lauterbach’s locality of the species “Key-Inseln: Doela” is probably either Kai (Kei) Dulah or Dulah Laut in the Kai (Kei) Islands of Indonesia, off the southwest coast of New Guinea. We herein report a new species from Morobe Province based on our herbarium studies.

**Methodology**

Herbarium work was conducted in the Papua New Guinea National Herbarium in Lae (LAE). Micromorphological characters were documented with scanning electron microscopy (SEM). The SEM samples were coated with gold and palladium, and observed under a Zeiss EVO M15 electron microscope with LaB6 electron source at the SEM Lab of the National Museum of Natural History, the Smithsonian Institution.

**Results and discussion**

*Ampelocissus asekii* J. Wen, R. Kiapranis & M. Lovave, sp. nov.

urn:lsid:ipni.org:names:77125856-1

http://species-id.net/wiki/Ampelocissus_asekii

Figs 1–3


**Description.** Liana. Young stems with dense light-brown woolly hairs. Leaves trifoliate; stipules narrowly triangular, 3–5 mm long, 2–3.5 mm wide; leaflets chartaceous, woolly pubescent with white hairs above, densely rusty woolly pubescent below, base of lateral leaflet strongly oblique, that of terminal leaflet acute, but slightly oblique, apex acute, margin sinuate-spinulose with 3–10 teeth on each side; petiole 9.5–10.5 cm long, densely woolly pubescent; blade of terminal leaflets obovate, blade of lateral leaflets unequally ovate, 13–15 cm long, 6–8 cm wide; lateral veins 5–7 on each side; petiolule 2–3 cm long, densely woolly pubescent. Tendril simple. Inflorescence ca. 35 cm long, a narrow panicle of spikes with all but one branch aggregated on the top 1/3 of the inflorescence primary axis, primary branches ca. 35, each 1–2.8 cm long, light rusty woolly pubescent, each with 6–25 flowers; peduncle ca. 10 cm long. Flowers sessile, 4 to rarely 5-merous; calyx saucer-shaped, glabrous, 0.2–0.3 mm long, 0.5–0.6 mm wide; petals oblong to ovate-oblong, glabrous, 1.0–1.3 mm long, 0.5–0.7 mm wide; floral disc adnate to ovary, grooved; stamens with filaments 0.5–0.6 mm long and ovate-oblong anthers; ovary 2-locular, styles short, 0.2–0.3 mm long. Fruits not seen.
Figure 1. Image of the holotype of *Ampelocissus asekii* J.Wen, R.Kiapranis & M.Lovave.
Distribution. The new species is only known from its type locality in Morobe Province, Papua New Guinea.

Ecology. Mid montane forests. Fl. Apr; elevation at ca. 1500 m.

Etymology. This species is named after the type locality, the Aseki Patrol area in Morobe Province.

The new species is closely related to *A. muelleriana*, another endemic from New Guinea. They differ in the highly distinctive brown woolly hairs on the lower leaflet surface, the acute leaflet apex and the chartaceous leaflet texture in the new species (vs. with tufts of rusty hairs in the axils of veins on the lower surface, acuminate leaflet apex, and thin...
chartaceous to membranaceous leaflet texture in *A. muelleriana*). The new species occurs in the mid montane zone, whereas *A. muelleriana* grows in the lowland rain forests in East Sepik, Madang and Morobe of Papua New Guinea as well as in West Papua of Indonesia.

**Below we provide a key to all four *Ampelocissus* species in New Guinea**

1a Leaves simple or pedately compound, inflorescence a thyrse with pedicellate flowers ................................................................. 2

2a Leaves simple ........................................................................... *A. arachnoidea*
2b Leaves pedate with (5-) 7-9 (-11) leaflets .................................................. *A. acetosa*

1b Leaves trifoliate, inflorescence a panicle with spicate inflorescence units (sessile or nearly sessile flowers) ................................................................. 3

3a Lower leaflet surface densely rusty woolly pubescent, leaflet chartaceous in texture, in mid montane habitat ........................................... *A. asekii*

3b Lower leaflet surface with rusty hairs at the leaflet vein axils, leaflet thin chartaceous or membranaceous; in lowland rain forest habitat........ *A. muelleriana*

*Ampelocissus arachnoidea* is tentatively included in the key.

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**References**


Axonopus graniticola, a new species of A. ser. Suffulti (Poaceae, Panicoideae, Paspaleae) from Minas Gerais, Brazil

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Abstract
A new species of Axonopus ser. Suffulti from Minas Gerais, Brazil, is described and illustrated. Comparison with morphologically related species, as well as comments on the ecology and the conservation status are provided.

Resumo
Uma nova espécie de Axonopus ser. Suffulti é descrita e ilustrada para o estado de Minas Gerais, Brasil. São fornecidas comparações com espécies morfologicamente relacionadas, assim como comentários sobre ecologia e estado de conservação.

Keywords
Atlantic Forest, inselbergs, Grasses, new taxon, Gramineae
Introduction

Axonopus P. Beauv. is an American genus of Poaceae comprising approximately 110 species (Black 1963, Clayton and Renvoize 1986, Cialdella et al. 2006). Most of its species occur in the tropics, where it is especially diverse in the Neotropical savannas, such as the Brazilian cerrado (Mendonça et al. 1998), the Espinhaço Range mountains (Viana and Filgueiras 2008), the Amazonian savannas and the Guayana Shield (Davidse et al. 2004). Traditionally, Axonopus was included in a wide circumscription of the tribe Paniceae, Panicoideae subfamily (e.g. Black 1963, GPWG 2001, Cialdella et al. 2006, Giraldo-Cañas 2007, 2008). However, the identity of Paniceae s.l. was challenged in the latest proposal of classification of this tribe (Morrone et al. 2012), based on an integrated analysis of ndhF plastid DNA and morphology. The authors split Paniceae s.l. into Paniceae s.s. (pantropical, basic chromosome number $n = 10$) and Paspaleae (American, $n = 9$), the latter encompassing Axonopus and other 38 genera.

Chase (1911) recognized three sections of Axonopus: A. sect. Cabrera (Lag.) Chase, A. sect. Lappagopsis (Steud.) Chase, and A. sect. Axonopus, a circumscription that was followed by Dedecca (1956) in his revision of the genus for Brazil. Thereafter, Black (1963), in his taxonomic study of the genus, divided A. sect. Axonopus into the series Axonopus, Barbigeri, Cappilares, Fastigiati, and Suffulti, based on such combination of characters as life span, indumentum, the number of nerves in the upper glume, trichomes in the rachis of racemes, and the color of fertile florets. The only attempt to assess the monophyly of Black’s Axonopus infrageneric groups using a combined analysis of morphological and molecular data (López and Morrone 2012) do not support Black’s classification. Some groups, however, appear to be monophyletic, like serie Suffulti. Nonetheless, a comprehensive phylogeny including a broader sampling within Axonopus is necessary to support a robust infrageneric classification of the genus.

Species of the Axonopus ser. Suffulti are perennial plants, with the upper glume and lower lemma lacking a central nerve, and fertile florets characteristically shiny brown to dark brown (Black 1963, Cialdella et al. 2006). Cialdella et al. (2006) published a comprehensive revision of the taxon, providing detailed descriptions of the 16 accepted names, ornamentation of the upper floret on SEM, illustrations, a key for identification of the species, and nomenclatural updates. Fifty five species of Axonopus are currently indicated to Brazil (Filgueiras and Rodrigues 2012), and seven of them are placed in the Axonopus ser. Suffulti.

A floristic survey in an overlooked granitic outcrop, or inselberg, in northeastern Minas Gerais, Brazil (de Paula et al. in prep.), revealed at least five new species of flowering plants. One of those, belonging to the Axonopus ser. Suffulti, is herein presented, illustrated and compared with putatively related species. SEM images of the fertile floret, as well as comments on its ecology and the conservation status are provided. For SEM images, samples were mounted on stubs, coated with gold palladium in a Hummer 6.2 (Anatech, Union City, CA, USA) sputtering system and viewed with a JSM-541OLV (JEOL, Tokyo, Japan) at 10kV.
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**Taxonomic treatment**

*Axonopus graniticola* P.L.Viana, sp. nov.
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http://species-id.net/wiki/Axonopus_graniticola

**Diagnosis.** *Axonopus graniticola* is distinguished from all other species of the *Axonopus* ser. *Suffulti* by its mostly caulinar leaves, distichous laterally compressed leaf sheaths, 1.5–2.5 cm wide leaf blades, deciduous with a subcordate base, and multi-racemose inflorescences of 26–75 racemes, with the basal ones re-branched.


**Description.** Plants perennial, densely caespitose, with very short falciform rhizomes. Culms 95–125 cm long, erect to decumbent, slightly curved at the base, not geniculate, unbranched; nodes various, hidden by leaf sheaths, glabrous; internodes 5–8.5 mm wide, cylindrical to slightly flattened, glabrous, stramineous. Leaves distichous, mostly caulinar; leaf sheaths 5.5–32 cm long, larger than the internodes, conuplicate, strongly keeled, striate, scabrous, glabrescent, persistent; ligule 0.15–0.20 mm long or absent, ciliate, apparently deciduous, because it is usually absent in older leaves; collar prominent, glabrous; leaf blades (4.5)12–32 × 1.5–2.5 cm, oblong to linear, lanceolate, flat, retrosebly scabrous abaxially, antrosely scabrous adaxially, eventually with sparse hairs on abaxial or adaxial surfaces, deciduous, nerves prominent, margins scabrous, base rounded, subcordate, arising from a constriction of 1–2 mm long in each margin of the ligular region, apex obtuse, asymmetrical, emarginate, slightly folding, reflexed, scabrous. Inflorescences 2 per flowering culm, terminal and axillary; peduncle up to 55 cm long, partially included in the leaf sheaths, cylindrical to angulose, striate, scabrous; pulvinulus pubescent; main axis 8–16.5 × 0.05–0.14 cm, angulose, striate, scabrous; panicles 12–26 cm long, in dense clusters of alternate to verticillate racemes, the lower branches re-branching in 5–18 racemes; racemes (4–)9–16.5 cm long, the apical ones slightly shorter than the basal, 26–75 per panicle; racis of racemes triquetous, fertile all along, except for the 1–4.5 mm basal portion length, ending in a fertile spikelet, (5)10–15 spikelets per portion of 25 mm long, pubescent, scabrous in the angles; pedicels 0.25–0.5 mm long, scaberulous, sometimes with a few hyaline tuberculate trichomes to 0.8–1.5 mm long. Spikelets 1.8–2.0 × 0.6–0.8 mm, oblong-ellipsoid, dorsiventrally compressed, apex acute; upper glume as long as the spikelet, elliptical, membranous, glabrous or with sparse trichomes, hyaline to stramineous, 2–4(–5)-nerved, nerves prominent, scaberulous in the apex, mid-nerve occasionally present; lower lemma glumiform, 2(–3)-nerved, nerves glabrous; upper lemma 1.8–2.0 × 0.8–0.9 mm, elliptical, stiff, glabrous, except for a discrete tuft of short white hairs at the apex, densely ornamented by diminute papillae, fading in den-
sity toward the margins, shiny brown to dark brown, apex acute, brown to pale, base brown to pale; upper palea similar to the upper lemma but slightly shorter, 1.7–1.9 × 0.6–0.8 mm, glabrous. Lodicules 0.2–0.3 mm long, 2, oblong, erose; stamens 3, anthers ca. 0.8 mm, dorsifixed, purplish; stigmas plumose, whitish. Caryopsis not seen.
**Etymology.** The epithet refers to the occurrence of the plants of this species on exposed granite rock outcrops.

**Morphological comments.** The new species has perennial habit, scabrous pubescent rachis, with few scattered trichomes 0.8–1.5 mm long associated with the region of the pedicel insertion, the 2–4(–5)-nerved upper glume and 2(–3)-nerved lower lemma, and typically shiny brown and stiff fertile florets. In accordance with Black’s (1963) infrageneric circumscription of *Axonopus*, accepted by Cialdella et al. (2006) and Giraldo-Cañas (2007, 2008), and the combination of the above features, *Axonopus graniticola* should be placed into the *Axonopus* subg. *Axonopus* ser. *Suffulti*.

A mid-nerve in the upper glume and lower lemma is found in some spikelets of the specimen de Paula 237. Although this feature is uncommon in *Axonopus* ser. *Suffulti* (Cialdella et al. 2006), some species included in this group can bear a discrete mid-nerve in these bracts in some spikelets. For example, in the delicate Peruvian *Axonopus elegantulus* (J. Presl) Hitchc. and in *A. flabeliformis* Swallen, from northern South America, some spikelets can have the upper glume with a visible mid-nerve; in the Venezuelan *Axonopus magallanesiae* Giraldo-Cañas, both upper glume and lower lemma can be 4–5-nerved, with a noticeable mid-nerve on the bracts (Cialdella et al. 2006), as recorded in some spikelets of the new species.

*Axonopus flabeliformis* shares with *A. graniticola* the characteristically equitant base, with distichous, laterally compressed and persistent leaf sheaths, disposed along the culm. The compound panicle, occasionally occurring in *A. flabeliformis*, and spikelets 1.6–2.2 mm long, also suggest affinity, even though superficial, to the new species. *Axonopus graniticola* can be easily distinguished from *A. flabeliformis* by its wider leaf blades (1.5–2.5 cm vs. 0.5–0.9 cm in *A. flabeliformis*), the rounded and subcordate base of the blade arising from a constriction in the ligular region (against blade bases straight and following the sheath apex width in *A. flabeliformis*), and its multi-flowered panicles (26–75 racemes vs. 6–20(–30) racemes in *A. flabeliformis*).

The new species also bears slight resemblance to *Axonopus pressus* (Nees ex Steud.) Parodi, from the Brazilian cerrado, Bolivia and Paraguay, by its strongly conduplicate and keeled leaf sheaths, giving the typical laterally compressed aspect to the plant. However, the leaves of *A. pressus* are predominantly basal, contrasting with mostly caulinar leaves of *A. graniticola*, with shorter spikelets (1.8–2 mm long, vs. 2.2–3 mm in *A. pressus*), wider leaf blades (1.5–2.5 cm, vs. 0.8–1.2 cm in *A. pressus*) and inflorescences with 26–75 racemes (against less than 35 racemes in *A. pressus*). Moreover, the panicles of the new species are compound, with the lower branches re-branching in 5–18 racemes, a feature absent in *A. pressus*, with its panicles with unbranched racemes.

The flat and characteristically wide leaf blades and the compound panicles of the new species bear a slight resemblance to the widely distributed *Axonopus scoparius* (Flüggé) Kuhlm. However, the latter species is placed in the *Axonopus* sect. *Axonopus* ser. *Barbigeri* Black (Black 1963, Giraldo-Cañas 2007, 2008), and is characterized, among others, by spikelets with the upper glume and lower lemma with a central nerve, and pale brown upper florets. *Axonopus graniticola* plainly fits the circumscription of the *Axonopus* sect. *Axonopus* ser. *Suffulti*, as discussed above.
**Figure 2.** SEM micrographs of upper floret A Lemma view B Palea view C Apical portion of floret showing silica bodies (arrows) D Upper lemma apex, showing conspicuous macrohairs and pappilae E Basal portion of floret. Images taken from the holotype (de Paula et al. 145).

**Ornamentation of fertile floret on SEM.** (Figure 2). Abaxial surface of palea and lemma ornamented with papillae, silica bodies, macro-hairs and micro-hairs. Papillae simple, conical, apex acute, one per cell, evenly distributed in longitudinal rows on the floret surface, except in the margins of the lemma, which lack papillae. Silica bodies equidimensional, dumbbell shaped, visible on the apical portion of lemma margins. Macro-hairs unicellular, simple, located in the apex of lemma and palea and in the basal portion of the lemma (Figure 2 E). Micro-hairs collapsed in the studied material, probably due to samples preparation process, distributed in the apex of lemma and palea and in the basal portion of the lemma.

The presence of numerous papillae, dumbbell shaped equidimensional silica bodies on the apex of fertile floret and macro- and micro-hairs on the base and apex of floret are typical features of species included in *Axonopus* ser. *Suffulti* (Cialdella et al. 2006). Although no unique diagnostic feature was recorded in *Axonopus graniticola*, papillae
Axonopus graniticola, a new species of A. ser. Suffulti (Poaceae, Panicoideae, Paspaleae)...

with acute apex seems to be uncommon among species of A. ser. Suffulti, being only recorded in the new species and in A. polydactylus (Steud.) Dedecca, A. ramosus Swallen and A. suffultus (Mikan ex Trin.) Parodi (Cialdella et al. 2006).


Distribution and ecology. The new species is known only from its type locality, an inselberg in the municipality of Teófilo Otoni, eastern Minas Gerais, Brazil. It occurs on granitic and gneissic rock outcrops, surrounded by the Atlantic Forest matrix (Veloso et al. 1991), at elevations around 600 m.

The species is found in depressions filled with thin soil, forming dense clumps, surrounded by rocky surface. During the rainy season, the profuse growth of new leaves with conspicuous flat and wide blades gives a vivid green color to the clumps (Figure 3A), in contrast with the pale brown, almost bladeless, clumps observed during the dry season (Figure 3C). The persistent leaf sheaths covering the culms and the readily deciduous leaf blades may be adaptations to avoid desiccation during the dry season and serve as protection against high temperatures of this extremely seasonal environment. These features are described for other species among monocots families, like Velloziaceae and Cyperacea, which are usually known as desiccation-tolerant plants (Porembski 2007, Porembski and Barthlott 2000).

The vegetation of the inselberg is influenced by the soil (Porembski et al. 1998, Porembski 2007), and its flora is predominantly xeromorphic. Adaptations to drought and high insolation are common for the species from the type locality of Axonopus graniticola. Desiccation tolerance is found in other plant groups that occur in this area, as in some ferns and allies (Sellaginella convoluta (Arn.) Spring, S. sellowii Hieron., Cheilanthes geraniifolia (Weath.) R.M.Tryon & A.F.Tryon) and in Angiosperms, such as Cyperaceae (Trilepis lhotzkiana (Nees) ex Arn.), and Velloziaceae (Barbacenia spp., Vellozia spp.). Succulence occurs in Cactaceae (Coleccephalocerus buxbaumianus Buining, Pilosocereus brasiliensis (Britton & Rose) Backeb.), Bromeliaceae (Encholirium gracile L.B.Sm.), Orchidaceae (Cyrtophyllum glutiniferum Raddi, Encyclia spiritusascens L.C.Menezes), and in some Piperaceae (Peperomia spp.). Leaf deciduousness is also an adaptation in Wunderlichia australis Maguire & G.M.Barroso (Asteraceae) and Tabebuia reticulata A.H.Gentry (Bignoniacae).

Conservation. The species is known so far from a single granite-gneiss outcrop in the Teófilo Otoni region, Minas Gerais, Brazil. Due to the poor state of knowledge of the flora from that region (Martinelli 2007), more field efforts are required to clarify the distributional range of this species. In accordance with the IUCN (2001) guidelines, the species should be evaluated as Data Deficient.

Although it was not possible to assess the precise conservation status of the species, it is important to note that the vegetation of the inselbergs are under threat due to the ever increasing granite and gem exploration, road-building, grazing and illegal plant collection in southeastern Brazil’s inselbergs (Safford and Martinelli 2000). To fill
Figure 3. In situ photographs of *Axonopus graniticola* P.L. Viana. 

A Dense clump of *A. graniticola* during the rainy season 

B Flowering culm 

C Clumps, in the beginning of the dry season 

D Detail of panicle. 

Photographs by L.F.A. de Paula.

the gap of information in this diverse and poorly studied area, and therefore provide guidelines for the conservation of the flora in the region, taking into account that rock outcrops support a large number of endemics (Porembski 2007), a broader study of the flora of the Teófilo Otoni *inselbergs* is urgently needed.

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Pyropia plicata sp. nov. (Bangiales, Rhodophyta): naming a common intertidal alga from New Zealand

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Abstract
A commonly found red alga of the upper intertidal zone of New Zealand rocky coasts is described for the first time as Pyropia plicata sp. nov. This species has been incorrectly known as Porphyra columbina Mont. (now Pyropia columbina (Mont.) W.A.Nelson) for many years. Pyropia plicata is widespread and common, and it is readily distinguished from other species of bladed Bangiales in New Zealand by its distinctive morphology, with pleated blades attached by a central rhizoidal holdfast.

Keywords
Bangiales, New Zealand, Porphyra, Pyropia columbina, Pyropia plicata sp. nov.

Introduction
For many years the most commonly found and widespread species of bladed Bangiales in New Zealand has been incorrectly known as Porphyra columbina Mont. Based on material collected from the New Zealand subantarctic Auckland Islands (Montagne 1842, 1845), Porphyra columbina was the first species in the order described from the New Zealand region. The name P. columbina has been applied to specimens with widely ranging growth forms and colour states found in diverse habitats from subantarctic to warm temperate areas of New Zealand, Australia, and South America (e.g. Howe 1914, Taylor 1947, Levring 1953, 1955, 1960, Chapman 1969, Womersley and Conway 1975, Acleto and Endo 1977, Ricker 1987, Ramirez and Santelices 1991, Adams 1994, Womersley 1994). Although there have been significantly different inter-
pretations of the species concept in New Zealand (e.g. Laing 1928, Levring 1955, Chapman 1969), the name *P. columbina* in New Zealand has been generally applied to a common species with a very distinctive rosette-like morphology and deeply folded or pleated blades, found in the upper intertidal zone of mainland shores, as treated and illustrated in Nelson and Conroy (1989) and Adams (1994: p. 143). This species was assigned the code “ROS54” by Broom et al. (1999) and has been referred to by this code in a number of subsequent publications (e.g. Hemmingson and Nelson 2002, Jones et al. 2004, Nelson et al. 2006, Sutherland et al. 2011).

The combination of targeted collections of members of the Bangiales throughout the New Zealand region, and analyses of sequence data coupled with morphological and anatomical investigations, has revealed many undescribed species around the archipelago (e.g. Broom et al. 1999, Nelson et al. 2001, Broom et al. 2004, Nelson and Broom 2005, Nelson et al. 2006). Recent collections of bladed Bangiales from subantarctic regions revealed at least four distinct species present on the Auckland Islands. With these data and specimens, Nelson and Broom (2010) were able to re-examine the original concept of *P. columbina* and the subsequent interpretations and applications of this name. They concluded that *P. columbina* is not conspecific with the mainland rosette-forming species referred to as ROS54, but rather it is primarily distributed in cold temperate areas of the southern hemisphere. They confirmed its presence on Auckland, Campbell, Antipodes, Chatham and Falkland Islands, and established that it is rarely present on mainland New Zealand (i.e. only one collection from the southern coast of the South Island from more than 700 samples of bladed Bangiales sequenced from the New Zealand region).

Although the monophyly of the Bangiales had been shown to be well supported by a number of studies (e.g. Oliveira and Bhattacharya 2000, Müller et al. 2001, Saunders and Hommersand 2004), Oliveira et al. (1995) demonstrated that neither of the two genera traditionally recognised in the order on the basis of gametophyte morphology (*Bangia* for filaments, *Porphyra* for foliose species) were monophyletic. A series of subsequent studies (e.g. Müller et al. 1998, Broom et al. 1999, 2004, Oliveira and Bhattacharya 2000, Lindstrom and Fredericq 2003, Nelson et al. 2006, Lindstrom 2008) provided further evidence of the diversity within the order and the need for segregate genera. Sutherland et al. (2011) revised the order Bangiales, recognising 15 genera of which eight are foliose. *Porphyra columbina* is now placed in the genus *Pyropia* (*Py. columbina* (Mont.) W.A.Nelson).

The rosette-forming species of *Pyropia*, previously referred to as ROS54, is formally described here.

**Materials and methods**

This study is based on specimens of foliose Bangiales collected from throughout the New Zealand region, particularly from the North, South and Chatham Islands from 1987 to 2012, as part of diversity surveys. Voucher material is deposited in the her-
Pyropia plicata W.A.Nelson, sp. nov.

http://species-id.net/wiki/Pyropia_plicata

Figures 1–7

Diagnosis. Blades circular to folded rosettes, strongly attached centrally by rhizoidal holdfast. Blades (1.5) 4–12 (42) cm in diameter. Colour purple to grey, bleaching to khaki-green on upper edges. Blades monostromatic, margin irregular bordered by pale cells. Monoecious, fertile regions marginal with intermixed sterile cells; zygotosporangia large, deep red to maroon, lozenge-shaped (a/4-8 × b/4-8 × c/4-8), spermatangia golden (a/2, b/2, c/8). Found in the upper to mid intertidal zone on open coasts.

Holotype. WELT A032582 (Figure 1).


Distribution. New Zealand - North I., South I., Chatham Is.


Etymology. plicata – folded or pleated.

Description. The blades of Pyropia plicata are deeply folded and when fully extended are seen to have a circular to oval shape. The blades are very variable in size, generally in the range of 4–12 cm in diameter although reproductively mature thalli have been found to range from 1.5 cm through to 42 cm in diameter. The thalli are attached to rock substrata by a centrally located holdfast, made up of rhizoids extending from cells in the lower (central) area of the blade. The thalli are robust and very strongly attached to rock substrata in the upper intertidal zone of rocky open coasts (Figure 2). Thalli are primarily purple to grey in colour, but they become bleached particularly in summer and autumn and become khaki to yellow-green particularly on the upper edges.

Thalli are monostromatic and monoecious. Sterile regions of the blades are ca. 50-55 µm thick and the margin of the blade has a ragged or irregular appearance bordered by several layers of small pale cells (Figure 3). Fertile regions of the blade develop around the margins with sterile cells intermixed with patches of spermatangia and presumed zygotosporangia (Figure 4).

In the early stages of development spindle-shaped carpogonia form trichogynes on both sides of the blade, in marked contrast to the box-like shape of the neighbouring sterile cells (Figure 5). Blades increase in thickness to ca. 85–110 µm in zygotosporangial regions (Figure 6) and ca. 60–70 µm in mature spermatangial regions.
(Figure 7). The zygotosporangia when mature are deep red and the packets vary in size, becoming lozenge shaped at maturity with divisions up to a/8, b/8, c/8 (Figure 6). The spermatangial patches become golden as they develop and when mature are divided into packets ca. a/2, b/2, c/8 (Figure 7). Spermatia and zygotospores are usually released before reaching the maximum division formulae.

Typically Pyropia plicata is found on the upper intertidal shores of open coasts on rocky substrata. It has not been found growing epiphytically and is uncommon in sheltered areas. The deep pleats and central attachment of P. plicata enable the retention of moisture between the folds in the blade. This morphology would appear
Pyropia plicata sp. nov. (Bangiales, Rhodophyta): naming a common intertidal alga...

...to be advantageous in the upper intertidal habitats where it is found, as this species can be out of water for periods of up to eight hours between tidal cycles. The outer part of a clump of *P. plicata* may be dried with a cellophane-like appearance yet within the folds, parts of the blade remain wet.

*Pyropia plicata* shows no particular seasonal trends in its distribution, with reproductively mature specimens collected throughout the year. Collections of this species have been made from the northern tip of the North Island, through to areas on the south western and south eastern South Island, as well as on the Chatham Islands. It has not been found on the Three Kings Islands, Stewart Island, or any of the New Zealand subantarctic islands.

Distinctive features: *Pyropia plicata* can be distinguished from other New Zealand species of bladed Bangiales by a number of distinctive features. It is the only species of *Pyropia* present on mainland shores with a marked rosette-like growth form. Although the ribbon-like blades of *P. cinnamomea* may become eroded with age, the basal position of the holdfast in this species differs from *P. plicata*. In addition, these two species can

Figure 2. *Pyropia plicata* exposed at low tide on upper intertidal rocks (ca 5 cm high).
be distinguished by colour, and also by the division formulae of zygotosporangia. On intertidal shores *P. plicata* is characteristically found in the high intertidal but below the position occupied by *Clymene coleana* (W.A.Nelson) W.A.Nelson from which it can be easily distinguished. *Clymene coleana* has finely divided finger-like lobes rather than the continuous circular to oval deeply pleated blade of *P. plicata*. Although both of these species have a predominantly grey colour in winter months, they bleach to different colours in bright light, with *C. coleana* becoming golden compared with the khaki colour of *P. plicata*. In addition the zygotosporangia and spermatangia are arranged in separate areas of the blade in *C. coleana* rather than being intermixed in *P. plicata*.

**Selected specimens examined: NEW ZEALAND. North Island. North Auckland:** Far North, east Tapotupotu Bay, 13 Nov 2001, R. Dunmore, WELT A030179 (34°26.1080’S, 172°43.0050’E); Muriwai Beach, Maori Bay (Maukatia), 04 Apr 2000, W. Nelson, T. Farr & G. Williams, WELT A024784 (36°50.30’S, 174°25.90’E). **Bay of Plenty:** Tauranga, Mount Maunganui main beach, 05 May 2000, G. Williams & T. Farr, WELT A024775 (37°38.00’S, 176°11.00’E); Maketu, Okurei Point East, 05 May 2000, T. Farr & G. Williams, WELT A024772 (37°44.95’S, 176°28.37’E). **Wellington:** Wellington City Harbour, Frank Kitts Lagoon reclamation, 12 Feb 2001, W. Nelson & T. Farr, WELT A030170 (41°17.20’S, 174°46.90’E); Lyall Bay,
Figure 5–7. 5 Cross section of monostromatic blade showing square sterile cells and spindle-shaped developing carpogonia. (WELT A032593) 6 Cross section view of mature zygotosporangia. (WELT A032593) 7 Cross section view of mature spermatangia. (WELT A032593). Scale bar 5: 50 µm, 6–7: 20 µm.

**Chatham Islands.** Reef at Owenga wharf, 10 Mar 2001, W. Nelson, J. Broom, W. Jones, T. Farr & M. Clayton, WELT A030169 (44°01.50'S, 176°22'W).

**South Island. Marlborough:** D’Urville Island, Bonne Point, 20 Sep 1999, W. Nelson & G. Williams, WELT A031087 (40°52.00'S, 173°55.00'E).


**South Island.** Marlborough: D’Urville Island, Bonne Point, 20 Sep 1999, W. Nelson & G. Williams, WELT A031087 (40°52.00'S, 173°55.00'E).


**Discussion**

A major problem in Bangiales taxonomy has been the incorrect application of names, making studies of the ecology and comparative physiology of species exceedingly difficult. The need for molecular sequence data in Bangiales taxonomic studies has been emphasised by many authors over the past decade in order to clarify species concepts as well as the phylogenetic relationships amongst taxa (e.g. Lindstrom and Fredericq 2003, Nelson et al. 2006). Such data have led to the discovery of cryptic taxa amongst species with very similar morphologies (e.g. Brodie and Irvine 1997, Broom et al. 2002, 2004, Neefus et al. 2002, Lindstrom and Fredericq 2003, Brodie et al. 2007, Lindstrom 2008). Descriptions of foliose members of the Bangiales have traditionally emphasised features such as blade shape and size, colour, and texture, in addition to division formulae for spermatangia and phyllosporangia, number of cell layers, number of plastids (e.g. summarised in Lindstrom and Cole 1993). In addition to external morphology (including marginal structure) and reproductive features, Miyata and Kikuchi (1997) also found seasonality and habitat (whether species are epiphytic or epilithic) to be have value taxonomically when distinguishing species of bladed Bangiales in Japan.

As circumscribed by Sutherland et al. (2011), the genus *Pyropia* encompasses species displaying a wide range of morphological forms, a wide colour spectrum and at least four different types of arrangements of reproductive regions on sexual thalli. This
genus is the most speciose of the Bangiales, and it also has the widest geographic distribution, with species occurring from tropical to cold temperate waters. *Pyropia plicata* has been recognised in the flora of mainland New Zealand for a long time, but has remained without a formal name as a result of confusion over the application of the name *P. columbina*. This situation was able to be clarified only after material collected in the subantarctic islands became available for study (Nelson and Broom 2010). Although mature thalli of *Pyropia plicata* range widely in size and also in colour, the fundamental shape of the blade, and the arrangement of reproductive regions are consistent, and enable this species to be readily distinguished. Within the genus *Pyropia*, *P. plicata* is grouped within a clade of at least 15 southern hemisphere species. The majority of these species are currently undescribed but the clade includes *P. virididentata*, *P. cinnomomea* and *P. columbina* (Broom et al. 2010, Sutherland et al. 2011).

**Acknowledgements**

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Pyropia plicata sp. nov. (Bangiales, Rhodophyta): naming a common intertidal alga...


Allium formosum Sennikov & Lazkov (Amaryllidaceae), a new species from Kyrgyzstan

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Abstract

Allium formosum Sennikov & Lazkov sp. nov. is described as new to science and illustrated. This species is the second member of A. sect. Spathulata F.O.Khass. & R.M.Fritsch, being different from A. spathulatum F.O.Khass. & R.M.Fritsch in larger, broader, obtuse and more intensely purple-coloured tepals, and in a more robust habit. It is a local endemic of Babash-Ata Mt. Range situated east of Fergana Valley in Kyrgyzstan, recommended for legal protection as Endangered because of the very small population size in its only locality.

Keywords

Central Asia, conservation, endemism, hotspot, new species, plant protection, Western Tian-Shan

Introduction

The genus Allium L. is highly speciose in the former Soviet part of Central Asia. The latest synopsis (Khassanov 2008) lists nearly 250 species and subspecies, and this number is constantly growing with descriptions of new species from nearly all mountainous areas of this region.

Kyrgyzstan is a Central Asian country with a rich native flora, assessed at nearly 3800 native species of vascular plants (Lazkov and Sultanova 2011) and still remaining seriously underexplored (Kamelin 2002). The old Flora of Kirghiz SSR (Nikitina and Kaschenko 1951) listed 67 species of Allium; this number has been significantly increased with a further exploration of the country by local botanists and Allium taxono-
mists. The current inventory is being performed after publication of the new checklist of vascular plants of Kyrgyzstan (Lazkov and Sultanova 2011) that counted 85 species of *Allium*, making an increase of 25% for the last 60 years.

During the years 2009–2011 botanists of the Botanical Museum of the University of Helsinki, in collaboration with the Institute of Biology and Soil Science of the Kyrgyz Academy of Sciences, made expeditions to collect plants in Kyrgyzstan. The expeditions focused on the most difficult and diverse taxonomic groups, with emphasis on local endemics. Several taxonomic novelties and new records resulted from these travels (Sennikov 2010, 2011; Sennikov et al. 2011). One of the new species belongs to *Allium* sect. *Spathulata* F.O.Khass. & R.M.Fritsch, and its description is presented here.

*Allium* sect. *Spathulata* was established (Khassanov 2000) for the single species *A. spathulatum* F.O.Khass. & R.M.Fritsch that was discovered only recently (Fritsch et al. 1998). This miniature plant has a very limited local occurrence and remained undetected in spite of its location within the limits of the famous Sary-Chelek Nature Reserve (Kyrgyzstan), where its type locality is situated nearby the headquarters of the Nature Reserve. These plants are so rare and minute that they were unnoticed for 100 years of botanical studies in the Nature Reserve.

When originally described, *A. spathulatum* was considered unique in *A. subgen. Allium* because of the presence of spathules and papyraceous tunics, ovoid bulbs, and the absence of bulblets (Khassanov 2000). Although this species was not included in the molecular phylogeny of *Allium* (Friesen et al. 2006) yet, which still embraces selected sections only, it was speculated to be less specialised in the subgenus from the primitive state of its several characters, e.g. an inflorescence with numerous long bracteoles (“spathules”), papery-like bulb tunics, and a symmetric karyotype with small satellites (Fritsch et al. 1998; Friesen et al. 2006).

**Materials and methods**

A description of the new taxon and its relative is based on herbarium vouchers and field observations, following the standard used in the taxonomy of *Allium*. One population per species is used. Measures are taken from dried plants.

Distribution maps are compiled using R software environment for statistical computing and graphics (R Development Core Team 2008). The base maps are taken from the Digital Chart of the World, Arc/INFO resource provided by the Environmental Systems Research Institute, Inc., the Pennsylvania State University Libraries.

**Data resources**

Specimen information is deposited in the database of records in vascular plants of Kyrgyzstan (Sennikov and Lazkov 2012) that is published also through the Global Biodiversity Information Facility (GBIF) and in the Dryad Data Repository at doi: 10.5061/dryad.pq87t.

Fig. 1

Ab Allio spathulato statura majore (caulibus ad 30 cm, nec ad 20 cm altis), spathulis brevioribus paucioribus, floribus pluris (ad 30, nec ad 20), tepalis obscurior roseolo-purpureis, longioribus (6–7.5 mm, nec 4–5.5 mm longis) latioribusque (2–2.5 mm, nec 2 mm latis), apice obtusioribus (nec acutis) basi subrotundis (nec distincte angustatis) differt.

Type. Kyrgyzstan. Babash-Ata Range: Kara-Köl River valley, left riverside, alt. 1650 m, 41.53°N, 72.68°E, 14.07.2010, A. Sennikov & G. Lazkov 132 (H 1750496, holotype; isotypes FRU, H 1750497).

Description. Bulbs subglobose, 7–8 mm in diameter, ca. 8 mm long, inner tunices slightly violaceous, very thin, transparent, papyraceous, with several longitudinal nerves, outer ones light-grey, decomposing. Bulblets missing. Scape single, 20–25 (30) cm long, up to 1.5 mm in diameter, solid, dark green with a slight purple tint at the base. Leaves 2(3), linear, not exceeding the stems, upright, with the blade up to 20 cm long, ca. 1.5 mm wide, round-appressed and fistulose in the section, dark green, glabrous, with sheaths up to 10 cm long. Spathe membranous, completely divided into two elongate valves 4–6 mm long, reflexed. Inflorescence hemispherical, rather lax, with 7–30 developed flowers and ca. 5 abortive buds; pedicels thin, basally thickened, straight, dark-green, of the same length, ca. 1.5 cm long, some of them being embraced in narrow spatheules ca. 1 mm long. Perianth cupuliform, intensively pinkish-purpureous in the upper two thirds, basally whitish, with dark-purpureous median veins. Tepals 6–7.5 mm long, 2–2.5 mm wide, oblong, obtuse at the apex, subrotund and only very slightly narrowed to the base. Filaments shorter than tepals, 2.5–3 mm long, white, connected and fused with sepals at the base, outer ones with the triangular base, inner ones broader, tricuspidate. Anthers ca. 0.4 mm long, yellow. Ovary ca. 2 mm long, 2–2.5 mm in diameter, subglobular. Style slightly over 1 mm long, white. Capsule and seeds not known.

Phenology. Flowering in July, fruiting unknown.

Ecology. The species occurs in the low-altitude forest zone (altitudes of ca. 1600–1700 m) in river valleys, on open sunny slopes with sparse savannoid vegetation, sheltered by stones. The plants grow clustered in small patches, suggesting the most successful establishment nearby mature plants (vegetative reproduction is not known in this section).

Distribution. Possibly a narrow endemic of Babash-Ata Mt. Range, Kyrgyzstan (Fig. 3), so far known from the type locality only.

Proposed conservation status. The distribution area of this species is like those of other local endemics of the mountains east of Fergana Valley. A single locality is known, where ca. 10 clusters of flowering plants were noticed. Even though no imme-
Figure 1. *Allium formosum*. A habit. B inner side of the perianth with stamina. C flower. D basal part of the umbella. Drawn from the type (H 1750496).
Allium formosum Sennikov & Lazkov (Amaryllidaceae), a new species from Kyrgyzstan

Etymology. The new species is named because of its elegant habit and beautiful colouration of the perianth, transitional between deeply pink and purple; Lat. formosum = beautiful.

Discussion

Allium spathulatum F.O.Khass. & R.M.Fritsch has been recently described from Chatkal Range, Sary-Chelek Nature Reserve, vicinities of Arkyt village (Fritsch et al. 1998). This species was recollected on 10.06.2010 by G. Lazkov from the slopes on the left side of Kojo-Ata River valley, situated immediately outside the entrance to Sary-Chelek Nature Reserve, in ca. 1 km from the original locality. The plants collected at that site (FRU, H 1750495, 1750506) were in a complete agreement with the protologue.

The plants from Babash-Ata Mts., Kara-Köl River differ from A. spathulatum mostly in having longer and broader tepals, which are obtuse at the apex and less narrowed to the base (Fig. 2), and in a larger size of the whole plant. The flowers seem to be more numerous. Some pedicels are embraced by spathules which are generally less developed (shorter and less numerous) than in A. spathulatum. These differences warrant the segregation of these plants into a separate taxon; the rank of species is preferred here because the differences are complex and constant. Another example of a similar distinction in the floral characters is the Central Asian pair A. tianschanicum Rupr. – A. kokanicum Regel, where major differences are also in the size and shape of tepals.

Another difference is observed in the shape of flowers which open less widely and thus look cupuliform in A. formosum (campanulate in A. spathulatum). However, this difference may appear dependent on weather conditions and needs to be proven by further observations.

The distance between the localities of A. spathulatum and A. formosum, both narrow endemics of mountains surrounding the eastern end of Fergana valley, is about 60 km (Fig. 3). The area of the eastern part of Chatkal Range and the northern outliers of Fergana Range (Babash-Ata and neighbouring mountains) is well known for the concentration of many narrow endemics, being a hotspot of plant diversity in Western Tian-Shan (Lazkov et al. 2002). The territories surrounding the eastern end of Fergana valley harbour many narrow endemics of Allium as well (see a brief review in Fritsch et al. 1998), and our discovery stresses the need of further explorations and plant protection in this area. Because of vulnerability of the species, we anticipate its inclusion in the forthcoming Red Data Book of Central Asia and the next edition of the Red Data Book of Kyrgyzstan.
Figure 2. *Allium formosum*. A outer tepal B inner tepal. Drawn from the type (H 1750496). *Allium spathulatum* C outer tepal D inner tepal. Drawn from Lazkov s.n. (H 1750506).

Figure 3. Distribution areas of *Allium formosum* and *Allium spathulatum*. 
The present state of the Allium research in Central Asia, especially descriptions of new species that are still regularly published, clearly show that the species inventory in this speciose and difficult genus is far from complete. In the absence of elaborated molecular phylogenies we feel premature to speculate on the origin and age of our newly discovered species.

The members of A. sect. Spathulata may be keyed out as follows

1. Plants up to 20 cm tall. Tepals narrowly oblong, 4–5.5 mm long, 2 mm wide, acute at the apex and narrowed to the base, pinkish in the upper third ..........

– Plants up to 30 cm tall. Tepals oblong, 6–7.5 mm long, 2–2.5 mm wide, obtuse at the apex, subrotund and very slightly narrowed to the base, intensely pinkish-purpureous in the upper two thirds .......... A. formosum

Other specimens examined

Allium spathulatum F.O.Khass. & R.M.Fritsch

Kyrgyzstan. Chatkal Range (S side): immediately S of Sary-Chelek Nature Reserve, left side of Kojo-Ata River valley, on rocks, 41.7° N, 71.9° E, 10.06.2010, G. Lazkov (FRU, H 1750495, 1750506).

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References


A synopsis of *Harperocallis* (Tofieldiaceae, Alismatales)
with ten new combinations

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Abstract
Ten new combinations from *Asagraea, Isidrogaliva,* and *Tofieldia* are proposed in the previously monospecific genus *Harperocallis* (Tofieldiaceae, Alismatales). As circumscribed here, the genus is restricted to the Americas. The majority of species occur in the Andes or the Guayana region of northern South America; more than half have restricted distributions, and *H. flava* is narrowly endemic in the Coastal Plain of the southeastern United States. A key to species, synonymies, distributions, representative specimens, and salient notes are presented. Populations of the species are mapped and *H. robustior* is illustrated. A neotype is selected for *Tofieldia frigida,* here considered a synonym of *H. falcata.* Several recent records of *H. longiflora,* previously known only from the type collected in 1902, are reported.

Resúmen
Se proponen diez nuevas combinaciones de *Asagraea, Isidrogaliva,* y *Tofieldia en Harperocallis* (Tofieldiaceae, Alismatales), un género previamente monoespecífico. Como se circunscribe aquí, el género se restringe a las Américas. La mayoría de las especies se encuentran en los Andes o en la región de Guayana, en el norte de América del Sur. Más de la mitad tienen distribuciones restringidas, y *H. flava* es estrictamente endémica en la llanura costera del sudeste de los Estados Unidos. Se presenta una clave para distinguir las especies, sinonimias, distribuciones, muestras representativas y notas salientes. Se mapearon poblaciones de las especies y se ilustra *H. robustior.* Se seleccionó un neotipo para *Tofieldia falcata,* considerado aquí como un sinónimo de *H. falcata.* Se reportan algunos registros adicionales de *H. longiflora,* especie anteriormente conocida sólo con el tipo colectado en 1902.

Keywords
Andes, Coastal Plain, Florida, Guayana region, *Isidrogalvia,* monocot, nomenclature, *Tofieldia*
Introduction

When Ruiz and Pavon (1802) established the genus *Isidrogalvia* Ruiz & Pav. they described and illustrated a single species, *I. falcata* Ruiz & Pav. This species was collected in Peru, but it is clear from their protologue that they did not intend to recognize a genus restricted to South America as they stated that the European species *Anthericum calyculatum* L. should be referred to their new genus (“Ad hoc Genus referendum est *Anthericum calyculatum* Linn.”). This European species is the type of the generic name *Tofieldia* Huds., which when published by Hudson (1787) included only one named species, *T. palustris* Huds., a name superfluous for, and homotypic with, *A. calyculatum* (McNeill et al. 2012; Arts 7.5 & 52). Thus, Ruiz and Pavon (1802) inadvertently created a generic synonym of *Tofieldia*.

The nomenclatural implications of this synonymy were overlooked when the South American taxa were revised by Cruden (1991) and when additional South American taxa were transferred to or described in *Isidrogalvia* (Cruden and Dorr 1992, Remizowa 2007, Campbell 2010). Concurrently, recognition of a distinct South American genus was reinforced as palynological (Mosyakin et al. 2009, Campbell 2010), morphological (Remizowa et al. 2010, 2011), and molecular data (Azuma and Tobe 2011) revealed that these South American taxa were distinct from *Tofieldia*. Phylogenetic analyses of molecular (Azuma and Tobe 2011) and morphological data (Remizowa et al. 2011) resolved the monospecific North American *Harperocallis* McDaniel (1968) as sister to the South American taxa (Azuma and Tobe 2011), or as derived with that lineage, and *H. flava* McDaniel was transferred to *Isidrogalvia* (Remizowa et al. 2011). Long known from only three populations, recent field surveys revealed additional populations (Leonard and Baker 1983, Walker and Silletti 2005, Keppner and Anderson 2008) of this endangered species (US Fish and Wildlife Service 1991, see also Pitts-Singer et al. 2002). *Harperocallis flava*, nonetheless, remains narrowly endemic and has low infraspecific genetic diversity (Godt et al. 1997).

Due to the nomenclatural consequences of Ruiz and Pavon’s synonymy (1802), Sokoloff et al. (2011) proposed conservation of the genus *Isidrogalvia* with a conserved type, *I. falcata*, a reasonable solution given that all recent literature treating the South American taxa (see Sokoloff et al. 2011) had employed the generic name *Isidrogalvia*. This proposal, however, was rejected (Applequist 2012) as the Nomenclature Committee for Vascular Plants indicated that they preferred to follow the rule of priority (McNeill et al. 2012; Art. 11.4). Consequently, we propose the following ten transfers of names first published in *Asagraea* Lindl., *Isidrogalvia*, or *Tofieldia* to *Harperocallis*.

Methods

Herbarium specimens or their images (indicated by an identifier in brackets) were examined from the following herbaria (herbarium abbreviations follow Index Herbariorum, http://sweetgum.nybg.org/ih): A, B-W (Röpert 2000), BC (Courtesy of JSTOR
A synopsis of Harperocallis (Tofieldiaceae, Alismatales) with ten new combinations

2012), BM (Courtesy of JSTOR 2012), BRIT (BRIT Virtual Herbarium), F (The Field Museum 2013), FLAS (Florida Museum of Natural History 2013), FSU (Mast et al. 2004), FTG, GH, K (Courtesy of JSTOR 2012), MA (Courtesy of JSTOR 2012), MO, NY, P (Muséum National d’Histoire Naturelle 2012), PH (Courtesy of JSTOR 2012), PORT, US, and VEN. Measurements were obtained visually and augmented from literature (Asagraea and Harperocallis flava).

Nomenclatural synopsis

http://species-id.net/wiki/Harperocallis
Figs 1–3

Type. Harperocallis flava McDaniel.

Key to the Species of Harperocallis (modified from: Cruden 1991, and Campbell 2010)

1 Capsules ribbed or unribbed, well-developed lateral veins never extending to the style base........................................................................................................6
– Capsules 9-ribbed, well-developed lateral veins extending to the style base...2
2 Inflorescence compound, the branches subtended by chlorophyllous cataphylls........................................................................................................ H. paniculata
– Inflorescence a simple raceme; peduncular bracts scarious.......................3
3 Flowers pendant ......................................................................................... H. penduliflora
– Flowers erect................................................................................................4
4 Leaves 2.0–4.0 mm wide, usually glabrous, occasionally ciliate at the sheath apex; peduncles < 1.5 mm wide; calycular bracts longer than wide; tepals 6.0–9.0 × 1.5–2.0 mm; anthers 0.9–1.1 mm long.............................. H. duidae
– Leaves 3.0–7.0 mm wide, margin ciliolate to hirsutulous; peduncles > 1.5 mm wide; calycular bracts usually wider than long, sometimes equal; tepals 11–14 × 2–4 mm; anthers > 1.1 mm long............................................5
5 Leaves 3.0–6.5 mm wide; peduncular bracts 3–8(–10); inflorescence ca. 9–30-flowered; tepals enclosing the rest of the flower; anthers 1.2–1.8 mm long ....................................................................................... H. schomburgkiana
– Leaves 6.0–7.0 mm wide; peduncular bracts 3 or 4; inflorescence ca. 25–40-flowered; tepals open; anthers 2.0–2.5 mm long.................... H. neblinae
6 Capsule incompletely 9-ribbed, well-developed lateral veins never extending to the style base.................................................................7
– Capsule 3-ribbed or unribbed.......................................................................8
7 Inflorescence with eglandular hairs; peduncular bracts (3–)4–11(–15); flowers (4–)8–28; styles recurved, apices oblique; stigmas facing outward; capsule etuberculate ................................................................. H. sessiliflora
Inflorescence glabrous; peduncular bracts 7–17; flowers 23–35; styles straight; stigmas capitate; capsule tuberculate ....................................................... *H. robustior*

Leaves glabrous, veins not prominent; inflorescence 1-flowered; flower erect; ovary densely tuberculate; capsule unribbed........................................ *H. flava*

Leaf margin tomentose, ciliolate or glabrous, veins prominent; inflorescence > 1-flowered, or if 1-flowered, the flower pendant; ovary not tuberculate; capsule 3-ribbed.................................................................................9

Figure 1. Distribution of *Harperocallis*. 
A synopsis of *Harperocallis* (Tofieldiaceae, Alismatales) with ten new combinations

9  Peduncular bract solitary, chlorophyllous; inflorescence 1–4-flowered; flowers pendant .................................................. *H. sipapoensis*
   – Peduncular bracts (1)2–8, scarious; inflorescence > 10-flowered; flowers erect ................................................................. 10

10 Calycular bracts usually longer than wide (1.8–3.0 × 1.7–2.5 mm); styles 0.3–0.8(–0.9) mm long, straight; stigmas capitate .................. *H. falcata*
   – Calycular bracts usually wider than long (1.5–2 × 1.8–2.3 mm); styles 0.9–1.1 mm long, recurved, apices oblique; stigmas facing outward ....... *H. longiflora*

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*Harperocallis duidae* (Steyerm.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128356-1
http://species-id.net/wiki/Harperocallis_duidae

*Tofieldia duidae* Steyermark, Fieldiana, Bot. 28(1): 156. 1951.


Type: Based on *Tofieldia duidae* Steyermark.

**Distribution** (Fig. 1). Endemic to the Guayana Highlands of Venezuela (Amazonas and Bolívar states) where it is known only from two tepuis (Cerros Duida and Jáua); 1000–2100 m.


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*Harperocallis falcata* (Ruiz & Pav.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128358-1
http://species-id.net/wiki/Harperocallis_falcata


Type: Peru. de Pillao [sic], *H. Ruiz & J.A. Pavon s.n.* (lectotype: MA [MA810531!], F-negative no. 29435 (F!, MO!); selected by Cruden, 1991; possible isolectotypes: BC [BC872749!], BM [BM000938089!], MA [MA810498!, MA [MA810530!]).

Type: Based on *Isidrogalvia falcata* Ruiz & Pav.
*Narthecium falcatum* (Ruiz & Pav.) Poir., Encycl., Suppl. 4: 61. 1816.

**Type.** Based on *Isidrogalvia falcata* Ruiz & Pav.

**Distribution** (Fig 1). The Andes of Ecuador (Azuay, Cañar, Loja, Morona-Santiago, and Zamora-Chinchipe provinces) and Peru (Amazonas, Cajamarca, Cusco, Huánuco, Junín, and Pasco regions); 2300–3860 m.


**Notes.** When compared to its present on-line image (http://plants.jstor.org/specimen/ma810531), a photograph (F-negative no. 29435) of the lectotype of *Isidrogalvia falcata* taken by J. Francis Macbride of the Field Museum before World War II shows
A synopsis of Harperocallis (Tofieldiaceae, Alismatales) with ten new combinations


that the original label (“Isidrogalvia falcata Sp. Pl. Fl. Per. de Pillao”) was moved from the center of the specimen to the lower left-hand corner.

Tofieldia frigida was based on a collection or collections made by F.W.H.A. von Humboldt & A.J.A. Bonpland in Ecuador (“Crescit in frigidis regni Quitensis inter Loxam et pagum Ona, in summis montibus Saraguri, et Alpachaca, alt. 1200–1400 hexap, … Floret Decembri.”). While no material with this name was found in Paris (P-Bonpl.) (Stauffer et al. 2012), the type specimen of T. flexuosa in B-W is annotated as Isidrogalvis [sic] frigida Klotzsch, nom. nud. This strongly supports that the names T. frigida and T. flexuosa are based on the same gathering (i.e., F.W.H.A. von Humboldt & A.J.A. Bonpland 3383) and we have selected this collection to neotypify the name T. frigida.
**Harperocallis flava** McDaniel, J. Arnold Arbor. 49(1): 38, figs 1, 2. 1968.
http://species-id.net/wiki/Harperocallis_flava
Fig. 2 A, B


**Type.** Based on *Harperocallis flava* McDaniel

**Distribution** (Fig. 1). Endemic to the southeastern U.S.A. where it is known only from the Apalachicola River lowlands on the Coastal Plain of the Florida panhandle (Bay, Franklin, and Liberty counties).

**Representative specimens. U.S.A. Florida:**

- Franklin Co.: North of highway 22 and east of Star Avenue, 16 May 2003, *L. Keppner 37* (FSU [000081383]).


**Note.** Zomlefer (1997) provides a complete description and detailed illustration of *Harperocallis flava*.

A search of the collection and accession records of the U.S. National Herbarium (US) indicates that not all of the herbaria McDaniel (1968) listed in his protologue have isotypes accessioned.

**Harperocallis longiflora** (Rusby) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128360-1
http://species-id.net/wiki/Harperocallis_longiflora


**Type:** Bolivia. La Paz: Franz Tamayo: Near Apolo, ca. 1785 m, 24 Jul 1902, *R.S. Williams 1471* (holotype: NY!).


**Type.** Based on *Asagraea longiflora* Rusby

**Distribution** (Fig. 1). Known only from the type locality and vicinity in Bolivia (La Paz department); 1785–2000 m.
A synopsis of *Harperocallis* (Tofieldiaceae, Alismatales) with ten new combinations

Figure 3. *Harperocallis robustior*. A Habit B Leaf (detail of parallel veins and tomentose margins) C Inflorescence (detail showing peduncular and calycular bracts subtending flowers) D Peduncular bracts (detail) E Flower F Tepal (adaxial view) G Ovary (note the tuberculae) H Ovary (cross-section showing axile placentation and ovules) I Capsule (carpels separating distally). (A, I from L.J. Dorr et al. 4967 (US); B–H from B. Stergios et al. 17327 (PORT).

Note. Another recent collection, C. Maldonado et al. 3121, from the same locality at a slightly higher elevation (2000 m) is reported to be at LPB (see Missouri Botanical Garden 2013).

**Harperocallis neblinae** (Steyerm. ex L.M. Campb.) L.M. Campb. & Dorr, comb. nov. urn:lsid:ipni.org:names:77128371-1
http://species-id.net/wiki/Harperocallis_neblinae

Type: Venezuela. Amazonas: Cerro de la Neblina, altiplanicie en la cumbre del brazo noroccidental, al norte del campamento base a lo largo del Río Mawarinuma, afluente del Río Baria, 1880 m, 7–8 Feb 1984, J.A. Steyermark & J.L. Luteyn 129828 (holotype: VEN!; isotype: MO!).

**Type.** Based on *Isidrogalvia neblinae* Steyerm. ex L.M. Campb.

**Distribution** (Fig. 1). Known only from Cerro de la Neblina in the Guayana Highlands of Venezuela (Amazonas state); 1700–2100 m. This species is expected to occur also in the Brazilian part of the massif (Amazonas state).

**Representative specimens. VENEZUELA. Amazonas:** Mpio. Río Negro, Cerro de la Neblina, altiplanicie en la cumbre del brazo noroccidental, al norte del campamento base a lo largo del Río Mawarinuma, afluente del Río Baria, aprox. 0°52–53’N; 66°05’W, 1880 m, 7–8 Feb 1984, J.A. Steyermark & J.L. Luteyn 129828-A (VEN-unicate); 4–6 km northeast of Cumbre Camp, 2100 m, 20 Nov 1957, B. Maguire et al. 42154 (NY); Ridge at divide between Brazil and Venezuela, 26 km east-northeast of Neblina base camp, ca. 0°53’N; 65°56’W, 2000 m, 15 Apr 1984, T. Plowman & W.W. Thomas 13594 (F).

**Harperocallis paniculata** (L.M. Campb.) L.M. Campb. & Dorr, comb. nov. urn:lsid:ipni.org:names:77128372-1
http://species-id.net/wiki/Harperocallis_paniculata


**Type.** Based on *Isidrogalvia paniculata* L.M. Campb.

**Distribution** (Fig. 1). Known only from Serra da Neblina in Brazil (Amazonas state); 2600–2700 m. This species may occur also in the Venezuelan part of the massif (Amazonas state).
**Harperocallis penduliflora** (L.M. Campb.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128373-1
http://species-id.net/wiki/Harperocallis_penduliflora

Type: Venezuela. Amazonas: Mpio. Río Negro, Cerro de la Neblina camp 2, Neblina massif, 2.8 km NE of Pico Phelps, 2100 m, 15 Apr 1984, *B.A. Stein & A.H. Gentry 1559* (holotype: VEN!; isotypes: K [K000400739!] US!).

Type: Venezuela. Amazonas: Mpio. Río Negro, Neblina Massif, Camp II, 2.8 km NE of Pico Phelps (= Neblina), 2085–2100 m, 16 Mar 1984, *B.L. Stannard 137* (holotype: K [K000400738!]; isotype: VEN!).

**Type.** Based on *Isidrogalvia penduliflora* L.M. Campb.

**Distribution** (Fig. 1). Known only from the vicinity of the type locality in the Guayana Highlands of Venezuela (Amazonas state); 1800–2100 m. This species likely occurs also in the Brazilian part of the massif (Amazonas state).

**Representative specimens. VENEZUELA. Amazonas:** Mpio. Río Negro, Neblina massif, camp II, 2.8 km NE of Pico Phelps (= Neblina), on plateau, 0°49′40″N; 65°59′W, 2085–2100 m, 17 Mar 1984, *B.L. Stannard 166* (VEN); S.S. Renner 2026 pro parte (MO [1434169]).

**Harperocallis robustior** (Steyerm.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128374-1
http://species-id.net/wiki/Harperocallis_robustior

Type: Venezuela. Lara: Wet meadow at Las Sabanetas, above Los Aposentos, west of Humocaro Bajo, 2530 m, 5 Feb 1944, *J.A. Steyermark 55291* (holotype: F [F0046066F!]; isotype: NY!).

Type: Based on *Tofieldia sessiliflora* var. *robustior* Steyerm.

**Type.** Based on *Tofieldia sessiliflora* var. *robustior* Steyerm.

**Distribution** (Fig. 1). Andes of Venezuela (Lara, Mérida, and Trujillo states); 2200–3700 m.

**Mérida:** Mpio. Rangel, Cerro el Guamo, 3100–3200 m, 19 Jun 1988, *L.J. Dorr & L.C. Barnett 5627* (NY). **Trujillo:** Páramo de Cachaco, 3400–3700 m, 7 Nov 1927, *P. Christ 84* (NY); Mpio. Boconó, Páramo de Guaramacal, ca. 3080 m, ca.

Harperocallis schomburgkiana (Oliv.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128375-1
http://species-id.net/wiki/Harperocallis_schomburgkiana
Fig. 2 E, F


_Type:* Venezuela. Roraima, summit, ca. 1845 m, Oct, *M.R. Schomburgk s.n.* (lectotype: K [K000099720!], MO [F negative 10002!], selected by Cruden 1991).


_Type:* Based on *Tofieldia schomburgkiana* Oliv.


_Type.* Based on *Tofieldia schomburgkiana* Oliv.

**Distribution** (Fig. 1). Guayana Highlands of Venezuela (Amazonas and Bolívar states) and adjacent Guyana; 1430–2800 m.

**Harperocallis sessiliflora** (Hook.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128376-1
http://species-id.net/wiki/Harperocallis_sessiliflora


Type. Based on *Tofieldia sessiliflora* Hook.

**Distribution** (Fig. 1). Andes of Venezuela (Mérida and Táchira states) and Colombia (Antioquia, Boyacá, César, Cundinamarca, Huila, Magdalena, and Norte de Santander departments); 2500–3200 m. Cruden (1991) also cites a dubious record (J.A. Steyermark 54804) from Ecuador (Loja), which we have not mapped.


**Harperocallis sipapoensis** (L.M. Campb.) L.M. Campb. & Dorr, comb. nov.
urn:lsid:ipni.org:names:77128377-1
http://species-id.net/wiki/Harperocallis_sipapoensis

Type. Based on *Isidrogalvia sipapoensis* L.M. Campb.

**Distribution** (Fig. 1). Known only from Cerro Sipapo in the Guayana Highlands of Venezuela (Amazonas state); 1500–1700 m. This species likely occurs also on the geologically and floristically similar Cerro Autana, which is near the type locality.

**Representative specimens. VENEZUELA. Amazonas:** Mpio. Atures, areniscas del Cerro Cuao, Caño Cabeza de Manteco, 73 km SE de Pto. Ayacucho, 5°06’N; 67°24’W, 1580 m, Sep 1989, A. Fernández et al. 6207 (MO, NY, PORT); Serranía Sipapo, cumbre, 5°N; 67°30’O, 1500 m, 17 Feb 1981, J.A. Steyermark et al. 124556 (VEN).


**Acknowledgements**

We especially appreciate the assistance of Rose Gulledge (US) who prepared the map and arranged the figures. We thank Cathy Pasquale for preparing the illustration of *Harperocallis robustior*; Donald Wheeler (Mertz Library, NY) for providing critical literature; Andres Botero (NY) for technical assistance; Brett Jestrow (FTG) for providing a specimen image; Kenneth Wurdack (US) for sharing photographs; the curators and staff at A, B, BC, BM, BRIT, F, FLAS, FSU, GH, K, MA, MO, NY, P, PH, PORT, US, and VEN for access to their specimens; and Wendy Zomlefer (GA) for a critical review of the manuscript.

**References**


A synopsis of *Harperocallis* (Tofieldiaceae, Alismatales) with ten new combinations


Reinterpretation of the nomenclatural type of *Pseudobombax heteromorphum* (Malvaceae, Bombacoideae) reveals an overlooked new species from Bolivia

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Abstract

In the course of a taxonomic revision of *Pseudobombax* Dugand, one of us (JGCS) frequently has observed herbarium specimens of Bombacoideae that comprise a mixture of different Angiosperm families. In particular, *P. heteromorphum* (Kuntze) A.Robyns, a frequent name in checklists of the Bolivian flora, is based on type material of *Bombax heteromorphum* Kuntze that is clearly a mixture of *Pseudobombax* flowers and *Tabebuia* Gomes ex DC. (Bignoniaceae) leaves. We herein designate as the lectotype of *B. heteromorphum* the flowers of an herbarium sheet deposited in NY and as epitype a complete specimen (leaves, flowers, and fruit) in HUEFS. We consider *Bombax heteromorphum* to be a synonym of *P. longiflorum* (Mart.) A. Robyns, a species widespread in Neotropical seasonally dry forest of Bolivia, Brazil, Paraguay, and Peru. Furthermore, we describe a new species, *P. pulchellum* Carv.-Sobr., apparently endemic to seasonally dry tropical forest (SDTF) in Bolivia (Chiquitano dry forest), based on specimens commonly but incorrectly identified as *P. heteromorphum*. We also comment on the morphology, distribution, and conservation status of this new species.

Resumen

En el curso de una revisión taxonómica de *Pseudobombax* Dugand, uno de nosotros (JGCS) con frecuencia ha observado especímenes de herbario de Bombacoideae que comprenden una mezcla de diferentes familias de angiospermas. En particular, *P. heteromorphum* (Kuntze) A.Robyns, un nombre frecuente en las listas de la flora boliviana, se basa en el material tipo de *Bombax heteromorphum* Kuntze que es claramente una mezcla de flores de *Pseudobombax* y hojas de *Tabebuia* Gomes ex DC. (Bignoniaceae). Aquí se designa como el lectotipo de *B. heteromorphum* las flores de uno especímenes de el herbario NY y como epítipo uno...
espécimen completo (hojas, flores y frutos) de el herbario HUEFS. Consideramos Bombax heteromorphum como sinónimo de P. longiflorum (Mart.) A.Robyns, una especie ampliamente distribuida en los bosques neotropicales estacionalmente seco de Bolivia, Brasil, Paraguay y Perú. Por otra parte, se describe una especie nueva, P. pulchellum Carv.-Sobr., aparentemente endémica de los Bosques secos Chiquitanos en Bolivia, con base en colecciones comúnmente, pero incorrectamente identificado, como P. heteromorphum, con comentarios sobre su morfología, distribución y estado de conservación.

Keywords
Bombax, Chiquitano dry forest, new species, seasonally dry neotropical forest, Tabebuia, typification

Palabras clave
Bombax, Bosque seco Chiquitano, Bosques secos neotropicales, especie nueva, Tabebuia, tipificación

Introduction
In his revision of Bombax L. s.l., Robyns (1963) transferred B. heteromorphum Kuntze to Pseudobombax Dugand and considered P. heteromorphum (Kuntze) A.Robyns to be endemic to Bolivia. Based solely on the holotype of B. heteromorphum (Kuntze s.n., Fig. 1), Robyns described P. heteromorphum as having long petiolules and scarcely expanded petiole apices. In his key to the species of Pseudobombax, he used these two characters to separate this species from morphologically closely related congeners. According to Robyns's description, P. heteromorphum also has grooved (canaliculate) petiolules, which if true would represent a unique character in the genus Pseudobombax.

In the course of a taxonomic revision of Pseudobombax (Carvalho-Sobrinho, in prep.), mixed collections of Bombacoideae, including type specimens based on mixtures, often have been observed. This is especially common for collections from seasonally dry Neotropical forest habitats where species often are leafless during the flowering period. In the present case, a careful examination of the morphology of the leaves and flowers of the holotype of Bombax heteromorphum revealed that the specimen is a mixture of reproductive and vegetative elements from two different Angiosperm families. Robyns (1963) failed to note that his type specimen has leaflets that are articulated with the petiole, a character state unknown in Pseudobombax; the genus is separated from all other Bombacoideae by the synapomorphy of non-articulated leaflets, which lack an abscission zone between the apex of the petiole and the base of the petiolules (Robyns 1963, Carvalho-Sobrinho and Queiroz 2011).

The holotype of Bombax heteromorphum (NY) and an image of an isotype (B as F negative 9535; Field Museum 2012) show floral material matching that of Pseudobombax longiflorum (Mart.) A.Robyns, including an androecium with a glabrous, relatively long staminal tube, filaments freely originating from the apex of the tube (i.e., without phalanges), and typical hippocrepiform anthers. However, the vegetative material of these two type specimens matches the leaves of Tabebuia aurea (Silva Manso) Benth. & Hook. f. ex S. Moore (Bignoniaceae), with suberous branches, opposite leaves (inferred from leaf scars), longer and grooved petiolules, leaflets with a clear abscission zone, and a clearly different venation pattern (Fig. 1). Pseudobombax longiflorum, a
Reinterpretation of the nomenclatural type of *Pseudobombax heteromorphum*...

Figure 1. Photograph of the holotype of *Bombax heteromorphum* Kuntze (NY 133522).
species widespread in Neotropical seasonally dry forest of Bolivia, Brazil, Paraguay, and Peru, and *T. aurea* are sympatric in the Bolivian Chiquitano dry forest and the latter species has been collected several times in the type locality of *B. heteromorphum* (municipality of Velasco, Santa Cruz, Bolivia) according to Tropicos (2012) and specimen labels from herbaria (F, US, and WIS).

**Lectotypification of Bombax heteromorphum**

Having demonstrated above that the holotype of *Bombax heteromorphum* represents a mixture of leaves belonging to *Tabebuia aurea* and detached flowers belonging to a species of *Pseudobombax* it becomes necessary to select a lectotype from these two elements in order to fix the application of the name (McNeill et al. 2012, Art. 9.14). We choose to lectotypify the name on the flowers only because the name *B. heteromorphum* always has been associated with Malvaceae.


**A new species of Pseudobombax long confused with *P. heteromorphum***

Robyns (1963) and subsequent authors (Killeen et al. 1993, Jardim et al. 2003) assigned specimens of a distinctive Bolivian species of *Pseudobombax* to *P. heteromorphum* in error. These collections in fact represent a new species, which we describe here.

*Pseudobombax pulchellum* Carv.–Sobr., sp. nov.

urn:lsid:ipni.org:names:77128380-1
http://species-id.net/wiki/Pseudobombax_pulchellum
Figs 2, 3

**Diagnosis.** Similar to *Pseudobombax longiflorum* (Mart.) A. Robyns by its long petiolules, obovate to suborbicular leaflets, and maculate seeds, but differing by the smaller leaves, flowers and fruits, slender branches, petioles 4 times the length of the petiolules
Reinterpretation of the nomenclatural type of *Pseudobombax heteromorphum*... 57

(vs. a petiole/petiolule ratio of 6–12 in *P. longiflorum*), and fruits acuminate for the distal 20% of their length (vs. 3%–5% in *P. longiflorum*).

**Type.** BOLIVIA. Santa Cruz: 42 km E of Curuyuqui, 18°45′56″S, 62°13′59″W, 350 m, 25 October 1991 (lf, fr), A. Gentry, R. Foster & M. Peña 75227 (holotype: MO!; isotypes: F!, LPB!, USZ!, WIS!).

**Description.** Treelets 3–8 m, deciduous; branches glabrous, relatively slender, often covered with pale wax; brachyblasts absent. Stipules not seen. Leaves palmately compound, clustered at apex of the branches; petioles (17–)34–87 mm long, flattened, slender, glabrous, usually glaucous with pale wax at the ends, bases slightly thickened, apices slightly thickened to 3–4 mm diam.; petiolules 14–22 mm long; leaflets (4) 5 (7), chartaceous, proximal leaflets 17–38 × 9–30 mm, distal leaflets 45–57(–75) × 29–51 mm, obovate, broadly elliptic to suborbicular, apices retuse, rarely acuminate, bases obtuse, rounded, truncate to slightly cordate, margins entire, glabrous on both surfaces, except for sparse, peltate microtrichomes, abaxial surface dull-brown in dried state, midrib prominent abaxially, 8–12 secondary veins inconspicuous, intersecondary veins present, tertiary veins reticulate. Complete inflorescences not seen; pedicels 19 mm long (–26 mm when in fruit). Flowers c. 65 mm long; receptacle with single whorl of c. 5 glands; calyces 8–9 × 11–15 mm, cupular to campanulate, truncate, outwardly glabrous except for peltate microtrichomes, internally sericeous; petals (50–)61–70 × 6–8 mm, linear to lanceolate, apex acute, dark-brown externally, covered with tufted, rigid hairs, inwardly pilose to glabrescent towards the base, covered mainly by verrucose microtrichomes; stamens c. 150–200, stamina tube 9–10 × 4 mm, pubescent, phalanges absent, filaments free for 40–58 mm, anthers hippocrepiform c. 2 mm long; ovary 5 × 2 mm, oblong-obovoid, glabrous except for peltate microtrichomes, style c. 70 mm long, glabrous, stigma inconspicuously 5-lobed. Capsules c. 90 mm long, woody, oblong-obovoid, conspicuously acuminate for distal 15 mm or so, valves coriaceous, glabrous, kapok abundant, golden brown. Seeds c. 5 mm diam., subglobose to pyriform, maculate, glabrous.

**Distribution.** *Pseudobombax pulchellum* is known from only four sites in the Department of Santa Cruz, Bolivia, and appears to be endemic to Chiquitano dry forest at elevations of 230 to 520 m.

**Phenology.** Flowers of this new species are known from a single collection made in June; fruiting material was collected in October.

**Etymology.** The specific epithet refers to the small, delicate leaflets and long, slender petiolules of this species, diagnostic even in sterile specimens. The epithet also honors the Brazilian botanist Aline Costa da Mota for her important insights and collaboration on the systematics of Bombacoideae.

**Conservation status.** Although *Pseudobombax pulchellum* occurs in the Kaa-Iya del Gran Chaco National Park, it must be considered Near Threatened because it is known from only four sites and “there are plausible events that may cause the species to decline, but these are unlikely to make the species Extinct or Critically Endangered in a short time” (IUCN 2010). Extensive fieldwork in other areas of dry forests in Bolivia is necessary to properly survey and to assess the status of this species.
Figure 2. Photograph of an isotype of *Pseudobombax pulchellum* Carv.-Sobr. (*Gentry et al.* 75227, F 2111431).
Reinterpretation of the nomenclatural type of *Pseudobombax heteromorphum*...

Specimens examined. **BOLIVIA. Santa Cruz**: Chiquitos, 19–23 Dec 1993 (fr), G. Navarro Sanchez 2192 (LPB!); Cordillera, 09 January 1993 (lf), G. Navarro Sanchez 1713 (MO!, USZ!); *ibidem*, 18°29′20″S, 61°07′06″W, 230 m, 17 June 1998 (fl), Alfredo F. Fuentes & G. Navarro Sanchez 2436 (MO!); Ñuflo de Chavez, 17°05′00″S, 61°47′00″W, 400 m, 24 October 1995 (lf), Alfredo F. Fuentes 1132 (LPB!, USZ,WIS!).

**Discussion.** *Pseudobombax pulchellum* is a remarkable species by its diminutive aspect, especially the relatively small, retuse, obovate to suborbicular leaflets, and the flowers; the petiolules are markedly long in relation to the petiole, and fruits are conspicuously acuminate. It seems to be closely related to *P. longiflorum* (Mart.) A. Robyns, a sympatric congener in Bolivian Chiquitano dry forest. The two are similar because of their glabrous aspect, long petiolules, leaflets with retuse apices, truncate to cordate bases, and maculate seeds.

**Figure 3.** Distribution of *Pseudobombax pulchellum* Carv.-Sobr. in Santa Cruz, Bolivia. Dashed lines indicate the boundaries of the Kaa-Iya del Gran Chaco National Park.
The new species is also similar to *Pseudobombax croizatii* A.Robyns and *P. minimum* Carv.-Sobr. & L.P. Queiroz; both of these species share small flowers (60–65 mm long), glabrous staminal tubes, androecia with relatively few stamens (c. 150–200), and glabrous fruits. The following key can be used to separate these four species of *Pseudobombax*.

<table>
<thead>
<tr>
<th>1</th>
<th>Petiolules 14–75 mm long. Petals externally blackish, staminal tube lacking phalanges (filaments freely originating from the apex of the tube). Seeds bicolor, maculate.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Petiolules to 5 mm long. Petals externally cream-colored, staminal tube originating phalanges 3–5 mm long. Seeds uniformly colored.</td>
</tr>
<tr>
<td>3</td>
<td>Petioles 4 times the length of the petiolules. Flowers c. 65 mm long, calyx 8–9 mm long, staminal tube c. 10 mm long. Capsules c. 90 mm long, acuminate for the distal 20% of their length. <em>P. pulchellum</em> (Bolivia)</td>
</tr>
<tr>
<td>4</td>
<td>Petioles 6–12 times the length of the petiolules. Flowers 15–22 mm long, calyx 15–25 mm long, staminal tube 35–60 mm long. Capsules 14–24 mm long, acuminate for the distal 3%–5% of their length. <em>P. longiflorum</em> (Bolivia, Brazil, Paraguay, Peru)</td>
</tr>
<tr>
<td>5</td>
<td>Leaflets 7–9, obovate, cuneate, margins revolute. Flowers to 60 mm long, staminal tube glabrous. Capsules 55 mm long, not acuminate. <em>P. minimum</em> (Central Brazil)</td>
</tr>
<tr>
<td>6</td>
<td>Leaflets 5, elliptic to broad-elliptic, acute, margins plane. Flowers 85–100 mm long, staminal tube with bands of simple trichomes. Capsules c. 70 mm long, acuminate. <em>P. croizatii</em> (Colombia, Venezuela)</td>
</tr>
</tbody>
</table>

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**References**

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