PhytoKeys 17: 1–17 (2012)
doi: 10.3897/phytokeys.17.3190
www.phytokeys.com

RESEARCH ARTICLE

A peer-reviewed open-access journal
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Synopsis of *Acalypha* (Euphorbiaceae) of continental Ecuador

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Academic editor: *Dmitry Geltman* | Received 4 April 2012 | Accepted 20 August 2012 | Published 11 September 2012

Citation: Cardiel JM, Muñoz P (2012) Synopsis of *Acalypha* (Euphorbiaceae) of continental Ecuador. PhytoKeys 17: 1–17. doi: 10.3897/phytokeys.17.3190

Abstract

A critical review of the Ecuadorian species of *Acalypha* L. (Euphorbiaceae) is presented; 20 of the 38 previously recognized species are accepted, 9 are considered synonyms and 9 are based on misidentifications. Comprehensive nomenclatural information is supplied and 13 lectotypes are designated. An identification key is also provided.

Resúmen

Se presenta una revisión crítica de las especies ecuatorianas de *Acalypha* L. (Euphorbiaceae); se aceptan 20 de las 38 especies previamente reconocidas, 9 se consideran sinónimos y otras 9 están basadas en identificaciones erróneas. Se aporta una exhaustiva información nomenclatural y se designan 13 lectótipos. Se incluye también una clave de identificación.

Keywords

Acalypha, Ecuador, Euphorbiaceae, lectotypification, species identification

Introduction

Acalypha L. is the third largest genus in the Euphorbiaceae sensu stricto (after *Euphorbia* L. and *Croton* L.). It comprises c. 500 species found mostly in the tropics worldwide, although some reach temperate regions. The Americas are home to two thirds of the species, from southeastern Canada and United States to Uruguay and northern Argentina. They thrive in a wide variety of habitats, from tropical rainforests to subde-

sertic areas, and from sea level up to 4000 meters of altitude. *Acalypha* belongs to subfamily Acalyphoideae, the most diverse and complex in the Euphorbiaceae (Hayden and Hayden 2000). This subfamily appears to be paraphyletic, but the central group of taxa, Acalyphoideae Beilschm. sensu stricto, is clearly monophyletic. Molecular analysis support the monophyly of *Acalypha* (Tokuoka 2007, Wurdack and Davis 2009).

Despite its great diversity, *Acalypha* is one of the lesser known genera of the Euphorbiaceae. The last treatment of the whole genus was made by Pax and Hoffman (1924), on wich 18 species were recorded in Ecuador (Table 1). The state of the knowledge of the genus in South America includes updated national floristic treatments (Cardiel 1995, 1999, Levin 2001), and checklists (Bacigalupo and Mulgura 1999, Berry et al. 2007, Brako 1993, Cardiel 2007, 2010, Levin 2008). Regarding Ecuador, the only complete work on *Acalypha* is the treatment of Euphorbiaceae for the Catalogue of the Vascular Plants of Ecuador (Webster 1999), which recognized 34 species for the continental land of Ecuador (and four other from Galapagos Island). This work was updated by Ulloa Ulloa and Neil (2005), who added another four species of *Acalypha* , but none in the second update (Neil and Ulloa Ulloa 2011). There are also several regional or thematic floras mentioning *Acalypha* species (Bonifaz and Cornejo 2004, Cerón et al. 2007, De la Torre et al. 2008, León-Yánez et al. 2011, Madsen et al. 2001, Valencia et al. 2000). In addition Cardiel (2000) described two new species and proposed several new synonyms for Ecuadorean *Acalypha*.

This work presents a reviewed critical synopsis of the species of *Acalypha* for continental Ecuador and provides a key to help identification.

Materials and methods

We studied 987 Ecuadorian collections of *Acalypha* from the following herbaria: A, AAU, B, BM, COL, DAV, F, G, GB, GH, HAL, HBG, JE, K, L, M, MA, MO, NY, P, PR, QCA, QCNE, S, SEL, U, UPS, US, W, WRSL and Z (acronyms according to Thiers 2011). We reviewed all the collections cited by Webster (1999) and Ulloa Ulloa and Neill (2005), solving the doubts raised by some names. We also found a large number of type specimens, clarifying the identity of many names. Typifications were made after a carefully review of the original literature on the taxa, and examination of the nomenclatural types. Where no holotype was indicated, or it has been lost or destroyed, a lectotype is designated according International Code of Botanical Nomenclature rules and recommendations (McNeill et al. 2006).

The structure of the checklist follows, in general terms, those of Brako and Zarucchi (1993) and Webster (1999). The accepted species are cited in alphabetical order, including original publications, homotypic synonyms and nomenclatural synonyms based on Ecuadorian collections. For each name, the information concerning the type collections is included, with studied specimens indicated with an exclamation mark (!). Then, we summarize information about habit, habitat and altitudinal range in 250 meters intervals; this information was obtained exclusively from the studied specimens. We follow the geographic regions proposed by Jørgensen and León-Yánez (1999).

Table 1. Species of *Acalypha* cited for Ecuador by Pax and Hoffmann (1924), Webster (1999), and in this work; the vouchers refers to cited by Webster (1999).

Pax and Hoffmann (1924)	Webster (1999)	In this work
	A. alopecuroides Jacq.	accepted
	A. amentacea Roxb.subsp. *wilkesiana* (Fosb.) Müll. Arg.	= *Acalypha wilkesiana* Müll. Arg. (fide Sagun et al. 2010)
A. andina Müll. Arg.	accepted	= *A. padifolia* Kunth (fide Cardiel 2000)
	A. argomuelleri Briq.	The voucher cited (P. Jørgensen 1551) corresponds to *A. padifolia* Kunth. *A. argomuelleri* has not been found in Ecuador.
	A. aronioides Pax & K. Hoffm.	The voucher cited (P. Jørgensen 1449) corresponds to *A. padifolia* Kunth. *A. aronioides* has not been found in Ecuador
A. arvensis Poepp.	accepted	accepted
	A. benensis Britton	The voucher cited (Berg & Akkermans 1016) corresponds to *A. stachyura* Pax. *A. benensis* is a synonym of *A. stricta* Poepp., not found in Ecuador (fide Cardiel 2007)
	A. brachyclada Müll. Arg.	Doubtful taxon not found in Ecuador (fide Cardiel 2007)
	A. cuneata Poepp.	accepted
	A. cuspidata Poepp.	accepted
A. dictyoneura Müll. Arg.	accepted	accepted
A. diversifolia Jacq.	accepted	accepted
A. ecuadorica Pax & K. Hoffm.	accepted	= *A. schiedeana* Schltdl. (fide Cardiel 2000)
A. eggersii Pax & K. Hoffm.	accepted	= *A. cuneata* Poepp. (fide Cardiel 1995)
A. heterodonta Müll. Arg.	= *A. macrostachya* Jacq.	= *A. macrostachya* Jacq. (fide Cardiel 1995)
	A. hispida Burm. f.	accepted
A. infesta Poepp.	not cited	accepted
	A. macbridei I.M. Johnst.	= *A. salicifolia* Müll. Arg. (fide Cardiel 2000)
	A. macrodonta Müll. Arg.	= *A. padifolia* Kunth (fide Cardiel 2007)
A. macrostachya Jacq.	accepted	accepted
	A. mapirensis Pax	The voucher cited (C. Ceron & C. Iguago 5461) correspond to *A. stachyura* Pax. *A. mapirensis* is a synonym of *A. stricta* Poepp., not found in Ecuador (fide Cardiel 2007)
	A. ostryifolia Riddell	The voucher cited (Dodson & al. 7109) corresponds to *A. subcastrata* Aresch. *A. ostryfolia* has not been found in Ecuador

Pax and Hoffmann (1924)	Webster (1999)	In this work
	A. padifolia Kunth	accepted
A. platyphylla Müll. Arg.	accepted	accepted
A. ruiziana Müll. Arg.	accepted	The voucher cited (Sodiro 151) corresponds to *A. dictyoneura* Pax. *A. ruiziana* is a synonym of *A. padifolia* Kunth (fide Cardiel 2007)
A. salicifolia Müll. Arg.	accepted	accepted
	A. scandens Benth.	accepted
		A. schiedeana Schltdl. (cited first time in Ecuador by Cardiel (2000)
	A. schimpffii Diels	= *Acalypha padifolia* Kunth (fide Cardiel 2000)
A. setosa A. Rich.	accepted	The voucher cited (Madsen 63051) corresponds to *A. subcastrata* Aresch. *A. setosa* has not been found in Ecuador
	A. stachyura Pax.	accepted
		A. stellata Cardiel (fide Cardiel 2000)
A. stellipila Pax & K. Hoffm.	= *Acalypha dictyoneura* Müll. Arg.	= *Acalypha dictyoneura* Müll. Arg.
	A. stenoloba Müll. Arg.	The voucher cited (Van der Werff & W. Palacios 10355) corresponds to *A. stachyura* Pax. *A. stenoloba* has not been found in Ecuador
	A. subandina Ule	= *A. platyphylla* Müll. Arg. (fide Cardiel 1995)
A. subcastrata Aresch.	accepted	accepted
A. tenuipes Pax & K. Hoffm.	accepted	= *A. cuspidata* Jacq. (fide Cardiel 2000)
A. tunguraguae Pax & K. Hoffm.	accepted	= *A. cuspidata* Jacq. (fide Cardiel 2000)
A. villosa Jacq	accepted	accepted
		A. websteri Cardiel (fide Cardiel 2000)

They defined three regions for continental Ecuador: Coastal, Andean and Amazonian. The Coastal region is defined as below 1000 meters elevation, from west of the Andes to the coast, while the Amazonian region is defined in the same altitudinal range to the east of the Andes. The Andean region is defined for lands above 1000 meters elevation. Ecuadorian provinces where the species are recorded are cited in accordance with the studied collections, following the Ecuadorian provinces after the 2007 reorganization (i.e., including the new provinces of Santa Elena and Santo Domingo de los Tsáchilas, as well as Orellana, created in 1998). We indicate the total number of collections reviewed per taxa and one representative specimen (voucher), indicating the herbaria acronym where it is deposited. Finally we indicate post-Webster (1999) bibliographic sources which offer updated information about the species. In the "notes" section we include, when needed, any other relevant information, including justifications for nomenclatural decisions.

Data resources

All the information gathered as part of this work is available online in the regularly updated "Acalypha Taxonomic Information System" Website (Cardiel J.M., P. Muñoz, E. Dorda & M. Pardo de Santallana**.** Acalypha Taxonomic Information System. http://www.acalypha.es). In addition, the information of the studied specimens has been also uploaded to the Global Biodiversity Information Facility (GBIF) (http://data.gbif.org/datasets/resource/12046/).

Results

Our work records 20 accepted species of *Acalypha* for continental Ecuador. Two of them are endemic: *Acalypha stellata* and *A. websterii,* and two others are allochtonous: *A. hispida* and *A. wilkesiana*. An identification key is provided. Of the 34 species recognized by Webster (1999) for this territory, nine are considered as synonyms and nine are based on misidentifications (Table 1). The four species added by Ulloa Ulloa and Neill (2005) are accepted. We identify 17 synonyms based on Ecuadorian collections, including the new one *A. pilocardia* Gilli. We indicate the type specimens of almost all the treated names, and 13 lectotypes are designated.

Key to the species of *Acalypha* of continental Ecuador

Key to the subgenera

1 Female flowers pedicellate; calyx with 4 or 5 sepals, the subtending bracts inconspicuous, not becoming foliaceous in fruit ..... **Subgen. *Linostachys***

2 Female flowers sessile; calyx with 3 sepals, the subtending bracts becoming foliaceous and accrescent in fruit (except in *A. hispida*) .... **Subgen. *Acalypha***

Key to species

Subgenus *Linostachys*

1a Leaf blade palmately nerved, brightly colored minute resinous droplets present, mainly on lower surface ..... **18. *A. villosa***
1b Leaf blade pinnately nerved, brightly colored minute resinous droplets absent **2**
2a Female inflorescences paniculate. Leaf blade with 10–17 veins per side; stipules generally more than 5 mm long. Petioles more than 1 cm long ..... **11. *A. platyphylla***
2b Female inflorescences racemose. Leaf blade with 9–13 veins per side; stipules inconspicuous, ca. 1 mm long. Petioles less than 1 cm long ... **12. *A. salicifolia***

Subgenus *Acalypha*

1a Herb or suffrutex **2**
1b Trees or shrubs **6**
2a Female inflorescences ellipsoid or cylindrical, densely flowered, with the axis completely covered by the flowers **3**
2b Female inflorescences loosely flowered, with the axis conspicuously visible ... **5**
3a Female bract with long awned lobes **4**
3b Female bract with triangular awnless lobes ..... **5. *A. infesta***
4a Young branches and leaves without glandular hairs; leaf blade acute; styles branched ..... **2. *A. arvensis***
4b Young branches and leaves with glandular hairs; leaf blade acuminate; styles unbranched ..... **1. *A. alopecuroidea***
5a Female inflorescences terminal, bracts with filiform lobes cut more than ½ length to the base ..... **17. *A. subcastrata***
5b Female inflorescences axillary, bracts with triangular lobes cut ca. ¼ length to the base ..... **4. *A. cuspidata***
6a Leaves with indumentum of stellate hairs **7**
6b Leaves without indumentum of stellate hairs **8**
7a Female inflorescences terminal, subtending bracts and styles with stellate hairs ..... **16. *A. stellata***
7b Female inflorescences generally axillary, rarely terminal, subtending bracts and styles without stellate hairs ..... **5. *A. dictyoneura***
8a Female or bisexual inflorescences terminal **9**
8b Female or bisexual inflorescences axillary **12**

9a Female bracts without glandular hairs ..... **18. *A. stachyura***
9b Female bracts with glandular hairs **10**
10a Female bracts subtriangular at maturity, with the central tooth prominent, lanceolate, acuminate ..... **19. *A. websteri***
10b Female bracts suborbicular at maturity, with the central tooth not or slightly prominent **11**
11a Leaf blade generally broadly ovate-lanceolate; accrescent bracts with glandular hairs ca. 0.3–0.5 mm long; styles 4–5 mm long. ..... **14. *A. schiedeana***
11b Leaf blade generally narrowly ovate-lanceolate; accrescent bracts with glandular hairs ca. 1 mm long; styles 7–8 mm long ..... **10. *A. padifolia***
12a Plants with both unisexual and bisexual inflorescences **13**
12b Plants with all the inflorescences unisexual **14**
13a Leaf blade generally triangular-lanceolate, palmately nerved .. **4. *A. cuspidata***
13b Leaf blade elliptic-lanceolate or oblong-lanceolate, pinnately nerved ..... **6. *A. diversifolia***
14a Leaf blade pinnately nerved **15**
14b Leaf blade palmately nerved **16**
15a Leaf blade generally obovate, the base subcuneate; female inflorescences 7–15 cm long ..... **3. *A. cuneata***
15b Leaf blade ovate to oblong-lanceolate, the base rounded to subcordate; female inflorescences 25–40 cm long ..... **12. *A. scandens***
16a Female inflorescences extremely densely flowered, with the axis hidden; bracts non-accrescent ..... **9. *A. hispida***
16b Female inflorescences more or less densely flowered, with the axis visible; bracts conspicuously accrescent **17**
17a Leaf blade generally variegated; female inflorescences up to 10 cm long ..... **20. *A. wilkesiana***
17b Leaf blade not variegate; female inflorescences more than 15 cm long ..... **9. *A. macrostachya***

Catalogue to the species of *Acalypha* of continental Ecuador

01. ***Acalypha alopecuroidea*** Jacq., Collectanea 3: 196. 1789[1791].

Type. Crescit in Venezuela, tab. 620 in Jacq., Ic. Pl. Rar. 3 (1792), lectotype designated by Cardiel, Anales Jard. Bot. Madrid 54: 233 (1995[1996]).

≡ *Ricinocarpus alopecuroides* (Jacq.) Kuntze, Revis. Gen. Pl. 2: 617. 1891.

Herb. Coastal, 0–250 m. − Provincial distribution: Guayas (2 collections examined). − Voucher: F.M.Valverde 334 (COL, US).

References. Levin (2001), Madsen et al. (2001), Cardiel (2007).

Note. We found only two Ecuadorian collection of this species, which is widely distributed in Central America, Venezuela and Colombia.

02. ***Acalypha arvensis*** Poepp. in Poepp. Endl., Nov. Gen. Sp. Pl. 3: 21. 1841.

Type. [PERU] Crescit in cultis et ruderalis provinciae Maynas ad Yurimaguas, toto anno florens, E.Poeppig 2215[2115] (**lectotype:** W!, **designated here**; isolectotypes G[2 sheets]!, F[fragment ex W]!, W!). Other type collection: [BRAZIL] ad Serpa in provincia Paranaensi, E.Poeppig s.n. (W!).

≡ *Ricinocarpus arvensis* (Poepp.) Kuntze, Revis. Gen. Pl. 2: 617. 1891.

Annual herb or small suffrutex. Coastal, 0–1000 m. Roadsides and disturbed vegetation. − Provincial distribution: Cotopaxi, Guayas, Los Ríos, Manabí, Napo, Pichincha, Sucumbíos (14 collections examined). − Voucher: O.Haught 2994 (GH, US).

References. Levin (2001), Cardiel (2007).

Note. *A. arvensis* was described based on two collections: E.Poeppig 2215 and E.Poeppig s.n., from Peru and Brazil respectively. We select one of the two specimens of the collection E.Poeppig 2215 found in the W herbarium, as lectotype. Some duplicates of this collection from G and W herbaria also show an original label with the number 2115, in addition of 2215.

03. ***Acalypha cuneata*** Poepp., Nov. Gen. Sp. Pl. 3: 22. 1841.

Type. [PERU] Crescit in fruticetis maynensibus ad Yurimaguas. Martio lecta, E.Poeppig 2230 (**lectotype:** W[113778]!, **designated here**; isolectotypes, B[destroyed, photo 5288], F!, W!). Other type collections: E.Poeppig 2317 (B[destroyed, photo 5288], F!, G!, P[2 sheets]!, W!), 2330 (F!, G[4 sheets]!, P[2 sheets]!, W!), 2807 (W!).

≡ *Ricinocarpus cuneatus* (Poepp.) Kuntze, Revis. Gen. Pl. 2: 617. 1891; *Acalypha obovata* Benth. var. *cuneata* (Poepp.) J.F. Macbr., Candolea 6: 26. 1940.

= *Acalypha obovata* Benth., Bot. Voy. Sulphur. 163, tab.53. 1846; *Acalypha cuneata* Poepp. var. *obovata* (Benth.) Müll. Arg., Linnaea 34: 14. 1865. **Type:** [ECUADOR, Esmeraldas] Atacames, tab. 53 in Benth., loc. cit. 1846.

= *Acalypha eggersii* Pax, Bot. Jarhb. Syst. 26: 205. 1899. **Type:** Ecuador: prov. Manabí, prope Hacienda El Recreo, H.Eggers 15007 (**lectotype:** S!, **designated here**; isolectotypes: B[destroyed, photo 5291], C!, F[2 sheets]!, MA!, MO!, NY!, US!).

Shrub or small tree. Mainly Amazonian and Coastal, excepcionally Andean, (0-) 250–1000(-1500) m. Generally associated with primary rainforests. − Provincial distribution: Esmeraldas, Guayas, Los Ríos, Manabí, Morona-Santiago, Napo, Orellana, Pastaza, Santa Elena, Santo Domingo de los Tsáchilas , Sucumbíos, Tungurahua, Zamora-Chinchipe (222 collections examined). − Voucher: E. Gudiño 61 (GB, DAV, MO, QCNE, U).

References. Bonifaz and Cornejo (2004), Cardiel (2007), De la Torre et al. (2008), Santiana and Cerón (2000).

Notes. Poeppig described *A. cuneata* based on four Peruvian collections: E.Poeppig 2230, 2317, 2330 and 2807. We selected the best preserved specimen, in the W herbarium, as lectotype. The synonym *A. eggersii* Pax was described from

a single collection (F.A.Eggers 15007), which was distributed to several herbaria; due to the destruction of Berlin specimen, we designate as lectotype the specimen from the S herbarium.

04. ***Acalypha cuspidata*** Jacq., Pl. Hort. Schoenbr. 2: 63, tab. 243. 1797.

Type. [VENEZUELA] Crescit ad Caracas, tab. 243 in Jacq., loc. cit. 1797, lectotype designated by Cardiel, Anales Jard. Bot. Madrid 54: 233 (1995[1996]).

= *Acalypha vestita* Benth., Bot. Voy. Sulpuhur. 164. 1844. **Type:** [ECUADOR] Guayaquil, Sinclair s.n. (K[in hb. Hook.]).

= *Acalypha tenuipes* Pax & K. Hoffm. in Engl., Pflanzenr. 147, 16 (heft. 85): 122. 1924. **Type:** Ecuador trockene Gebüsche bei Agua Amarga, Elrecreo, H.Eggers 15833 (**lectotype:** US!, **designated here**; isolectotypes: B[destroyed, photo 5325], F!, K! [2 sheets], L!, M!).

Shrub or suffrutex. Coastal, 0–250 m. Associated with dry deciduous forest, savanna and thickets. − Provincial distribution: El Oro, Guayas, Manabí, Santa Elena (8 collections examined). − Voucher: J.E. Madsen 63938 (AAU, MA, QCA, QCNE).

References. Cardiel (2000, 2007), Madsen et al. (2001), De la Torre et al. (2008).

Notes. *A. cuspidata* Jacq. is often confused with A. *plicata* Müll. Arg., which has a conspicuous glandular indumentum on the young branches, leaves and inflorescences. *A. plicata* is frequent in the Andean zones of Colombia and Peru, but has not been found in Ecuador where it is also likely to be present. The synonym *A. tenuipes* Pax & K. Hoffm. was described from a single collection (H.Eggers 15833), which was distributed to several herbaria; due to the destruction of Berlin specimen, we select as lectotype the best preserved and most complete specimen found in the US herbarium. See comments about this synonym in Cardiel (2000).

05. ***Acalypha dictyoneura*** Müll. Arg., Linnaea 34: 12. 1865.

Type. [PERU] In Peruvia prope Chachapoyas, A.Matthews s.n. (holotype: G!; isotype: K!).

= *Acalypha pilocardia* Gilli, Feddes Repert. Spec. Nov. Regni Veg. 92: 678. 1981. **Syn. nov. Type:** [ECUADOR] Schlucht des Angamarca-Flusses bei El Corazón, 1300 m, 1.7.75, 301, fl., A.Gilli 301 (holotype: W!).

= *Acalypha stellipila* Pax & K. Hoffm. in Engl., Pflanzenr. 147, 16 (heft. 85): 49. 1924. **Type:** Ecuador, Gualea, Sodiro 151/26[a] (**lectotype:** F[644679]!, **designated here**; isolectotype B[destroyed, photo 71872]). Other type collections: Ecuador, Puente de Chimbo, Sodiro 151/26[b] (B[destroyed, photo 5321]).

Shrub or small tree. Andean, (1300)1750–2500 m. Montane rainforests. − Provincial distribution: Bolívar, Chimborazo, Imbabura, Napo, Orellana, Pichincha, Santo Domingo de los Tsáchilas, Tungurahua (52 collections examined). − Voucher: M.Balslev & E.Madsen 10362 (AAU, COL, C, F, MO, NY, QCA, SEL, US).

References. Cardiel (2000, 2007), Santiana and Cerón (2000).

Note. The synonym *A. stellipila* Pax & K. Hoffm. was described from two collections (Sodiro 151/26[a] and 151/26[b]), both destroyed in B herbarium. We designate as lectotype a fragment of the first one, preserved in F herbarium.

06. ***Acalypha diversifolia*** Jacq., Pl. Hort. Schoenbr. 2: 63, tab. 244. 1797.

Type. [VENEZUELA] ex Caracas, tab. 244 in Jacq., Pl. Hort. Schoenbr. 2 (1797), lectotype designated by Cardiel, Anales Jard. Bot. Madrid 54: 233 (1995[1996]).

Shrub or small tree. Amazonian, Andean and Coastal, 0–2000 m. Lowland rainforests, deciduous and semi-deciduous forests (often along river banks) and disturbed areas. − Provincial distribution: Bolívar, Carchi, Chimborazo, Cotopaxi, El Oro, Esmeraldas, Guayas, Imbabura, Loja, Los Ríos, Manabí, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Santo Domingo de los Tsáchilas, Sucumbíos, Tungurahua, Zamora-Chinchipe (310 collections examined). − Voucher: V.Zak & J.Jaramillo 2822 (DAV, F, GB, GH, K, MO, NY, QCNE, SEL).

References. Levin (2001), Cardiel (2007), De la Torre et al. (2008).

07. ***Acalypha hispida*** Burm. f., Fl. Ind. 302, tab. 61, f. 1. 1768.

Type. Habitat in India, tab. 61 in Burm., loc. cit. 302. 1768.

Shrub. Coastal, 0–250 m. Cultivated and naturalized. − Provincial distribution: Guayas, Santo Domingo de los Tsáchilas (4 collections examined). − Voucher: L.P.Kvist & E.Asanza 40725 (AAU, QCA, QCNE).

References. Levin (2001), Cardiel (2007), De la Torre et al. (2008).

Note. Native to Malaysia or Melanesia, this species is grown in gardens throughout the tropics, and sometimes appears naturalized.

08. ***Acalypha infesta*** Poepp. in Poepp. & Endl., Nov. Gen. Sp. Pl. 3: 22. 1845.

Type. [PERU] Crescit in cultis ad Cuchero, E.Poeppig 1701 (**lectotype:** W[103476]!, **designated here**; isolectotypes: F!, P!, US!, W!).

Annual herb or suffrutex. Andean, 1000–2500 m. Disturbed areas. − Provincial distribution: Bolívar, Cañar, Chimborazo, Pichincha (6 collections examined). − Voucher: F.R.Fosberg & M.A.Giler 22627 (NY, US).

References. Cardiel (2001, 2007), Ulloa Ulloa and Neill (2005).

Notes. This species is often confused with *A. poiretii* Spreng., present in South America (mostly in Argentina and Bolivia), and not found in Ecuador. *A. poiretii* has bisexual inflorescences, the calyx of female flowers with four sepals and female bracts with smaller teeth. *A. infesta* Poepp. was described from a single collection (E.Poeppig 1701), which was distributed to several herbaria. We select as lectotype one of the two sheets conserved in the W herbarium.

09. ***Acalypha macrostachya*** Jacq., Pl. Hort. Schoenbr. 2: 63, t. 245. 1797.

Type. [VENEZUELA] crescit ad Caracas, tab. 245 in Jacq., Pl. Hort. Schoenbr.: 2 (1797), lectotype designated by Cardiel, Anales Jard. Bot. Madrid 54: 233 (1995[1996]).

= *Acalypha heterodonta* Müll. Arg. var *hirsuta* Müll. Arg., Linnaea 34: 12. 1865. **Type:** [Ecuador] Ad pedem montis Chimborazo, R.Spruce 6147 (holotype: K!; isotypes: BM!, W!).

Shrub or small tree. Amazonian, (250-)500–2000 m. In lowland and lower montane rainforests, frequent in disturbed areas. − Provincial distribution: Carchi, Chimborazo, El Oro, Esmeraldas, Morona-Santiago, Napo, Orellana, Pastaza, Pichincha, Santo Domingo de los Tsáchilas, Sucumbíos, Tungurahua, Zamora-Chinchipe (103 collections examined). − Voucher: H.Balslev & E.Madsen 10462 (AAU, C, COL, F, GB, MO, NY, QCA, SEL, US).

References. Levin (2001), Cardiel (2007), Cerón et al. (2007), De la Torre et al. (2008).

10. ***Acalypha padifolia*** Kunth in Humb. & Bonpl., Nov. Gen. Sp. (quarto ed.) 2: 97. 1817.

Type. [COLOMBIA] Crescit locis sylvaticis subfrigidis inter Almaguer et Pasto, prope villam Meneses, alt. 1322 hex, A.Humboldt & A.Bonpland 2136 (holotype: P-Bonpl.!; isotype: P!).

= *Acalypha andina* Müll. Arg., Flora 55: 26. 1872. **Type:** [ECUADOR] In andibus orientalibus ecuadorensibus inter Bannas et Rio verde altitudine circ. 5000 ped., M.Wagner s.n. (holotype: M!).

= *Acalypha tunguraguae* Pax & K. Hoffm. in Engl., Pflanzenr. 147, 16 (heft. 85): 66. 1924. **Type:** Ecuador, am vulkan Tunguragua, 1800–2000 m., F.Lehmann 6641 (**lectotype:** K[600517]!, **designated here**; isolectotype: B[destroyed, photo 5327]).

= *Acalypha schimpffii* Diels, Biblioth. Bot. 29: 103. 1937. **Type:** Mittel-Ecuador: West-Kordillere: Prov. Chimborazo: Tal des R. Chanchan bei Huigra an buschigen Abnhägen, 1260 m. 16 November, H.J.F.Schimpff 429 (**lectotype:** MO!, **designated here**; isolectotypes: A[3 sheets]!, M!, NY, US!, Z[3 sheets]!). Other type collection: Ecuador, loc. cit. 21 September 1993, Diels 1128 ([B destroyed]).

Shrub or small tree. Andean, 2000–3250(3800) m. Upper and lower montane rainforests, mainly disturbed. − Provincial distribution: Azuay, Bolívar, Cañar, Carchi, Chimborazo, Imbabura, Loja, Pastaza, Pichincha, Tungurahua (83 collections examined). − Voucher: C.E.Cerón & G.Benavides 2551 (F, MO, QCA, QCNE).

References. Cardiel (2000, 2007), De la Torre et al. (2008), Santiana and Cerón (2000).

Notes. The synonym *A. tunguaraguae* Pax & K. Hoffm. was described from a single collection (H. Eggers 15833); due to destruction of the Berlin specimen, we select as lectotype the duplicate found in the K herbarium. The synonym *Acalypha schimpffii*

Diels was described based on two collections: Diels 1128, destroyed in B herbarium, and Schimpff 429, poorly preserved, which was distributed to several herbaria; we select as lectotype the specimen preserved in the MO herbarium.

11. ***Acalypha platyphylla*** Müll. Arg., Linnaea 34: 6. 1865.

Type. In Ecuador Peruviae, L.Fraser s.n. (holotype: G-DC[324093]!).

≡ *Ricinocarpus platyphyllus* (Müll. Arg.) Kuntze, Revis. Gen. Pl. 2: 618. 1891.

Shrub or small tree. Andean, 1250–2500 m. In lower and upper montane rainforests. − Provincial distribution: Azuay, Cotopaxi, Morona-Santiago, Napo, Orellana, Pichincha, Santo Domingo de los Tsáchilas (87 collections examined). − Voucher: J.Jaravillo & V.Zak 7481 (F, MO, NY, QCA, QCNE).

References. Cardiel (2007).

12. ***Acalypha salicifolia*** Müll. Arg., Flora 47: 438. 1864.

Type. [ECUADOR] in Andibus Ecuadorensibus, R.Spruce 4963 (holotype: W!; isotypes, F, K[2 sheets, fragments ex W]!).

≡ *Ricinocarpus salicifolius* (Müll. Arg.) Kuntze, Revis. Gen. Pl. 2: 618. 1891.

Shrub or small tree. Amazonian, 500–1250(-1750) m. In lower montane rainforests and lowland rainforests. − Provincial distribution: Morona-Santiago, Napo, Sucumbíos, Zamora-Chinchipe (28collections examined). − Voucher: H.Van der Werff & E.Gudiño 11350 (G, GB, MO, NY, QCNE).

References. Cardiel (2000, 2007), Cerón et al. (2007), De la Torre et al. (2008).

13. ***Acalypha scandens*** Benth., J. Bot. (Hooker) 6: 329. 1854.

Type. [BRAZIL] On the island of the Amazon opposite Santarem, R.Spruce 1000 (holotype: K!).

Shrub or small tree. Amazonian, 0–250 m. Lowland rainforests, often along river banks. − Provincial distribution: Orellana, Pastaza, Sucumbíos (6 collections examined). − Voucher: C.E.Cerón et N.Gallo 5186 (AAU, MO, QCNE).

References. Cardiel (2007).

14. ***Acalypha schiedeana*** Schltdl., Linnaea 7: 384. 1832.

Type. [MEXICO] In sylvis umbrosis Jalapae, C.J.W. Schiede 44 (**lectotype:** P[645420]! **designated here**). Other type collections: C.J.W.Schiede 72 (B[destroyed, photo 5319]!), 247 (HAL[072241]!).

= *Acalypha ecuadorica* Pax & K. Hoffm. in Engl., Pflanzenr. 147, 16 (heft 85): 68. 1924. **Type:** Ecuador, Agua Amarga bei El recreo, trockene Gebüsche, H.Eggers 15535 (**lectotype:** S[S-R-7770]!, **designated here**; isolectotypes: B[destroyed, photo 5290], BM, C!, F!, GH, K[2 sheets]!, L!, M!, MA!, NY!, PR, US!).

Shrub or small tree. Coastal, 0–500(-750) m. Generally associated with dry forests and thickets. − Provincial distribution: Guayas, Loja, Los Ríos, Manabí (19 collections examined). − Voucher: E.Asplund 15240 (S)

References. Cardiel (1999, 2000), Santiana and Cerón (2000), Ulloa Ulloa and Neill (2005).

Notes. *A. schiedeana* Schltdl. was described from a single collection, Schiede 72. The specimen deposited in the B herbarium was destroyed. We select as lectotype the duplicate found in the K herbarium. The synonym *A. ecuadorica* Pax & K. Hoffm. was described from a single collection, H.Eggers 15535, distributed to many herbaria. It represents young branches with immature inflorescences. Because of the destruction of the Berlin specimen, we select as lectotype the duplicate from S herbarium, which has the most developed flowers. See comments about this synonym in Cardiel (2000).

15. ***Acalypha stachyura*** Pax, Repert. Spec. Nov. Regni Veg. 7: 110. 1909.

Type. [BOLIVIA] Charopampa und San Carlos bei Mapiri, 750 m –August und November 1909. O.Buchtien 1315 (**lectotype:** M!, **designated here**; isolectotype US!). Other type collections: O.Buchtien 1307 (WRSL, US!), 1314 (US!).

Shrub or small tree. Amazonian region, 0–1000(-1250) m. In lowland rainforests. − Provincial distribution: Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Zamora-Chinchipe (136 collections examined). − Voucher: J.Zaruma & al. 126 (F, GB, MO, NY, QCNE).

References. Cardiel (2007), Cerón et al. (2007), De la Torre et al. (2008).

Note. *A. stachyura* Pax was described based on three collections of O.Buchtien: 1307, 1314 and 1315, all from the same locality. We select as lectotype the best preserved collection, from the M herbarium.

16. ***Acalypha stellata*** Cardiel, Novon 10(4): 362. 2000.

Type. ECUADOR, Bolívar: Limón, estribaciones de la Cordillera Occidental, 880–1100 m, 14 Oct. 1943, M.Acosta Solís 6639 (holotype: F!; isotype: F!). Shrub or small tree. Coastal, 500–1000 m. Lower western slopes of the Andes. − Provincial distribution: Bolívar, Chimborazo, El Oro (5 collections examined).

References. Cardiel (2000), Ulloa Ulloa and Neill (2005).

Note. Ecuadorian endemic.

17. ***Acalypha subcastrata*** Aresch., Pl. Itin. Eugeniae: 137. 1910.

Type. [ECUADOR] On Puna i Guayaquil viken, N.J.Andersson 160 (**lectotype:** S[S-R-7773]!, **designated here**; isolectotype: S[08-1622]!).

Annual herb. Coastal, 0–500(-1200) m. Generally associated with dry forest and open sites. − Provincial distribution: Guayas, Loja, Los Ríos, Manabí, Santa Elena (24 collections examined). − Voucher: C.M.Dodson & P.M.Dodson 13680 (MO, QCNE, SEL).

References. Cardiel (2007).

Notes. *A. subcastrata* Aresch. is often confused with *A. setosa* A. Rich, which has the ovary hispid and female bracts without glandular hairs (vs. ovary glabrous and bracts with glandular hairs). *A. setosa* occurs in Venezuela and Colombia, and has not been found in Ecuador. *A. subcastrata* was described based on a single collection, N.J.Andersson 160, of which we found two sheets in S herbarium. We select one of them as the lectotype.

18. ***Acalypha villosa*** Jacq., Enum. Syst. Pl. 32.1760.

Type. [COLOMBIA] Habitat Carthagenae in silvis & sepibus, tab. 183, fig. 16 in Jacq., Select. Stirp. Amer. Hist. (1763). Lectotype designated by R.A. Howard (1776). Epitype: tab. 47 in Jacq., Hort. Bot. Vindov. (1776), designated by Cardiel, Anales J. Bot. Madrid (1995[1996]).

= *Acalypha villosa* Jacq. var. *latiuscula* Pax. & K. Hoffm. in Engl., Pflanzenr. 147, 16 (heft. 85): 17. 1924. **Type:** Ecuador, Manabí, bei Hacienda El Recreo, H.Eggers 15616 (**lectotype:** K[600533]!, **designated here**; isolectotype: L!). Other type collections: Ecuador, Manabí, bei Hacienda El Recreo, H.Eggers 15047(F!, K!, L!, M!, US!); Brasilien, Alto Amazonas, Rio Acre, Seringal S. Francisco, E.Ule 9537 (K!); [BRAZIL] Matto Grosso, Malme 2543; [BRAZIL] Madeira Fälle, H.Rusby 1272 (K!, NY!, US!); [BOLIVIA] Bolivien, am Zusammenfluß des Beni und Madre de Dios, H.Rusby 1271 (BM!, MA!, K!, MO!, NY!, US).

Shrub or small tree. Coastal, 0–250 m. Generally associated to secondary woods and thickets, also with savanna and deciduous forest, mainly on sandy and humid soils. − Provincial distribution: El Oro, Esmeraldas, Guayas, Los Ríos, Manabí, Pichincha, Santo Domingo de los Tsáchilas (54 collections examined). − Voucher: L.P.Kvist 40466 (AAU, MO, NY, QCA).

References. Levin (2001), Cardiel (2007), De la Torre et al. (2008).

Note. The synonym *A. villosa var. latiuscula* Pax & K. Hoffm. was described based on six different collections from Bolivia, Brazil and Ecuador. We select as lectotype the quite well preserved Ecuadorian collection H.Eggers 15616, from the K herbarium.

19. ***Acalypha websteri*** Cardiel, Novon 10(4): 360. 2000.

Type. ECUADOR, Prov. Chimborazo, Huigra, ca. 1200 m, E.Asplund 15427 (holotype S!, isotype S!). Shrub. Andean, 1200 m. − Provincial distribution: Chimborazo (3 collections examined). − Voucher: J.E.Madsen 36847 (AAU).

References. Cardiel (2000), Ulloa Ulloa and Neill (2005).

Note. Ecuadorian endemic.

20. ***Acalypha wilkesiana*** Müll. Arg. in DC., Prodr. 15(2): 817. 1866.

Type. [FIJI] In insulis Fidji (U.S. Expl. Exped. Under. Capt. Wilkes), B.C.Seeman 22 (holotype, G-DC!; isotypes, GH!, K[2]!, US[2]!).

≡ *Acalypha amentacea* Roxb. subsp. *wilkesiana* (Müll. Arg.) Fosberg, Smithsonian Contr. Bot. 45: 10. 1980.

Shrub. Cultivated and naturalized. Coastal, Andean and Amazonian, 0–1500 m. − Provincial distribution: Guayas, Imbabura, Manabí, Napo, Santo Domingo de los Tsáchilas (6 collections examined). − Voucher: M.Acosta-Solís 13076 (F).

References. Levin (2001), Cardiel (2007), Sagun et al. (2010).

Note. Native to the Polynesian island of Fiji , this species is widely used as an ornamental in the tropics. It has been treated as a subspecies of *A. amentacea* Roxb. because of its morphological similarities (Fosberg and Sachet 1980), but a molecular study by Sagun et al. (2010) showed that it was closer to *A. hispida* Burm. than to *A. amentacea,* and therefore should be the species rank.

Acknowledgements

This work was partly financed by the Spanish Government, through the research project EUI 2008-0388. Support was also received from the Universidad Autónoma de Madrid (Spain) and the Regional Government (Comunidad de Madrid), through the research project CCG07-UAM/AMB-1453. We kindly thank the curators and staff of the aforementioned herbaria for facilitating the study of their specimens. Francisco Pando, manager of GBIF-Spain, kindly helped us in everything relating to biodiversity databases. The authors are also grateful to Grady Webster for his advice in the early studies on Ecuadorean *Acalypha*; rest in peace.

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PhytoKeys 17: 19–23 (2012)
doi: 10.3897/phytokeys.17.3672
www.phytokeys.com

RESEARCH ARTICLE

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Psoralea karooensis (Psoraleeae, Fabaceae): a new species from the Klein Karoo region of South Africa

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Academic editor: *Patrick Herendeen* | Received 11 July 2012 | Accepted 29 August 2012 | Published 12 September 2012

Citation: Stirton CH, Muasya AM, Vlok J (2012) *Psoralea karooensis* (Psoraleeae, Fabaceae): a new species from the Klein Karoo region of South Africa. PhytoKeys 17: 19–23. doi: 10.3897/phytokeys.17.3672

Abstract

A new species of *Psoralea* is described. *Psoralea karooensis* C.H. Stirt., Muasya & Vlok is endemic to mountain streams in the Klein Karoo region of the Western Cape Province, South Africa. The new species is characterised by its flexuose habit of many stiff bare stems with the seasonal shoots arising apically in clusters and its greenish cream flowers borne at the apex of 10–12 mm long peduncles each ending in a trifid cupulum.

Keywords

Fabaceae, Klein Karoo, Leguminosae, New species, *Psoralea*, Psoraleeae, South Africa, Taxonomy

Introduction

Psoralea L. comprises ± 70 species of mostly shrubs which are widespread in the winter rainfall area of South Africa and extend into Afromontane regions (Stirton 2005). The genus is commonly found in mountain fynbos in drainage systems (river beds, stream banks, seepage areas), occurring frequently on sandstone derived soils across the Cape Floristic Region (Stirton and Schutte 2000). However, there are a number of species, occurring marginally to the main generic distribution, that have adapted to surviving in drier conditions along the arid Fynbos-Succulent Karoo boundary (e.g. *P. angustifolia* Jacq., *P. glaucescens* Eckl. & Zeyh., *P. tenuifolia* L., and *P. verrucosa* Willd.). A new species is described here which occurs along seasonal freshwater streams in the Klein Swartberg and Anysberg Mountains (Vlok and Schutte-Vlok 2010).

Species treatment

Psoralea karooensis **C.H. Stirt., Muasya & Vlok, sp. nov.**
urn:lsid:ipni.org:names:77122079-1
http://species-id.net/wiki/Psoralea_karooensis
Plates 1, 2

Psoralea glaucescens *affinis, sed habitu cernuo caulibus nudis rigidis multis, brachyblastis vernalis ab apice fasciculatis; foliis 1-foliolatis; brachyblastis floriferis vernalis ramosis erectis brevibus; floribus viridi-cremeis parvis cupulo trifido parvo apice pedunculi 10–12 mm longi vexilloque macula nectarifera purpurea singula, venis purpurescentibus differt.*

Type. South Africa: Western Cape, Ladismith (3320), Witteberg Private Nature Reserve, Driedamhoek (–AD), at end of jeep track, 33°20'11.7"S, 20°31'57.7"E, 20 February 2011, Muasya, Chimphango, & Stirton 5927 (holotype: BOL!; isotypes: BM!, GRA!, K!, MO!, NBG!, NH!, P!, PRE!).

Description. *Habit* erect, willowy, flexuose branched shrub to 3 m tall, reseeder but coppices regularly once established. *Stems* 1(2), brownish-grey with scattered white lenticels, weakly fissured, bare of leaves except on the seasonal shoots which arise in a characteristic burst-branching; shoots coppice seasonally on old stems, leafy along their entire length, glaucous green with a whitish bloom, glabrous, with small raised crateriform glands. *Leaves* 1-foliolate, petiolate, stipulate, glandular, glabrous. *Leaf size* variable, being larger on water shoots from the rootstock (20–23 mm long, 2–3 mm wide), becoming smaller up the flowering shoots, dull glaucous green; apex rounded to acute; base cuneate; tip arching; petiole 1–2 mm long. *Stipules* 1–2 mm long, fused at base, rigid, triangular, semi-patent, 1-veined, rapidly senescent on flowering shoots. *Flowers* 10.0–12.5 mm long, greenish cream, borne in most axils of the upper half of the seasonal shoots, 1–3 per axil; pedicels 2 mm long. *Peduncles* 10–12 mm long, purple-tinged, terminated by a small tri-toothed cupulum; cupulum teeth equal, broadly triangular, acute, green, <1.0mm long. *Calyx* 5 mm long, pale green, sometimes flushed with purple, glabrous; teeth triangular, all 2 mm long, carinal tooth broadest, blunt, weakly ribbed, glandular; tube longer than the teeth, accrescent in fruit, persisting after fruits and seeds are shed. *Standard* broadly elliptic, 10 mm long, 10–12 mm wide; claw 2 mm long, almost tubular; cream, nectar flash purple rising from above the strongly developed auricles to the apex; inner face of the standard greenish, veins purple; apex emarginate but standard not fully reflexed. *Wing petals* 10–11 mm long, 4 mm wide; claw 2.5 mm long; locked into keel fold but not fused, slightly longer than the keel, petal sculpturing present, upper basal, comprised of 4–5 transcostal parallel lamellae. *Keel petals* 10 mm long, 3 mm wide; claw 5 mm long; apex deep purple. *Androecium* 9 mm long; tenth stamen free; sheath split adaxially, fenestrate. *Pistil* 9 mm long; ovary 1.5 mm long, sessile, glabrous, thickened before point of flexure, height of curvature 3 mm, erect, penicillate. *Fruits* ovate, indehiscent, wall scarious, 3.8–4.1 mm long and

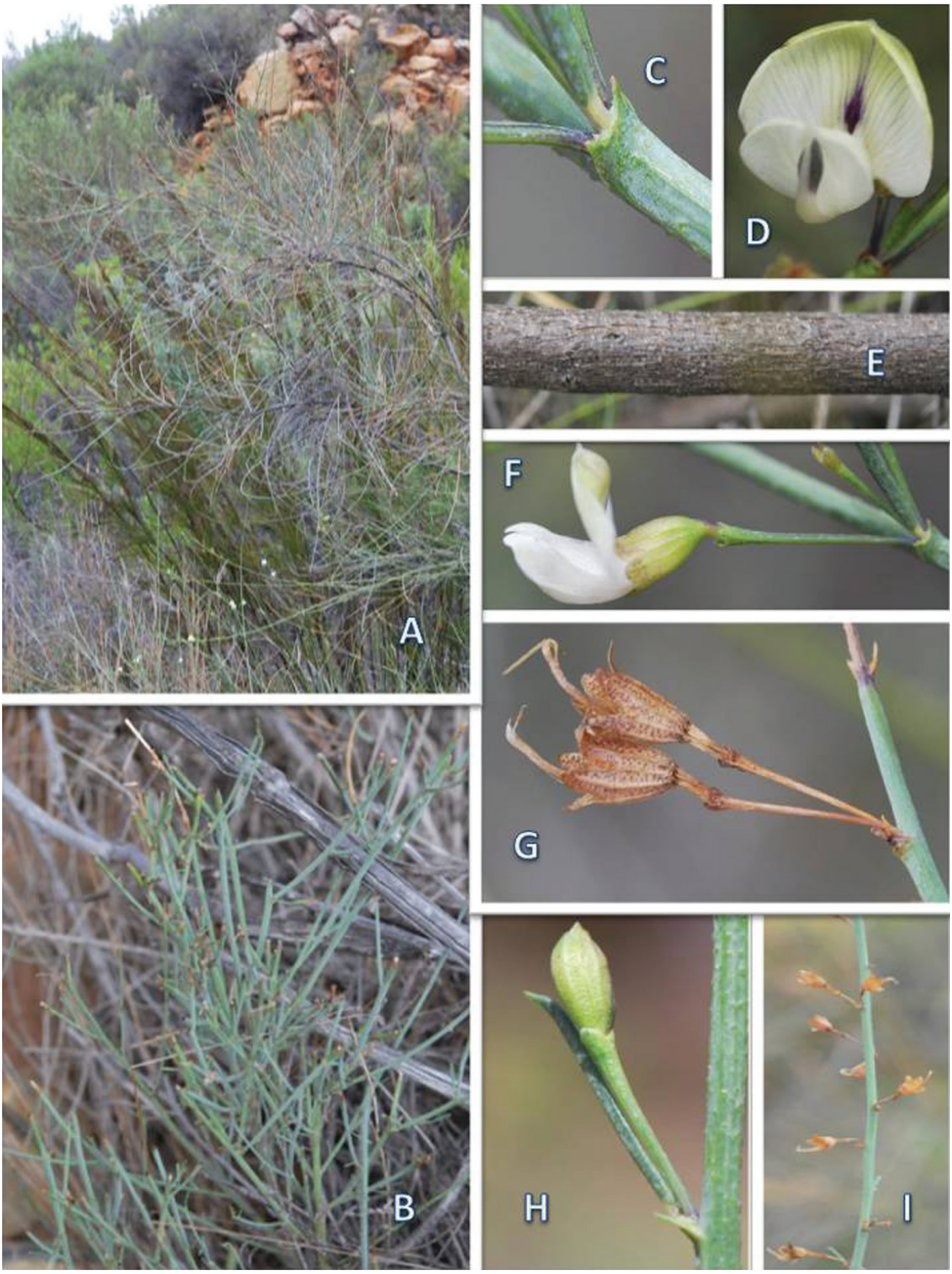

Plate 1. *Psoralea karooensis* C.H. Stirt., Muasya & Vlok **A** overseasonal shoots **B** seasonal shoots **C** fused stipules and base of leaflet **D** flower **E** bark **F** lateral view of flower, note small cupulum at base of calyx **G** persistent calyces after fruit and seed shed **H** flower bud and 1-foliolate leaf **I** fruiting branch. All photographs taken by CH Stirton. Voucher: Muasya, Chimphango, & Stirton 5927 (BOL).

Plate 2. Habit and habitat of *Psoralea karooensis* C.H. Stirt., Muasya & Vlok **A** Mature plant **B** Young coppicing plant **C** typical dry gulley habitat. All photographs taken by CH Stirton. Vouchers: (**A**) Stirton, Muasya & Chimphango 13245 (BOL); (**B–C**) Muasya, Chimphango & Stirton 5927 (BOL).

2.2–2.5 mm wide at mid length. *Seed* 3.5–4.0 mm long and 2.1–2.2 mm wide at mid length, dark olive green, smooth, aril present and light olive green.

Distribution and ecology. *Psoralea karooensis* grows in the Klein Karoo mountains, between 1000–1200 m. It is restricted to the Witteberg quartzite fynbos vegeta-

tion, between the Witteberg and Anysberg Mountains, and occurs mainly in gulleys and along the banks of dry river beds (Plate 2).

Etymology. The specific epithet alludes to its known restriction to the Klein Karoo.

Conservation status. *Psoralea karooensis* is locally common within its range and much of its distribution occurs in protected nature reserves. However, the species is a habitat specialist (fresh water stream beds with intermittent flow) at above 1000 m and is only known from an area less than 500 km^2. We therefore assess this species to be Rare under the South African Red list categories and criteria (EOO, AOO; Von Staden et al. 2009).

Other specimens examined. South Africa: Western Cape: Laingsburg district (3320 AD), Elandsfontein Farm, on dirt road off N1 - Laingsburg via Witteberg [33°18'38.41"S, 20°26'46.13"E], 20 Feb 2011, *Stirton, Muasya & Chimphango 13245* (BOL); Witteberg Kloof, 16 Jul 1923, *Compton 2592* (BOL). Witteberg, S. base of the range, 31 Jan 1961, *Esterhuysen 28844* (BOL, PRE).

Western Cape: Ladismith district (3320 AD), 9 Aug 1939, *Levyns 6106* (BOL).

Western Cape: Laingsburg district, at entrance to Perdekloof Gorge, S. of Matjiesfontein at northern base of Witteberg (3320 BC), *Helme 2938* (NBG).

Discussion. *Psoralea karooensis* is characterised by its small (< 13 mm long) greenish cream flowers with a small (< 1.0 mm long) trifid cupulum at the apex of a 10–12 mm long peduncle, standard with single purple flash nectar patch and purplish veins, 1-foliolate leaves, erect multi-branching short seasonal flowering shoots, and flexuose habit of many stiff bare stems with the seasonal shoots arising apically in clusters. It is most similar to *Psoralea glaucescens* Eckl. & Zeyh., a widespread but rare species found in the northwestern Cape. The resprouter *Psoralea glaucescens* differs in its densely branched mounded habit, grey puckered stems, 3–5-foliolate irregularly sized leaves, greenish yellow flowers, with violet veining and nectar flash, borne 1–5 per axil, and purplish calyces.

Acknowledgements

Field studies were funded by the National Research Foundation grants (SABI – AM Muasya; Competitive support for unrated researchers – SBM Chimphango). CHS thanks Mrs. Wilna Venter (Research Office, UCT), Prof. Jeremy Midgely (Head of Department, UCT) and Mr. Terry Trinder-Smith (Curator of the Bolus Herbarium) for full support and facilities. Jan-Andrian Viljoen kindly translated the diagnosis into Latin, and Geoffrey Higgins (Matara Centre) assisted in fieldwork.

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PhytoKeys 17: 25–26 (2012)
doi: 10.3897/phytokeys.17.4013
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SHORT COMMUNICATION

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Two new combinations in the genus *Distephanus* Cass. (Asteraceae, Vernonieae)

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Academic editor: *Vicki Funk* | Received 17 September 2012 | Accepted 20 September 2012 | Published 21 September 2012

Citation: Robinson H (2012) Two new combinations in the genus *Distephanus* Cass. (Asteraceae, Vernonieae). PhytoKeys 17: 25–26. doi: 10.3897/phytokeys.17.4013

Abstract
New combinations are provided in *Distephanus* for two species from Madagascar.

Keywords
Compositae, Madagascar

Introduction

In the process of recognizing the proper limits of *Distephanus* Cass. a number of combinations have already been made (e. g., Robinson and Khan 1986) and a number of combinations remain to be done. The following two combinations are needed now because of recent entries in GenBank. Descriptions of both species can be found in Humbert (1960).

Systematics

Distephanus ambongensis (Humbert) H. Rob., comb. nov. Basionym: *Vernonia ambongensis* Humbert, Bull. Soc. Bot. France 87: 346. 1940.
urn:lsid:ipni.org:names:77122348-1

Distephanus bara (Humbert) H. Rob., comb. nov. Basionym: *Vernonia bara* Humbert, Notul. Syst. (Paris) 8: 9–10. 1939.
urn:lsid:ipni.org:names:77122349-1

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Humbert H (1960) Flore de Madagascar et des Comores. 189^{e} Famille – Composees, vol. 1. Typographie Firmin-Didot, Paris.

Robinson H, Khan B (1986) Trinervate leaves, yellow flowers, tailed anthers, and pollen variation in *Distephanus* Cassini (Vernonieae: Asteraceae). Proc. Biol. Soc. Wash. 99: 493–501.

PhytoKeys 17: 27–39 (2012)
doi: 10.3897/phytokeys.17.3485
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RESEARCH ARTICLE

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Two new species in the *Matelea stenopetala* complex (Apocynaceae, Asclepiadoideae) from the Guiana Shield and Amazonian Brazil

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Academic editor: *Lena Struwe* | Received 7 June 2012 | Accepted 19 September 2012 | Published 26 September 2012

Citation: Krings A, Morillo G (2012) Two new species in the *Matelea stenopetala* complex (Apocynaceae, Asclepiadoideae) from the Guiana Shield and Amazonian Brazil. PhytoKeys 17: 27–39. doi: 10.3897/phytokeys.17.3485

Abstract

Two new species in the *Matelea stenopetala* complex (Apocynaceae, Asclepiadoideae) are described from the Guiana Shield and Amazonian Brazil: *Matelea brevistipitata* Krings & Morillo, **sp. nov.** and *M. trichopedicellata* Krings & Morillo**, sp. nov.** The new species belong to a small group of adaxially-pubescent-flowered taxa within the complex, including *M. hildegardiana* and *M. pakaraimensis*. The new species are described and a dichotomous key is provided.

Keywords

Gonolobinae, *Matelea*, Neotropics, twining vines, taxonomy

Introduction

The *Matelea stenopetala* Sandwith complex (Apocynaceae, Asclepiadoideae, Gonolobinae) in northern South America includes about ten species of vines (Morillo 1988, 1991; Farinaccio and Stevens 2009; Krings 2011). Members of the complex are recognized by leaves membranous, often more or less elliptic or oblong and relatively large (to ca. 17 x 8 cm), leaf bases frequently narrow and cuneate or acute, flowers small (corolla lobes usually ≤ 4–5 mm long [to 5.8 mm in *M. cayennensis* Morillo]), typically green to greenish-yellow, reticulate but not ocellate, and gynostegial coronas not elaborate, the staminal corona segments (Cs) usually appearing as ridges emanating from the central stipe and the interstaminal corona segments (Ci) appearing as sinuses in between the Cs. The morphology

of the flowers is strikingly similar to *Matelea palustris* Aubl. [type of *Matelea* Aubl.], the affinity to which has been pointed out by Sandwith (1931: his protologue of *M. stenopetala*), as well as by Farinaccio and Stevens (2009). On-going work for various regional initiatives, including the Flora of the Guianas and the Biological Diversity of the Guiana Shield, has resulted in the discovery of two new species referable to the *M. stenopetala* complex. Both new species exhibit corolla lobes adaxially pubescent, a character state shared in the complex only by *M. hildegardiana* Morillo (Venezuela), *M. pakaraimensis* Krings (Guyana), and, very rarely, *M. stenopetala* (northern South America). The new species are described and distinguished below. Corona morphological terminology follows Liede and Kunze (1993), although it is recognized that additional work may be needed to clarify issues of family-wide homology (see Endress and Bruyns 2000, Livshultz 2003). Shorthand abbreviations for corona morphology following Liede and Kunze (1993) are as follows: Ca = annular corona of corolline derivation (faucal annulus); Ci = interstaminal corona; C(is) = fused interstaminal and staminal corona; Cs = staminal corona.

Data resources

The data underpinning the analysis reported in this paper are deposited at GBIF, the Global Biodiversity Information Facility, http://ipt.pensoft.net/ipt/resource.do?r=two_new_species_in_the_matelea_stenopetala_complex_from_the_guiana_shield_and_amazonian_brazil

Taxonomic treatment

Key to the adaxially-pubescent-flowered members of the *Matelea stenopetala* complex

1 Abaxial corolla surface conspicuously pubescent, trichomes predominantly eglandular, glandular capitate trichomes absent or sparse and inconspicuous **2**

– Abaxial corolla surface glabrous or minutely and indistinctly pubescent, trichomes primarily glandular capitate, eglandular trichomes absent or rare ... **3**

2 Leaf bases broadly cuneate to rounded; pedicels with only glandular capitate trichomes ubiquitous, eglandular trichomes not ubiquitous, instead in two lines, ca. 0.3 mm long; corolla rose, lobes 4.1–4.2 mm long; Figs. 1A, 2A, 3A, 4B, 6 ..... ***Matelea trichopedicellata***

– Leaf bases attenuate to narrowly cuneate; pedicels with both glandular capitate and eglandular trichomes ubiquitous, eglandular trichomes to 0.07 mm long; corolla green, lobes 4.9–5.5 mm long; Figs. 1B, 2B, 3B ..... ***Matelea hildegardiana***

3 Corolla purplish; C(is) not distinctly raised off the corolla surface by a subtending stipe; Figs. 1C, 2C ..... ***Matelea pakaraimensis***

– Corolla green, greenish-yellow, yellow, or cream; C(is) distinctly raised off the corolla surface by a subtending stipe **4**

4 Open flowers per inflorescence usually 1(–2); peduncles 1.9–10.0 (–16.0) mm [avg. 7 mm]; calyx green, sometimes purplish; stipe subtending C(is) 0.12–0.22 mm [avg. 0.17 mm] tall; Figs. 1D, 2D, 3C, 4A, 5..... ***Matelea brevistipitata***

– Open flowers per inflorescence usually (2–) 3–4 (–5); peduncles (4–) 8–26 mm [avg. 15 mm]; calyx frequently purple, sometimes black or brown; stipe subtending C(is) 0.3–0.55 mm tall [avg. 0.37 mm]; Figs. 1E & F, 2 E & F, 3D ..... ***Matelea stenopetala***

Matelea brevistipitata **Krings & Morillo, sp. nov.**
urn:lsid:ipni.org:names:77122392-1
http://species-id.net/wiki/Matelea_brevistipitata
Figures 1D, 2D, 3C, 4A, 5

A new species in the Matelea stenopetala complex, most similar to M. stenopetala, but differing in part by inflorescences with fewer flowers open at a time (usually 1(–2) vs. (2–) 3–4 (–5) in M. stenopetala), shorter peduncles (avg. 7 mm vs. avg. 15 mm in M. stenopetala), and stipe subtending the C(is) 0.12–0.22 mm [avg. 0.17 mm] tall (vs. 0.3–0.55 mm tall [avg. 0.37 mm] in M. stenopetala].

Type. VENEZUELA. BOLÍVAR: Cerro Guaiquinima, Base Camp (Camp 7) along the Río Canapo, tropical lowland evergreen forest, near river, 5°N, 63°W, 310 m, 3 Feb 1990 (fl), *B. Boom 9318* (Holotype: VEN!; Isotype: NY!).

Description. *Slender, woody vine*. *Stems* glabrescent to moderately pubescent, pubescence in two lines, eglandular trichomes retrorse or spreading, of different size classes, largest ca. 0.5 mm long, smallest ca. 0.08 mm long, glandular capitate trichomes sparse to moderately dense, spreading, ca. 0.1 mm long. *Leaf* blades lanceolate, ovate, elliptic, oblong, obovate, or oblanceolate, 5.2–11.5 × 1.1–5.2 cm, with 5–7 pairs of lateral veins, adaxial surface glabrous, midvein glabrous to moderately pubescent, eglandular trichomes spreading, ca. 0.3 mm long, glandular capitate trichomes spreading, ca. 0.1 mm long, abaxial surface glabrous, midvein glabrous or sparsely pubescent, eglandular trichomes spreading, ca. 0.3 mm long, glandular capitate trichomes spreading, ca. 0.1 mm long, apices acuminate, bases cuneate to rounded, margins entire, colleters 3–4, lanceolate, 0.4–0.6 mm long; petioles 0.7–3.0 cm long, moderately pubescent, eglandular trichomes ubiquitous but most dense along adaxial ridge, spreading to antrorse, 0.4–0.5 mm long, glandular capitate trichomes ubiquitous, spreading, ca. 0.05 mm long. *Inflorescence* racemiform, 3–5-flowered (1(–2) flowers open at a time); peduncles 1.9–10 (–16) mm, sparsely to moderately pubescent, pubescence ubiquitous, eglandular trichomes rare, spreading or antrorse, ca. 0.2–0.25 mm long, glandular capitate trichomes spreading, ca. 0.1 mm long; pedicels 6.3–15.0 mm long, sparsely to moderately pubescent, pubescence ubiquitous, eglandular trichomes rare,

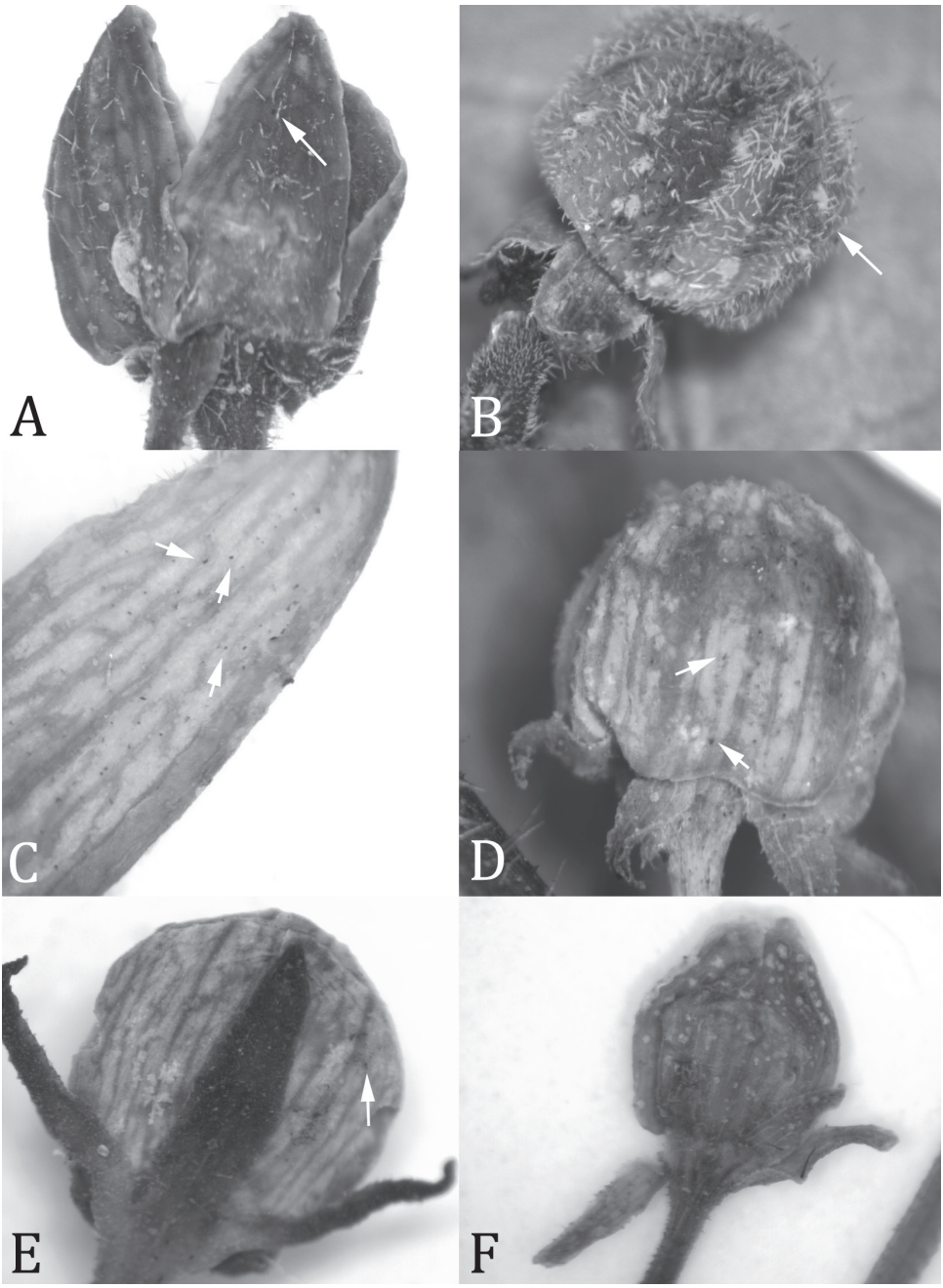

Figure 1. Abaxial corolla surface in the adaxially-pubescent-flowered members of the *Matelea stenopetala* complex. **A** *M. trichopedicellata* (based on *Daly et al. 1619*, US) **B** *M. hildegardiana* (based on *Liesner 23469*, U) **C** *M. pakaraimensis* (based on *Mutchnik 122*, US) **D** *M. brevistipitata* (based on *Boom 9318*, VEN) **E** *Matelea stenotepala* (based on *Ek et al. 881*, U) **F** *M. stenopetala* (based on *Mori et al. 24547*, US); Note difference in pubescence type between **A–B** (eglandular trichomes shown at arrows) and **C–F** (glandular capitate trichomes shown at arrows).

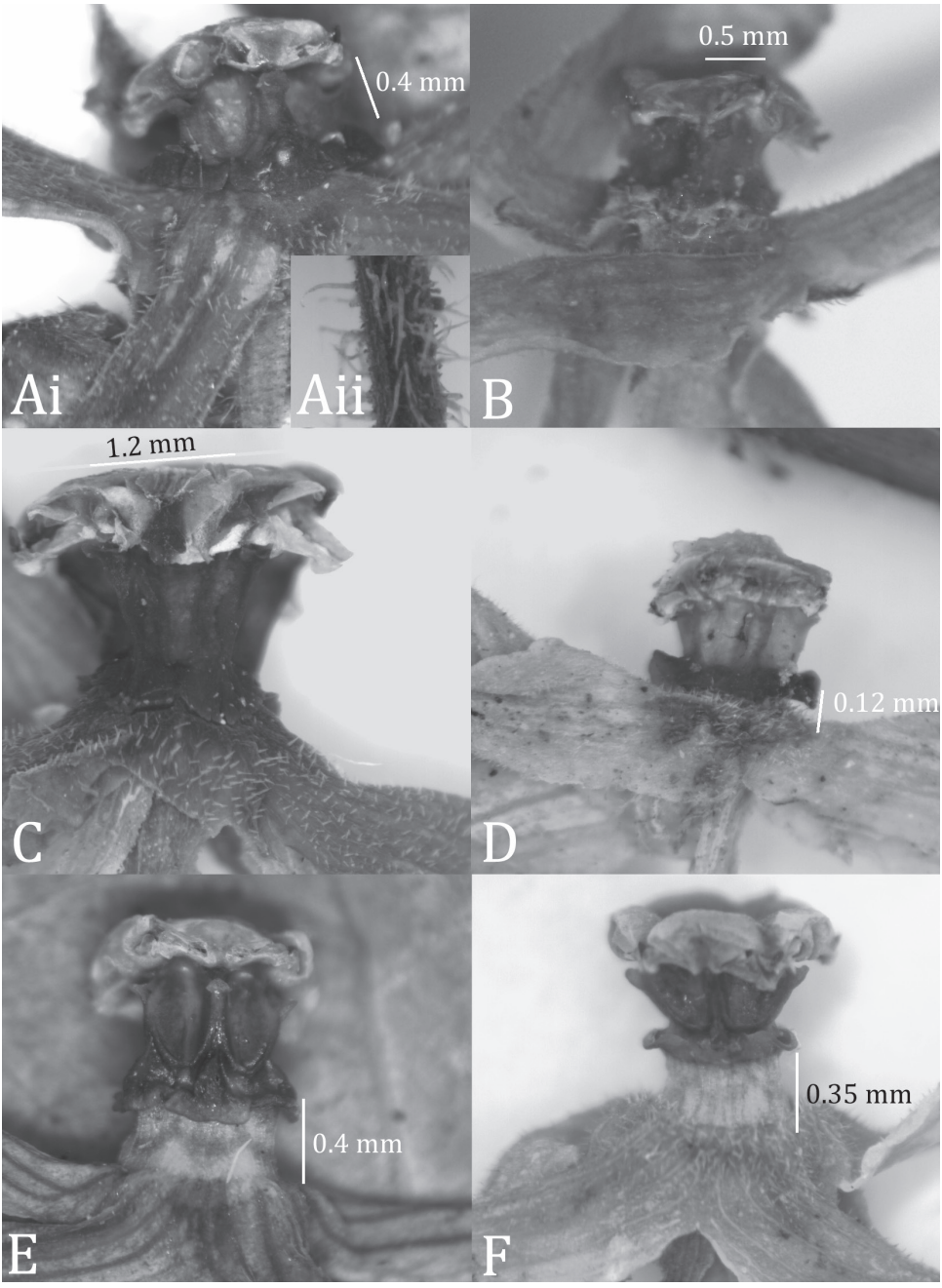

Figure 2. Gynostegial variation in the adaxially-pubescent-flowered members of the *Matelea stenopetala* complex. **A** *M. trichopedicellata*: i, flower, ii, coarsely pubescent pedicel, trichomes ca. 0.3 mm long (based on *Daly et al. 1619*, US) **B** *M. hildegardiana* (based on *Davidse 4903*, U) **C** *M. pakaraimensis* (based on *Mutchnik 122*, US) **D** *M. brevistipitata* (based on *Boom 9318*, VEN) **E** *Matelea stenotepala* (based on *Ek et al. 881*, U) **F** *M. stenopetala* (based on *Mori et al. 24547*, US). Note coronas at base of gynostegial columns sessile in A–C and raised off the surface of the corolla by a subtending stipe in **D–F**.

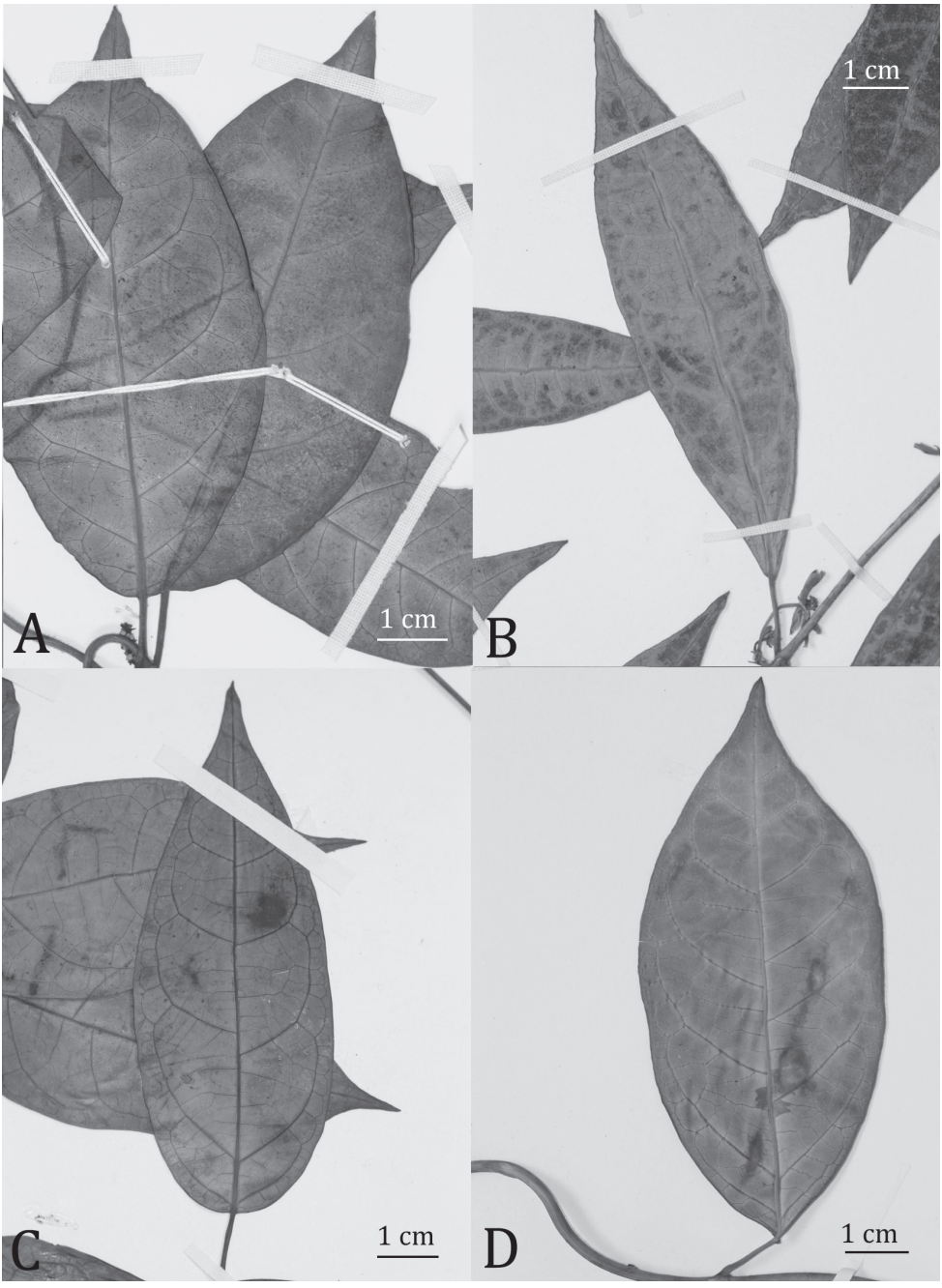

Figure 3. Foliar variation in some adaxially-pubescent-flowered members of the *Matelea stenopetala* complex. **A** *M. trichopedicellata* (based on *Daly et al. 1619*, US) **B** *M. hildegardiana* (based on *Davidse 4903*, US) **C** *M. brevistipitata* (based on *Boom 9318*, VEN) **D** *Matelea stenotepala* (based on *Ek et al. 881*, U).

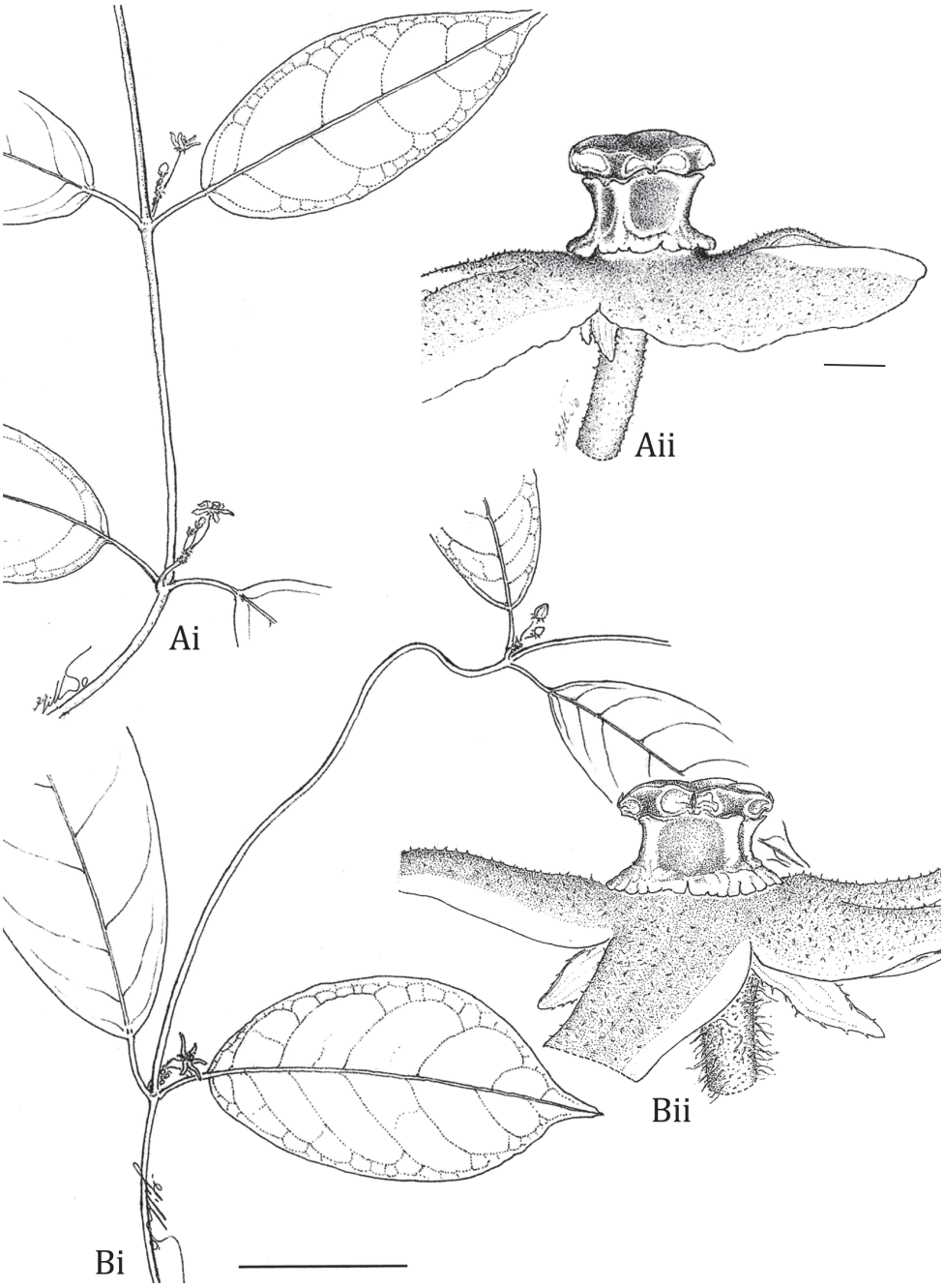

Figure 4. Illustration of the leaves, inflorescences, and flowers of *Matelea brevistipitata* and *M. trichopedicellata*. **A** *M. brevistipitata* (based on *B. Stergios 12315*, NY) **B** *M. trichopedicellata* (based on *Daly et al. 1619*, US). Scale bars are 4 cm (Ai & Bi) and 0.4 mm (Aii & Bii).

Figure 5. Isotype of *Matelea brevistipitata* (*Boom 9318*, NY). Courtesy of the New York Botanical Garden.

spreading or antrorse, ca. 0.1 mm long, glandular capitate trichomes spreading, ca. 0.05 mm long. *Calyx* lobes linear to lanceolate, 1.1–2.0 × 0.25–0.45 mm, strongly reflexed, adaxial surface glabrous, abaxial surface sparsely to moderately pubescent, eglandular trichomes spreading or antrorse, ca. 0.3 mm, glandular capitate trichomes spreading, 0.03–0.05 mm long, apices obtuse, margins entire; colleters 1 per sinus, lanceolate, ca. 0.2 mm tall. *Corolla* green, greenish-yellow, or greenish-white (fide collectoris), subcampanulate at base, tube ca. 0.5–0.7 × 0.8–0.9 mm, lobes imbricate in bud, lanceolate to oblong, apparently spreading, 3.0–4.1 × 1.7–1.9 (–2.2) mm, not ocellate, adaxial surface pubescent, eglandular trichomes spreading, ca. 0.05–0.1 mm long, glandular-capitate trichomes absent, abaxial surface sparsely pubescent, eglandular trichomes rare, ca. 0.07 mm long, glandular capitate trichomes spreading, ca. 0.03 mm long, apices obtuse, margins entire. *Faucal annulus* (corolline corona or Ca) absent. *Gynostegial corona* of fused staminal (Cs) and interstaminal (Ci) parts, C(is) subtended by a short stipe, stipe 0.12–0.22 mm tall, Cs rising to meet the lower portion of the anther, rising segment at a distinctly acute angle relative to the base, 0.6–0.66 mm tall, margin entire, base somewhat swollen, entire or crenulate-lobate, ligule an apical ridge, not free, Ci unlobed, not ligulate. *Style-head* 1.2–1.4 (–1.7) mm diam, stipe 0.9–1.1 mm tall (incl. section subtending the C(is)), terminal style-head appendage absent. *Pollinarium*: corpuscula ca. 0.12–0.17 mm long, caudicles present, pollinia oblong, 0.36–0.4 × 0.15–0.25 mm. *Follicles* unknown. *Seeds* unknown.

Distribution. *Matelea brevistipitata* is apparently endemic to the Guiana Shield in the Venezuelan states of Amazonas and Bolívar. It is very likely also present in the portion of Amazonian Brazil bordering those states. The distributions of *M. brevistipitata* and *M. stenopetala* appear to be largely parapatric. Both species occur in Bolívar (Venezuela), but this represents the easternmost edge of the range of *M. brevistipitata* and the westernmost edge of the range of *M. stenopetala*.

Ecology. Known from swamp and riverine forests at low elevations, to 500 m.

Phenology. Collected in flower in April, May, October, and November.

Etymology. The specific epithet refers to the short stipe subtending the C(is).

Conservation status. Currently, very little is known regarding the status of this species.

Discussion. At a glance, *Matelea brevistipitata* can be distinguished from *M. stenopetala* by the few-flowered inflorescences, suggesting divergence in reproductive biology. *Matelea stenopetala* usually displays inflorescences with 3–4 open flowers, whereas *M. brevistipitata* displays inflorescences with only one open flower (rarely two) at a time. The floral display itself also differs between the two species. Although both exhibit calyx lobes strongly reflexed at anthesis, the lobes of *M. stenopetala* tend to be purple (sometimes also black or brown), presenting a striking contrast to the light colored corolla. In *M. brevistipitata*, in contrast, the calyx is usually green (frequently drying an olive green). While the adaxial corolla surface is pubescent in *M. brevistipitata*, it is only very rarely so in *M. stenopetala*. In fact, the vast majority of specimens of *M. stenopetala* seen exhibit corollas adaxially glabrous. It is worth noting that the rare exception (i.e., *Mori 24547*, US) otherwise exhibits character states typical of *M. stenopetala*, including long peduncles (13–16 mm),

inflorescences with up to five flowers open at a time, and long stipes subtending the C(is) (0.35 mm; Fig. 2F).

Specimens examined. Venezuela: **Amazonas**. Camino entre caño Gruya y el pueblo de Gruya, bosque higrófilo macrotérmico ligeramente alterado en la margen del río Orinoco, 100 m, 8 Apr 1978 (fl), *G. Morillo 7382* (VEN); Dept. Atabapo, Salto Yureba, Caño Yureba, Bajo Ventuari, 4°3'N, 66°1'W, 120–150 m, 24 Oct–4 Nov 1981 (fl), *F. Delascio & F. Guánchez 10968* (MER,VEN); Dept. Atures, carretera Pto. Ayachucho-Samariapo, selva húmeda caliente, 13 Jan 1982 (fl), *B. Stergios 3183* (VEN); Dept. Río Negro, between Río Marawinuma at base of Neblina (0°50'N, 66°9'W) and Río Baría, in swamp forest, a heavily overgrown series of small channels with black water, 8 May 1984 (fl), *W.W. Thomas, A. Gentry & B. Stein 3401* (VEN, NY). **Bolívar**. Dept. Roscio, El Abismo, al norte del río Icabarú, bosque húmedo macrotérmico, 500 m, Oct 1985 (fl), *F. Delascio 12503* (VEN); Expedición Proyecto I.R.N.R.S. a la cuenca alta del Río Caura (Hoja NB-20-14), selvas ribereñas del Caño El Pavo hasta arriba de la boca del Caño Maravene, 4°16'N, 64°9'W, 13–14 Apr 1988 (fl), *B. Stergios 12315* (NY, US, VEN); Dist. Piar, Río Aparamán, at rapids of Yuraymerú, tributary of Río Acanan, SW base of Amaruay-tepui, E of Auyan-tepui, W of Aparaman-tepui, small tributary or river, densely forested with trees 20–30 m high, 5°55'N, 62°15'W, 500 m, 21 Apr 1986 (fl), *B. Holst & R. Liesner 2661* (VEN, MO).

Matelea trichopedicellata **Krings & Morillo, sp. nov.**
urn:lsid:ipni.org:names:77122393-1
http://species-id.net/wiki/Matelea_trichopedicellata
Figures 1A, 2A, 3A, 4B, 6

A new species in the Matelea stenopetala complex, most similar to M. hildegardiana, but differing in part by leaf bases broadly cuneate to rounded (vs. attenuate to narrowly cuneate in M. hildegardiana), pedicels coarsely pubescent, with only glandular capitate trichomes ubiquitous, eglandular trichomes not ubiquitous, rather in two lines, ca. 0.3 mm long (vs. both glandular capitate and eglandular trichomes ubiquitous, eglandular trichomes to 0.07 mm long in M. hildegardiana), and corollas rose, lobes 4.1–4.2 mm long (vs. corolla green, lobes 4.9–5.5 mm long in M. hildegardiana).

Type. BRAZIL. PARÁ: Rio Tocantins near Igarapé Cajazeirinha, approx. 30 km N of Itupiranga, 4°1'S, 49°21W, 1 Dec 1981 (fl & fr), *D.C. Daly, R. Callejas, M.G. da Silva, E.L. Taylor, C. Rosario, & M.R. dos Santos 1619* (Holotype: NY!; Isotype: US!, MG, n.v., MO, n.v.).

Description. *Slender, woody vine*. *Stems* moderately to densely pubescent, pubescence in two lines, eglandular trichomes coarse, retrorse, ca. 0. 4 mm long, glandular capitate trichomes sparse, spreading, ca. 0.05 mm long. *Leaf* blades narrowly to broadly elliptic, 5.7–7.8 × 2.0–4.5 cm, with 5–8 pairs of lateral veins, adaxial surface

Figure 6. Holotype of *Matelea trichopedicellata* (*Daly et al. 1619*, NY). Courtesy of the New York Botanical Garden.

glabrous, midvein glabrous or pubescent, eglandular trichomes antrorse or spreading, ca. 0.3 mm long, glandular capitate trichomes spreading, ca. 0.05–0.07 mm long, abaxial surface glabrous, midvein glabrous or pubescent, eglandular trichomes antrorse or spreading, ca. 0.3 mm long, glandular capitate trichomes spreading, ca. 0.05-0.07 mm long, apices acuminate, bases broadly cuneate to rounded, margins entire, colleters 2–4, lanceolate, 0.3–0.4 mm long; petioles 0.9–1.3 cm long, moderately pubescent, pubescence ubiquitous, eglandular trichomes mostly restricted to the adaxial ridge, spreading to antrorse-spreading, ca. 0.4 mm long, glandular capitate trichomes spreading, 0.05–0.07 mm long. *Inflorescence* racemiform, apparently 1–2-flowered (1 flower open at a time); peduncles to 2.4 mm long, moderately pubescent, pubescence ubiquitous, eglandular trichomes antrorse or spreading, 0.2–0.25 mm long, glandular capitate trichomes spreading, 0.05–0.07 mm long; pedicels 4.4–5.2 mm long, moderately to densely pubescent, eglandular trichomes in two lines, spreading, ca. 0.3 mm long, glandular capitate trichomes ubiquitous, spreading, ca. 0.05–0.07 mm long. *Calyx* lobes lanceolate, reflexed or spreading, 1.4–1.7 × 0.4–0.6 mm, adaxial surface glabrous, abaxial surface moderately to densely pubescent, eglandular trichomes antrorse or spreading, ca. 0.18 mm long, glandular capitate trichomes absent or very sparse, spreading when present, ca. 0.06 mm long, apices obtuse, margins entire; colleters 1 per sinus, lanceolate, ca. 0.18 mm tall. *Corolla* rose (fide collectoris), subcampanulate at base, tube ca. 0.9 × 0.9 mm, lobes imbricate in bud, linear-lanceolate to oblong, spreading, 4.1–4.2 × 1.9–2.0 mm, not ocellate, marginally or laterally recurved, adaxial surface pubescent, eglandular trichomes spreading, ca. 0.06–0.08 mm long, glandular-capitate trichomes absent, abaxial surface moderately pubescent, eglandular trichomes antrorse, 0.15–0.18 mm long, glandular capitate trichomes absent or very sparse, spreading when present, 0.03–0.04 mm long, apices obtuse, margins entire. *Faucal annulus* (corolline corona or Ca) absent. *Gynostegial corona* of fused staminal (Cs) and interstaminal (Ci) parts, C(is) on the surface of the corolla lobes, not subtended by a stipe, margin crenulate-lobate, Cs rising to meet the lower portion of the anther, rising segment more or less perpendicular relative to the base, ca. 0.4 mm tall, margin entire, base somewhat swollen, crenulate-lobate, ligule an apical ridge, not free, Ci unlobed, not ligulate. *Style-head* 1.6–1.7 mm diam, stipe 0.45–0.65 mm tall, terminal style-head appendage absent. *Pollinarium*: corpuscula ca. 0.18 mm long, caudicles present, pollinia narrowly ovoid, ca. 0.45 × 0.2 mm. *Follicles* ovoid-fusiform (imm), ca. 6 x 1.3 cm. *Seeds* unknown.

Distribution. Known only from the type, collected in the Brazilian Amazon, near Igarapé Cajazeirinha.

Ecology. Currently known only from terra firme forest.

Phenology. Collected in flower and fruit (imm) in December.

Etymology. The specific epithet refers to the conspicuously pubescent pedicels.

Conservation status. Currently, very little is known regarding the status of this species.

Discussion. *Matelea trichopedicellata* shares with *M. hildegardiana* (apparently endemic to the Gran Sabana, Bolívar, Venezuela), pubescent abaxial and adaxial corolla surfaces, but differs from it in part by leaf bases broadly cuneate to rounded and corolla

lobes rose, 4.1–4.2 mm long (leaf bases attenuate to narrowly cuneate, and corolla lobes green, 4.9–5.5 mm long in *M. hildegardiana*). *Matelea trichopedicellata* and *M. hildegardiana* both exhibit eglandular trichomes on the abaxial corolla lobe surface in which the lowest cell is usually filled with a green or dark substance. The upper cells of the trichomes are usually translucent.

Acknowledgments

We thank the following herbaria for providing specimen loans pertinent to this study: NY, U, US, and VEN. We also thank the kind staff of NY, US and VEN for their hospitality during our recent visits, and particularly Brian Boom, Doug Daly, Lucy Klebieko, and Edgardo Rivera for arranging scans of type specimens at NY.

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PhytoKeys 17: 41–62 (2012)
doi: 10.3897/phytokeys.17.3114
www.phytokeys.com

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Contribution to the taxonomy of *Garcinia* (Clusiaceae) in Africa, including two new species from Gabon and a key to the Lower Guinean species

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Academic editor: *W. John Kress* | Received 22 March 2012 | Accepted 12 October 2012 | Published 24 October 2012

Citation: Sosef MSM, Dauby G (2012) Contribution to the taxonomy of *Garcinia* (Clusiaceae) in Africa, including two new species from Gabon and a key to the Lower Guinean species. PhytoKeys 17: 41–62. doi: 10.3897/phytokeys.17.3114

Abstract

Garcinia has some 260 species and is often regarded as a genus with a difficult taxonomy. No recent treatment is available for the botanically rich Lower Guinea phytogeographical region. This study aims at partly filling this gap. First, several taxonomic problems are solved. *G. chromocarpa* is reduced to a variety of *G. quadrifaria*. *G. gnetoides* and *G. granulata* are both synonyms of *G. quadrifaria*. *G. zenkeri* is a synonym of *G. densivenia* and lectotypes are being designated for both names. *G. brevipedicellata* is a synonym of *G. afzelii*, as is *G. antidysenterica* for which a lectotype is designated. Second, two new species endemic to Gabon are described: *Garcinia gabonensis* Sosef & Dauby and *Garcinia obliqua* Sosef & Dauby. Finally, an identification key to all species present in the Lower Guinea region is provided. A few remaining West African species names could not be placed with certainty, because the type material was lost or not traced yet. One is a Rutaceae while the remaining three are provisionally to be regarded as synonyms of *G. smeathmannii*.

Keywords

Garcinia, Clusiaceae, Africa, Lower Guinea, Gabon, taxonomy

Introduction

The genus *Garcinia* L. is part of the family Clusiaceae which, in its present circumscription (Stevens 2007), is subdivided into two sub-families: *Kielmeyeroideae* Engl., which includes the African genera *Mammea, Endodesmia, Lebrunia* and *Calophyllum,* and *Clusioideae* Engl. with the African genera *Allanblackia, Garcinia, Pentadesma* and *Symphonia*. All but one of these genera (*Lebrunia*) are present in the Lower Guinea phytogeographical region (western Central Africa; White 1979). Unfortunately, the delimitation of the family and its subdivision have not settled down yet (Stevens 2007, Sweeney 2008, APG III 2009).

Most authors now agree upon a broad concept of *Garcinia*, including the former genera *Rheedia* L. and *Ochrocarpos* Thouars, as well as the small genera *Pentaphalangium* Warb. and *Tripetalum* Schumann. One might also merge the genus *Allanblackia* with *Garcinia* (Sweeney 2008, Ruhfel et al. 2011), because the first seems phylogenetically nested within the latter, although the support for that is not very strong yet. Moreover, even when the nested position of *Allanblackia* is confirmed by future studies, regarding the large morphological differences between the latter two genera and hence the comparatively long length of the branch leading to *Allanblackia*, it will be preferable to accept *Garcinia* as a natural though paraphyletic genus (Sosef 1997, Brummitt and Sosef 1998).

Amongst the African genera, *Garcinia* is characterized by the dioecism of its species and hence its unisexual flowers (or at least functionally so, see also Dunthorn (2004) for a study of the situation in *Mammea*), the presence of a foveola at the base of the petiole (an excavation with an extension resembling a ligule), the peltate stigma, the ovary with a single apical ovule per locule and the berry-like fruit.

Garcinia contains approximately 260 species which are mainly confined to the tropics (Jones 1980, Stevens 2007). Over the centuries, these have been accommodated into many sections, which have been reduced to a total of 14 in an unpublished thesis by Jones (1980). Her view has been largely confirmed by recent molecular work (Sweeney 2008). In Africa, including Madagascar, representatives of six of these sections can be found.

In Lower Guinea (roughly comprising the forested regions in Cameroon, Equatorial Guinea, Gabon, the south-west of the Republic of the Congo, Cabinda (Angola) and the southwest of the Democratic Republic of the Congo; White 1979), and in fact in the whole of the African rain forest region, *Garcinia* spp. form an important component of the lower strata of dense lowland to submontane rain forests, where they often occur gregariously (Achoundong 1995, Guedje et al. 2002, Thomas et al. 2003, Sosef et al. 2004, Senterre 2005, Gonmadje et al. 2011, Dauby 2012). In Central Africa, some species are also well-known among local populations due to their various medicinal properties (Guedje and Fankap 2001, and see the PROTA website at http://www.protaafrica.org).

The presence of high numbers of sympatric *Garcinia* species in almost every tropical region (Ashton 1988, Sweeney 2008) may well have led to a situation where the

genus received comparatively little attention from taxonomists because of its supposed complexity. This has resulted in an unsatisfying situation where taxonomic treatments have often only been focussing on a particular region (in Floras for example) and as a result contain various contradictions and errors. This obviously further feeding the idea that *Garcinia* is a complex and 'difficult' genus. Plant collectors, but also foresters, ecologists, etc., are often satisfied when they have concluded that their specimen belongs to the genus *Garcinia* and when they try to identify their material down to an individual species, they are bound to make many errors due to the unresolved taxonomic backbone.

In tropical Africa, the Clusiaceae (often in their old concept of Guttiferae) have been treated for West Africa (Hutchinson et al. 1954), the Congo Basin region (Bamps 1970a), East Africa (Bamps et al. 1978), and the Zambesian region (Robson 1960). However, no treatment exists yet for the notoriously richest Lower Guinean region (Sosef 1996, Küper et al. 2004). Many West African species extend their range to the east into Lower Guinea while many East and Central African ones do so to the west. Combined with a comparatively high local endemism in Lower Guinea, possibly caused by the presence of Pleistocene rain forest refugia (Sosef 1994, 1996, Linder 2001), this area counts as a diversity hotspot for many angiosperm families (Beentje et al. 1994, Barthlott et al. 1996, Küper et al. 2004, Linder et al. 2005). Besides that, it is also the region where taxonomic views and treatments of 'West' and 'East' meet and not seldom appear to disagree. During the preparation of a treatment of the Clusiaceae for the revitalized Flore du Gabon (Sosef and Florence 2007), several of these taxonomic 'problems' within *Garcinia* were tackled, and it was decided to slightly broaden the scope of that study. The resulting present article clarifies the confusing taxonomy amongst several African members of the sections *Xanthochymus* (Roxb.) Pierre and *Tagmanthera* Pierre, describes two interesting new species from Gabon, provides an identification key to the *Garcinia*'s within the high diversity region of Lower Guinea, and hopes to draw attention to the need of more elaborate taxonomic studies in *Garcinia*.

Materials and methods

The authors studied the available *Garcinia* material in BM, BR, BRLU, K, L, LBV, MO, P and WAG (herbarium abbreviations follow Index Herbariorum, http://sweetgum.nybg.org/ih). Additional material was consulted through the JSTOR Plant Science website (http://plants.jstor.org). In 2008 and 2009, during tree plot inventories and general collecting undertaken in Gabon, the second author collected numerous *Garcinia* specimens and made many useful field observations.

The conservation status of the two new species was assessed using the IUCN (2001) category criteria. Extent of occurrence and area of occupancy were estimated using Arcview 3.3 and Conservation assessment tools (Moat 2007).

The *Garcinia quadrifaria* complex

On the correct authors of the name *Garcinia quadrifaria*

The species now known as *Garcinia quadrifaria* was first described by Oliver (1868: 168) as *Xanthochymus ? quadrifarius*. It was transferred to *Garcinia* by Pierre (1883: 4) who seems to credit Baillon (1877: 404) for the name and also cites Oliver (1868: 168). Many sources (including IPNI, (http://www.ipni.org), Tropicos (http://www.tropicos.org), etc.) refer to *G. quadrifaria* with Baill. or Baill. ex Pierre as the authors of this combination. Actually, Baillon (1877) only states that *Xanthochymus* should be united with *Garcinia*, and refers to Oliver (1868), but does not make any new combinations. Therefore, the correct author combination for *G. quadrifaria* is (Oliv.) Pierre.

On the distinction between *G. quadrifaria* and related species

The species *G. quadrifaria* belongs to the section *Xanthochymus*, characterized mainly by having staminal bundles with filaments only partly fused and globose anthers (Jones 1980). *G. quadrifaria* shows several quite striking characters. Most obvious are the quadrangular and narrowly though distinctly winged twigs, the usually terminal inflorescence composed of a simple and short rachis set by 4 rows of overlapping scale-like bracts (somewhat reminiscent of an inflorescence of a *Gnetum* species), the 5-merous flowers, a fruit with a verrucose exocarp and white latex. It shares these features with the following, until recently still recognized, species: *G. chromocarpa* Engl., *G. gnetoides* Hutch. & Dalziel, *G. granulata* Hutch. & Dalziel and *G. le-testui* Pellegr. In the past, two more species names, *G. parva* Spirlet and *G. echirensis* Pellegr., have been treated as synonyms of *G. chromocarpa* (Bamps, 1970a, 1970b).

After careful examination of the characters of *G. quadrifaria* and *G. chromocarpa*, we have come to the conclusion that the only distinction between the two is the minute puberulence on the bracts, pedicels and fruits of *G. chromocarpa*, where those of *G. quadrifaria* are glabrous. Although at first glance there might be a geographical distinction, *G. chromocarpa* in the Congo Basin, west to Gabon and Cameroun (Bamps 1970c), and *G. quadrifaria* in W.-Africa east to Cameroon and Gabon, this could not be upheld because of the presence of true *G. quadrifaria* in eastern DR Congo (North Kivu: Léonard 2337; Kivu: Gutzwiller 1868) and true *G. chromocarpa* in Ivory Coast (Breteler 6126, J.J. de Wilde & Leeuwenberg 3442). Also, when studying the literature (Engler 1908, Pellegrin 1959, Bamps 1970a, 1970b) one might conclude that *G. chromocarpa* has 3-locular ovaries and 3-lobed stigmas, while *G. quadrifaria* would have 2-locular ones bearing 2-lobed stigmas. Although indeed all true (glabrous) *G. quadrifaria* specimens studied had 2-lobed stigmas, various true (puberulent) *G. chromocarpa* ones with 2-lobed stigmas (D.W.Thomas 4874, Walters & Niangadouma 1264, White 767 and others) were observed. Finally, from the literature it seems that flowers of *G. chromocarpa* may have shorter pedicels than those of *G. quadrifaria*. Again, after proper examination of all the material available this turns out to be incorrect.

We therefore conclude that since the differences between the two taxa are minimal, they cannot be upheld as different species. We do, however, want to distinguish them, and the level of variety seems most appropriate since there is no geographical separation. Because the name *G. quadrifaria* has priority over *G. chromocarpa*, this leads to the following new combination:

***Garcinia quadrifaria* (Oliv.) Pierre var. *chromocarpa* (Engl.) Sosef & Dauby, comb. nov.**
urn:lsid:ipni.org:names:77122646-1

Basionym : *Garcinia chromocarpa* Engl., Bot. Jahrb. Syst. 40: 561 (1908).
Heterotypic synonyms:
Garcinia echirensis Pellegr., Bull. Soc. Bot. France 106 : 225 (1959).
Garcinia parva Spirlet, Bull. Jard. Bot. État Bruxelles 29 : 326 (1959).

Subsequently, we have studied the West-African species *G. gnetoides* Hutch. & Dalziel. The type material at K, Chevalier 15157, consists of a plant carrying terminal inflorescences with a dense mass of many racemes composed of a short rachis with closely set bracts which are glabrous. In *G. quadrifaria* each raceme normally appears solitary. An old note attached to the type already states it might well be a galled inflorescence, because a larva was observed inside. Hutchinson and Dalziel are well aware of its potentially diseased nature which shows from their remark in the Flora of West tropical Africa (Hutchinson and Dalziel 1927). However, in their more elaborate 1928 publication they do not mention the galled inflorescence. They cite two other specimens apart from the type (Chevalier 15620 and Vigne 222) and these have normal, solitary racemes. Besides that, they cite *Xanthochymus quadrifarius* A.Chev. non Oliv. as belonging here. So, they were aware of the fact that this plant had some relation to that species, transferred to *Garcinia* by Pierre in 1883 (see above). Their plants had no fruits. In the same 1928 publication they describe another new species, *G. granulata*, citing a single specimen, Unwin & Smythe 58, that bears only fruits which are verrucose and glabrous.

After careful examination of all material at hand, we cannot conclude otherwise than that both *G. gnetoides* and *G. granulata* represent the same species known to us as *G. quadrifaria* and thus are synonyms of the latter. The fact that the first two are in fact synonymous was already concluded by Hawthorne and Jongkind (2006).

Some sources cite the publication of the names *G. gnetoides* and *G. granulata* in Kew Bulletin (Hutchinson and Dalziel 1928) as the place of valid publication, and not that of one year earlier in the Flora of West tropical Africa (Hutchinson and Dalziel 1927). In the latter publication the authors indeed seem to indicate the names will be formally published later on by adding "ined.", meaning *ineditus* (unpublished), behind "Kew Bull.". However, this does not render their 1927 publication invalid. Article 34.1b of the Code (McNeill et al. 2006) does not apply, because they do accept the taxa.

So, in conclusion, the new situation is as follows:

Garcinia quadrifaria* (Oliv.) Pierre var. *quadrifaria

Heterotypic synonyms:
Garcinia gnetoides Hutch. & Dalziel, Fl. West trop. Afr. ed. 1, 1(1): 236 (1927), **syn. nov.**
Garcinia granulata Hutch. & Dalziel, Fl. West trop. Afr. ed. 1, 1(1): 236 (1927), **syn. nov.**

Finally, *G. le-testui*, a rare species endemic to southern Cameroon and Gabon, seems sufficiently distinct from *G. quadrifaria* being larger in most parts (notably wider wings on the twigs, larger leaves, longer pedicels, etc.). Most differences being related to size, it would not be surprising if *G. le-testui* turns out to be a polyploid of *G. quadrifaria.*

On the status of *G. densivenia* and *G. zenkeri*

Two more species of the section *Xanthochymus* were described by Engler (1908): *G. densivenia* and *G. zenkeri*. The first was based on two collections from Cameroon: Zenker 2397 (with flowers) and Zenker 2547 (with fruits). The angular twigs and coriaceous leaves are reminiscent of *G. quadrifaria.* However, the fruit wall is smooth (not verrucose) and the inflorescence is both terminal and axillary and composed of bundles of very short racemes (up to 10 mm). Occasionally the inflorescence is composed of a branched raceme. In our view, this renders the taxon sufficiently distinct to recognize it at species level. To date, no lectotype has been chosen from among the two syntypes, and because the fruit character is the most striking distinction, the best choice would be Zenker 2547. With the duplicate at B lost, we propose to select the duplicate at G, which seems to have the finest fruits, as the lectotype.

G. zenkeri was also based on two Zenker collections from Cameroon: Zenker 1120 (with flowers) and Zenker 3247 (with fruits). According to the African Plants Database (http://www.ville-ge.ch/musinfo/bd/cjb/africa), *G. zenkeri* would be a synonym of *G. quadrifaria*. This view is probably based upon Pellegrin (1959), who only cites the first syntype. Studying material of both syntype collections (especially the first with numerous duplicates in various herbaria), we indeed confirm the presence of angular twigs and coriaceous leaves which point to *G. quadrifaria.* However, we also observe the presence of inflorescences composed of bundles of short racemes, often axillarily positioned, just as in *G. densivenia*. The only duplicate of Zenker 3247 (the syntype with fruits) available to us is sterile, and so we were unable to verify whether the fruit wall is smooth as in *G. densivenia*. On the other hand, Engler l.c. does not mention a verrucose structure of the fruit wall, a feature we believe he would certainly not have missed. We therefore render it most likely that the fruit he observed had a smooth wall. In all, we conclude that *G. zenkeri* and *G. densivenia* are synonyms. Both being published in the same publication, we may choose one of the names as being the valid one, and we have picked *G. densivenia* because the type material is better, showing all diagnostic features. *G. zenkeri* also needs a lectotypification, for which we have taken Zenker 1120. Although all duplicates we have seen lack flowers, it is by far the most

widely distributed collection. Since, again, the material at B was lost and that at G seems the best among the remaining duplicates available, we have chosen that to be the lectotype. The above leads to the following situation:

***Garcinia densivenia* Engl.**, Bot. Jahrb. Syst. 40: 563 (1908). − LECTOTYPE (designated here): CAMEROON. Bipinde, Urwaltgebiet, 1903. Zenker 2547 (G!, barcode G00018874; isotype BR!, GOET!, K!, M!, P!, WAG!).

Heterotypic synonym:
Garcinia zenkeri Engl., Bot. Jahrb. Syst. 40: 566 (1908), **syn. nov.** − LECTOTYPE (designated here): CAMEROON: Bipinde, Urwaltgebiet, 1896, Zenker 1120 (G!, barcode G00018871; isotype BM!, GOET!, K!, M!, P!, S!, WAG!).

The material now identified as *G. densivenia,* shows a remarkable variation in the distinctiveness of the tertiary venation. In the type as well as the paratype collection this venation is indeed, as the name indicates, strikingly dense and prominent. However, in most of the remaining material we observed a large continuous variation towards leaves where the tertiary venation was even hardly visible. Because otherwise, the material is quite uniform, we assume this character to be highly variable within the species, and possibly also depending on the way in which the material was treated and dried after collecting.

A second remarkable variation was observed in the shape of the fruits. These can be subglobose to distinctly 5-lobed and 'pumpkin-like'. The lobed feature was even already mentioned by Engler in his protologue: "Baccae ….. leviter 5-lobae….." and "schwach 5 lappigen Früchte…..". However, again, we found no other characters to correlate with this feature. Moreover, the label of Bos 3639 specifically mentions that the shape of the fruits he collected are "globose to shallowly 5-lobed and resembling a pumpkin". We thus assume that these observations also illustrate within-species variation, and might be related to the number of seeds that develop within a single fruit.

The *Garcinia afzelii* complex

The section *Tragmanthera* is characterized by 4-merous flowers and staminal bundles that are completely fused carrying a row of ellipsoid anthers at their tip (Jones 1980). Four of its species, *G. afzelii* Engl., *G. brevipedicellata* (Bak.f.) Hutch. & Dalziel, *G. lujae* De Wild. and *G. mannii* Oliv., are closely related because they share a unique feature: the presence of anthers with locellate (septate) thecae. After studying the material, we noticed it is fairly easy to split it into two groups based on a leaf venation character: 1) *G. afzelii* and *G. brevipedicellata* having leaves with the lateral veins (3-)4-11 mm apart and gradually but distinctly curving up towards the margin and eventually running almost parallel to it, and 2) *G. lujae* and *G. mannii* with dense lateral veins, only 1-2(-3) mm apart, that run almost straight to the margin, or curving up just before it, where they join up in a blunt angle with an intramarginal vein running just inside of (at 0.5-1 mm) the actual margin.

Bamps (1970b) already noticed that the latter two species are very closely related. The only remaining differences we could find is the colour of the petals (red to deep orange or sometimes yellow in *G. mannii* and always yellow in *G. lujae*) and the length of the staminal bundles (as long as the pistillode in *G. mannii* and clearly overtopping the pistillode in *G. lujae*). Although these distinctions are weak, there is no geographical overlap between the two taxa, *G. lujae* in the Democratic Republic of the Congo and *G mannii* from southern Nigeria to Gabon, which made us decide to uphold them at species level, but further investigations are needed.

However, we could not find any clear difference between the remaining two species, *G. afzelii* and *G. brevipedicellata*. Hutchinson et al. (1954) give the density of the lateral veins (more dense in *G. afzelii*) as the only difference, but we have clearly observed this feature to be variable, even within a single specimen. Also, the name of *G. brevipedicellata* suggests it has short pedicels (although this taxon was originally described as a variety of *G. mannii* and so this would be a difference with that taxon), but again, those in *G. afzelii* are quite variable and we observed a continuous variation. Finally, there might be a difference in flower colour, since the petals of *G. afzellii* are reported to be yellow to pale green, while label data indicates the flowers of *G. brevipedicellata* are "yellow with a red centre". The latter observation is indeed correct, because the petals are yellow and the pistillode or ovary has an orange to red colour. Both species have staminal bundles that are longer than the ovary. So, none of the presumed diagnostic characters can be confirmed and we conclude that both names refer to the same species. Since *G. afzelii* is the older one, that is the accepted name for the taxon.

Finally, the status of the name *G. antidysenterica* A.Chev. is unclear. At present, it is regarded as a synonym of *G. afzelii* (Hutchinson et al. 1954, Pellegrin 1959, African Plants Database at http://www.ville-ge.ch/musinfo/bd/cjb/africa). The protologue text provides information on three collecting localities referring to Chevalier's own specimens: "entre Nze et Danané", "entre le Morénou et l'Indénie" and "bassin du moyen Comoé". No holotype is designated, but the protologue is accompanied by a photo of one of the sheets: Chevalier 21200, collected at "Danané", and so this seems to be the most logical choice for the lectotype. However, this collection (duplicates at P and K) turns out to be *G. epunctata* Stapf, as was already discovered by Bamps (1969: 364). While the protologue clearly states that the anthers have locellate thecae, those of *G. epunctata* and hence of Chevalier 21200 are not. Therefore, choosing the latter collection as the holotype should be avoided, following Article 9.17 of the Code (McNeils et al. 2006; lectotype in serious conflict with the protologue while other elements are available). Chevalier (1920) provides a list of specimens which according to him belong to *G. antidysenterica.* The only other collection that carries one of the remaining two localities, "vallée du Moyen-Comoé", is Chevalier 22571. Therefore, this seems the most obvious choice for the lectotype. It has at least three duplicates (BR, K (2x) and P) and the specimen at P should be regarded as the most original material. At least the BR and K duplicate carry an original label with the name *Garcinia antidysenterica* A.Chev. (The P material was seen at an early stage of the project, but due to the closure of the Paris herbarium the exact label data could not be checked.)

The above now leads to the following situation:

***Garcinia afzelii* Engl.**, Bot. Jahrb. Syst. 40: 570 (1908).

Heterotypic synonyms:
Garcinia antidysenterica A.Chev., Vég. ut. Afr. trop. franc. 6: 445, fig. 52 (1911). – LECTOTYPE (designated here): IVORY COAST: vallée du Moyen-Comoé, entre Yabrouakrou et Tingouéla, 13 décembre 1909, Chevalier 22571 (P!; isotype BR!, K!).
Garcinia mannii Oliv. var. *brevipedicellata* Bak.f., in Rendle *et al.*, Cat. pl. Oban : 8 (1913). – *Garcinia brevipedicellata* (Bak.f.) Hutch. & Dalziel, Fl. West trop. Afr., ed. 1, 1(1): 237 (1927), **syn. nov.**

Within the section *Tragmanthera* some taxonomic questions remain to be solved, for example the distinction between the non-locellate species such as *G. epunctata* Stapf and *G. preussii* Engl., and the status of several other names now regarded as their synonyms. For now, we maintain the present status quo, just signalizing the need for a more in-depth study.

Two new endemic *Garcinia* species from Gabon

During the preparation of the Clusiaceae treatment for Flore du Gabon, material belonging to two new species turned up. Both are endemic to this country that has a plant endemism rate of ca. 11% (Sosef et al. 2006). Gabon is notoriously rich in species (see above), especially its lowland rain forest is reputedly the most species-rich in tropical Africa (Breteler 1990, Linder et al. 2005, Reitsma 1988) and novelties are still regularly discovered (Bissiengou and Sosef 2008, Ntore et al. 2010, Walters et al. 2011).

***Garcinia obliqua* Sosef & Dauby**
urn:lsid:ipni.org:names:77122647-1
http://species-id.net/wiki/Garcinia_obliqua
Fig. 1

Diagnosis. Similar to *Garcinia smeathmannii* but leaves with 6–9 pairs of lateral veins, tertiary venation only slightly distinct above, petiole almost smooth, and fruits asymmetric with a coriaceous and ribbed skin.

Type. GABON: Ogooué-Ivindo, near Djidji, 5–10 km West of Koumémayong, 0°15'N, 11°50'E (DMS), 25-4-1988, Breteler 8993 (holotype WAG!; isotype BR!, K!, LBV!, MO!, P!).

Description. Dioecious tree; bole up to 35 cm dbh; twigs round to slightly angular in cross section; latex transparent or yellow. *Leaves* opposite; petiole (0.8–)1–1.5(–2) cm long, smooth or slightly transversely wrinkled, with a distinct foveola of up to 3

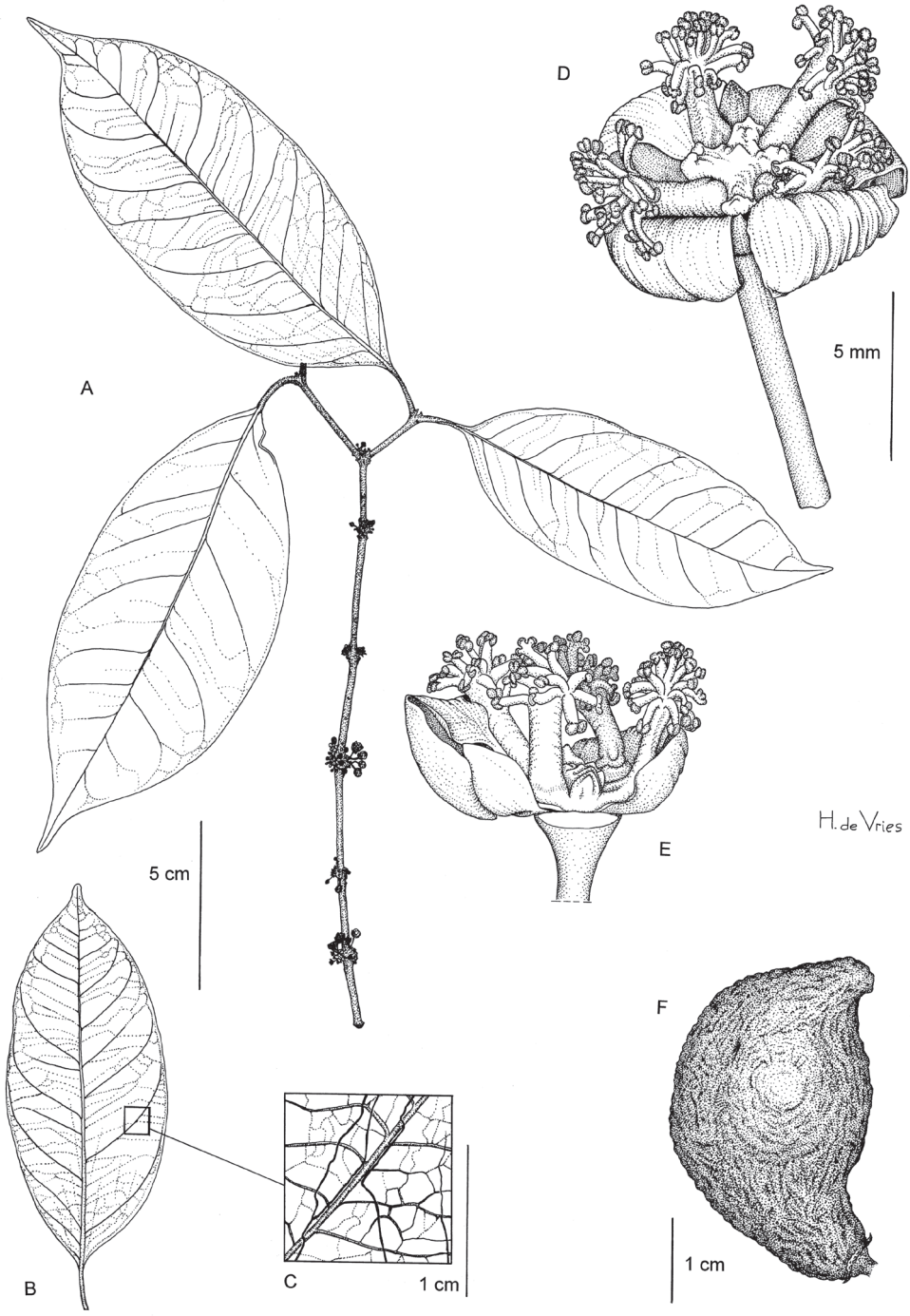

Figure 1. *Garcinia obliqua*: **A** Flowering twig **B** Leaf from below **C** Idem, detail **D** Male flower **E** Idem, 1 sepal and 2 petals removed **F** Fruit. (A: Breteler et al. 8993 **B, C, F**: Dauby et al. 1570; **D, E**: Breteler et al. 8738). Drawing by Hans de Vries, NCB Naturalis (section NHN) ©.

mm long ; blade elliptic to lanceolate, (8–)9–17(–18) × 2.5–6 cm, attenuate at base, acuminate at apex, glabrous; lateral veins 6–9 pairs, distinct below, slightly distinct above, disappearing towards the margin; tertiary venation visible to distinct below, slightly distinct above; resin canals visible on the lower surface, black and subparallel to the midrib. *Inflorescence* axillary, with fascicles of flowers on swellings in the axils of twigs. *Flowers* 4-merous, unisexual; pedicel 3–6 mm; external sepals about 2.5 mm long, internal ones about 3 mm, greenish; petals suborbicular, about 4 mm long. *Male flower*: staminal bundles tree-like, with 10–19 irregularly positioned stamens per bundle, filaments free at the apex, anthers small, subglobose; pistillode present. *Female flower* not observed. *Fruit* on a 12 mm long pedicel (only 1 fruit with pedicel observed), asymmetric, oblique, probably because of aborted ovules, circular to broadly ovate in cross section, 3–3.5 × 1.8–2 cm; **e**xocarp strongly furrowed and coriaceous and green with blue reflection in dry condition. *Seed* 1, obliquely ellipsoid, 2–3 × 1.5–2 cm, black.

Distribution. Endemic to central Gabon, known only from the Ogooué-Ivindo and Ngounié provinces (see Figure 3a).

Habitat and ecology. Primary terra firme rainforest; at ca. 450–800 m altitude. Flowering in April, fruits observed in February.

Conservation status. *G.obliqua* is currently known from nine collections and six locations. Estimates of its extent of occurrence and area of occupancy are respectively ca. 9488 km^2 and 80 km^2. One collection (Dauby et al. 1650) corresponded to a dead individual along a forestry road and all locations are currently found within logging concessions. Hence, we assume the extent of occurrence, area of occupancy, quality of habitat and number of sub-populations will decrease in the near future. We therefore assign a preliminary status of Vulnerable (Vu B1ab(i,ii,iii,iv,v)+B2ab(i,ii,iii,iv,v)).

Notes. The shape of the staminal bundles and the anthers, as well as the distinct foveola point to a relationship with *G. smeathmannii* and *G. ovalifolia*, both belonging to the section *Rheediopsis* Pierre (Jones, 1980). On the other hand, preliminary molecular data obtained by the second author suggest that *G. obliqua* is not related to these species. Therefore, the results of an upcoming molecular study are awaited before a firm statement about the sectional position can be made.

Additional specimens examined (all from Gabon). CFAD de Rimbunan Hijau, au Sud-Ouest du Parc National de la Lopé, 0.64°S, 11.16°E (DD), 2/2/2009 (fr.), Dauby et al. 1570 (LBV, MO, BRLU). CFAD de Rimbunan Hijau, au Sud-Ouest du Parc National de la Lopé, 0.7°S, 11.23°E (DD), 27/2/2009 (fr.), Dauby et al. 1643 (BRLU). CFAD de Rimbunan Hijau, au Sud-Ouest du Parc National de la Lopé, 0.7°S, 11.23°E (DD), 28/2/2009 (ster.), Dauby et al. 1650 (BRLU). near Djidji, 5–10 km W. of Koumémayong, 0°15'N, 11°50'E (DMS), 15/4/1988 (fl.), Breteler et al. 8738 (WAG). Est du Parc National de Waka, à plus ou moins 5 km au Sud de la rivière Mayi, 1.23°S, 11.28°E (DD), 4/6/2008 (ster.), Dauby et al. 677 (BRLU). Est du Parc National de Waka, à plus ou moins 5 km au Sud de la rivière Mayi, 1.23°S, 11.28°E (DD), 4/6/2008 (ster.), Dauby et al. 666 (BRLU). Bouvala hills, 1.62°S, 11.75°E (DD), 8/10/2007 (ster.), MBG transect (Leal et al.) 1105 (BRLU). Bouvala hills, 1.63°S, 11.78°E (DD),

12/10/2007 (ster.), MBG transect (Leal et al.) 1106 (BRLU). Village Eghuba, nord-ouest du Parc National de Waka, 1.03°S, 11.14°E (DD), 12/5/2008 (ster.), Ngombou Mamadou & Ndjombe 226 (LBV, MO).

***Garcinia gabonensis* Sosef & Dauby**
urn:lsid:ipni.org:names:77122648-1
http://species-id.net/wiki/Garcinia_gabonensis
Fig. 2

Diagnosis. Similar to *Garcinia kola*, but leaves with lateral veins towards the margin clearly connected in distinct loops and united into an intramarginal vein that runs at (1−)2−3 mm from the margin, free stamens and a well-developed, longitudinally ribbed pistillode.

Type. GABON: Ngounié, c. 36 km Mouila to Yeno, 1°45'S, 11°20'E, 19-9-1986, Breteler 7782 (holotype WAG!; isotype BR!, K!, LBV!, MO!, P!, PRE).

Description. Dioecious shrub or small tree, up to 4 m high; latex transparent to greenish; branches circular in cross section, fissured, often reddish when dry; twigs flattened on cross section, smooth. *Leaves* opposite; petiole (4−)5−10(−12) mm, smooth, slightly canaliculated above, with indistinct foveola of about 1 mm long; blade generally oblanceolate, sometimes elliptic or rarely ovate, (7−)8−15(–16) × (2–)2.5–5(−6) cm, pointed at base, caudate-acuminate at apex, coriaceous to papery, glabrous; midrib prominent below, canaliculate above, lateral veins 7−13 pairs, visible on both surfaces**,** towards the margin clearly connected in distinct loops and united into an intramarginal vein that runs at (1−)2−3 mm from the margin, tertiary veins laxly reticulate, indistinct; resin ducts normally indistinct except in young leaves, subparallel to the midrib. *Inflorescence* axillary, of few-flowered fascicles; bracts many, small (<1 mm long). *Flower* 4-merous, unisexual; pedicel slender, 2(−3) mm; sepals obovate, two external ones about 2 mm long, two internal ones about 4 mm long, greenish to yellowish; petals obovate, about 4 mm long, yellowish or greenish to white. *Male flower*: stamens 8−14, free, inserted in a ring around the pistillode, filament broadened and flat, white, anthers ellipsoid, strongly curved; pistillode broadly triangular-obovoid, longitudinally ribbed, stylode simple and slender, 1−2 mm long. *Female flower*: disc annular, flattened and pressed against the ovary; ovary globose, about 3 mm in diameter; stigma peltate, lobed, 2 mm wide. *Fruit* ovoid to subglobose, 5−11 mm in diameter, greenish, smooth, with persistent sepals at base.

Distribution. Endemic to southern and central Gabon, in the provinces of Moyen-Ogooué, Ngounié and Ogooué-Maritime (see Figure 3b).

Habitat and ecology. Primary or late secondary *terra firme* rain forest, along rivers or on ridges; at ca. 150−850 m altitude. Flowering in September to November, fruiting in September, November, December and February.

Conservation status. Currently, *G. gabonensis* is known from eleven collections and nine locations. Estimates of the extent of occurrence and the area of occupancy are respectively ca. 16 000 km^2 and 109 km^2. Since nine of the eleven collections are within logging concessions or along main roads, we consider that continuing decline

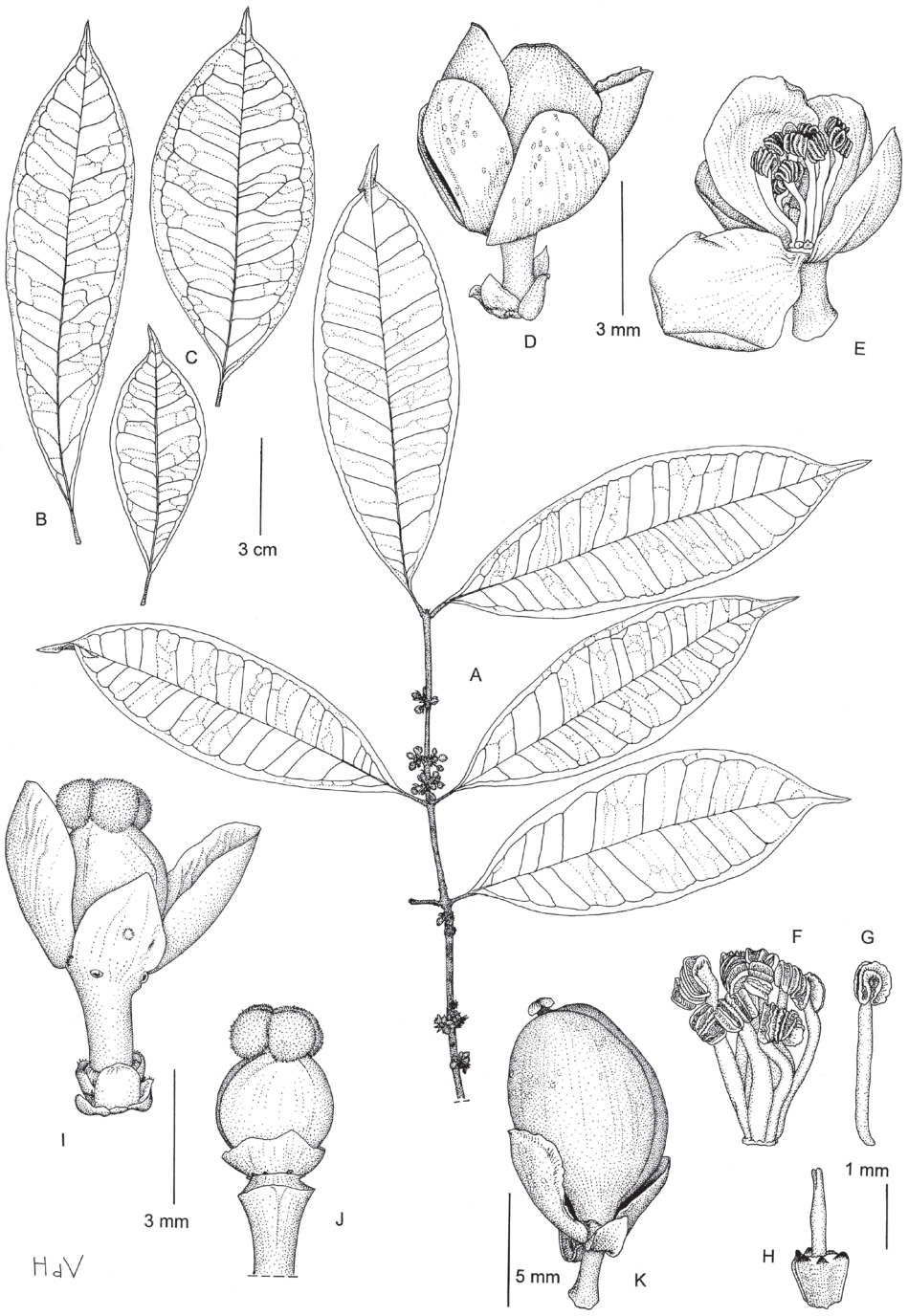

Figure 2. *Garcinia gabonensis*: **A** Flowering twig **B, C** Leaves, showing the variation **D** Male flower **E** Idem, open and three petals removed **F** Androecium **G** Stamen **H** Pistillode **I** Female flower **J** Gynoecium and disk **K** Fruit. (**A, D–H**: Leeuwenberg & Persoon 13683; **B, K**: Arends et al. 510; **C, I, J**: Wieringa et al. 4546). Drawing by Hans de Vries, NCB Naturalis (section NHN) ©.

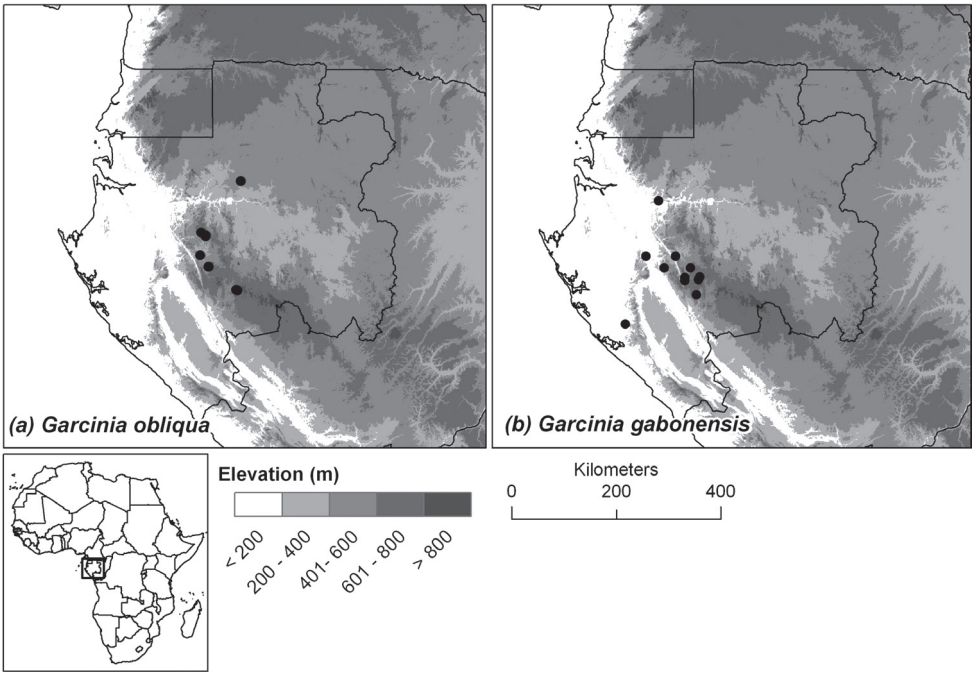

Figure 3. Distribution of the two new species endemic to Gabon: (**a**) *Garcinia obliqua*, (**b**) *Garcinia gabonensis*.

in the extent of occurrence, area of occupancy, quality of habitat and number of subpopulations has occurred or will occur in the near future. We therefore assign a preliminary status of Vulnerable (VU B2ab(i,ii,iii,iv)).

Notes. For now, it remains unclear as to which section this species belongs. Most striking feature are the free stamens. According to the elaborate work of Jones (1980), this is characteristic for only two sections: sect. *Teracentrum* Pierre and sect. *Rheedia* sensu Jones. Species belonging to the first, however, have their stamens inserted across a central mass and lack a pistillode. Those belonging to the second are known to occur, until now, only in Central and South America and on Madagascar…. Morphologically though, *G. gabonensis* seems very similar to other species in sect. *Rheedia*, and this might be the first continental African representative of that section. A molecular study to further investigate this will be performed soon.

Additional specimens examined (all from Gabon). SE of Sindara, km 12 from Camp Chantier Waka to Ngounié River, 1°14'S, 10°51'E (DMS), 26/9/1985 (fl.), Leeuwenberg & Persoon 13683 (BR, K, WAG). Moukabo, about 37 km E of Mouila, on the road to Yeno, 1°40'S, 11°20'E (DMS), 27/11/1984 (fl.), Arends et al. 484 (WAG). about 40 km E of Mouila, on the road to Yeno, 1°40'S, 11°20'E (DMS), 28/11/1984 (fr.), Arends et al. 510 (BR, LBV, WAG). Massif du Chaillu, old secondary forest partly primary, near Mouyanama, about 27 km. E. of Mimongo, 1°39'S, 11°46'E (DMS), 25/11/1983 (fl.), Louis et al. 854 (K, WAG).

Fougamou, 7 km on forestry road following Bendolo river, 1°12.1'S, 10°32.2'E (DDM), 26/10/1994 (fl.), Wieringa et al. 2916 (LBV, WAG). 10 km on the road Ikobey to Bakongue, Eghaba Mountain, 1°2.0'S, 10°2.6'E (DDM), 28/11/2001 (fl., fr.), Wieringa et al. 4473 (WAG). 5−15 km NNW of Ndjolé, 0°5'S, 10°45'N (DMS), 13/11/1991 (fl.), Breteler 10445 (LBV, WAG). 13 km on the road Eteké to Ovala, Nyongué, 1°26.1'S, 11°26.1'E (DDM), 8/11/1994 (fl.), Wieringa et al. 3096 (WAG). 60 km on the road Mouila to Yeno, 1°41.85'S, 11°23.96'E (DDM), 3/12/2001 (fr.), Wieringa et al. 4546 (LBV, WAG). Doudou mountains, about 60 km along exploitation track in WNW direction from Doussala, 2°12'S, 10°11'E (DMS), 27/11/1986 (fl.), Wilde J.J. de et al. 8984 (K, LBV, WAG). Massif du Chaillu, near Guédévé village about 40 km N of Lébamba, 1°55'S, 11°25'E (DMS), 30/11/1983 (fr.), Louis et al. 1056 (K, WAG). Est du Parc National de Waka, à environ 5 km au Sud de la rivière Mayi, 1°23'S, 11°3'E (DMS), 21/2/ 2008 (fr.), Dauby et al. 735 (LBV, MO, BRLU).

Key to the Lower Guinean species of *Garcinia*

For most of the continental tropical African regions, an identification key to the species of *Garcinia* exists: Hutchinson et al. (1954) for West Africa, Bamps (1970a) for Central Africa, Bamps et al. (1978) for East Africa, and Robson (1961) for the Zambesian region. The lack of such a key for the notoriously species-rich Lower Guinean region has hindered proper identification of specimens; a shortcoming we hope to overcome by providing the key below.

1 Inflorescence very large, central axis often over 50 cm and up to 180 cm long, with several very long and unbranched ramifications of similar lengths, carrying distantly spaced clusters of small white sessile flowers; leaf blade (14−)25−57 cm long, shiny..... ***G. lucida*** **Vesque**

– Inflorescence much smaller; flowers at least shortly pedicellate; leaf blade normally smaller, up to 28(−35) cm long, shiny or not **2**

2 Twigs angular, slightly or sometimes distinctly winged; petioles transversely wrinkled; latex white; flowers 5-merous, in compact racemes with a tetragonous rachis and imbricate bracts; fruit smooth or verrucose **3**

– Twigs rounded to angular; petioles smooth to transversely wrinkled; latex yellow or transparent; flowers 4-merous, in fascicles, cymes or solitary; fruit smooth **6**

3 Twigs narrowly winged; pedicel up to 1.5 cm long (up to 2 cm in fruit); leaf blade 5−21 × 2−9.5 cm **4**

– Twigs strongly winged, wings 3−5 mm wide; pedicel 3−5.5 cm long; leaf blade (14−)18−41 × (4.5−)6−15.5 cm..... ***G. le-testui*** **Pellegr.**

4 Ovary and fruit verrucose; inflorescence almost strictly terminal, 1(−3) racemes together of 1.5−3 cm long **5**

– Ovary and fruit smooth; inflorescence terminal and axillary, often with several racemes together or racemes branched, these 2–10 mm long ..... ***G. densivenia* Engl.**

5 Bracts, pedicels and fruit minutely puberulous..... .... ***G. quadrifaria* (Oliv.) Pierre var. *chomocarpa* (Engl.) Sosef & Dauby**

– Bracts, pedicels and fruit glabrous..... ..... ***G. quadrifaria* (Oliv.) Pierre var. *quadrifaria***

6 Filaments fused, at least at base; leaf blade without intramarginal vein or with one that runs just inside (at 0.5–1 mm) of the margin **7**

– Filaments entirely free; leaf blade with a distinct intramarginal vein running at (1–)2–3 mm from the margin..... ***G. gabonensis* Sosef & Dauby**

7 Staminal bundles with filaments partly free, at least at the top, and globose or ovoid anthers; leaf blade coriaceous..... **8**

– Staminal bundles with filaments completely fused and ellipsoid to oblong, curved anthers; leaf blade papyraceous to coriaceous..... **13**

8 Leaf blade with distinct to very striking reticulations, green to brown in dry condition; sepals smooth to rugose; anthers 3–20 per staminal bundle **9**

– Leaf blade with indistinct reticulations, brown-red when dry; sepals finely papillose; anthers very numerous ..... ***G. conrauana* Engl.**

9 Pedicels and sepals glabrous; sepals smooth or slightly rugose; inflorescence axillary..... **10**

– Pedicels and sepals puberulous; sepals distinctly rugose; inflorescence terminal ..... ***G. kola* Heckel**

10 Stamens 3–10 per bundle; leaf blade with 15–20(–25) pairs of lateral veins; petiole distinctly transversely wrinkled; fruit symmetric **11**

– Stamens 11–19 per bundle; leaf blade with 6–9 pairs of lateral veins; petiole smooth to slightly transversely wrinkled; fruit oblique .... ***G. obliqua* Sosef & Dauby**

11 Leaves distinctly petiolate (petiole >4 mm long), with cuneate to rounded or seldom subcordate base..... **12**

– Leaves subsessile, with cordate and sometimes amplexicaulous base .... ***G. staudtii* Engl.**

12 edicel 1.5–6(–10) mm long; staminal bundles in male flower with 3(–4) stamens; petiole 1–2 mm thick; leaf blade 3–15 × 0.5–6 cm, usually long acuminate but the very top rounded..... ***G. ovalifolia* Oliv.**

– Pedicel (10–)15–45 mm long; staminal bundles in male flower with (5–)6–10 stamens; petiole 2–4 mm thick; leaf blade 8–28(–35) × 3,5–12(–17) cm, rounded to tapering or acuminate towards the top, the very top usually acute..... ***G. smeathmannii* (Planch. & Triana) Oliv.**

13 Leaf blade with lateral veins making an angle of (45–)60–80° with the midrib..... **14**

– Leaf blade with lateral veins making an angle of 30–45° with the midrib .... ***G. buchananii*** **Baker**

14 Leaf blade opaque or with continuous translucent resin canals..... **15**

– Leaf blade with translucent resin canals composed of dots and short lines.... .....***G. punctata*** **Oliv.**

15 Leaf blade with a distinct acumen to gradually acuminate; with main lateral veins (3–)4–11 mm apart, the intermediate ones often clearly not reaching the margin; in dry condition resin canals running parallel to the lateral veins indistinct or invisible; petals white to yellow or yellowish green, not sticky; staminal bundles longer than the pistillode, anthers with septate or non-septate thecae; mature fruit yellow to orange..... **16**

– Leaf blade with a distinct acumen; main lateral veins 1–2(–3) mm apart, because the intermediate ones are almost equally strong and often reach the margin; in dry condition those resin canals running parallel to the lateral veins often distinct and prominent; petals red or orange-red or sometimes yellow, often sticky; staminal bundles as long as the pistillode, anthers with septate thecae; mature fruit orange to purplish red..... ***G. mannii*** **Oliv.**

16 Leaf blade with lateral veins almost straight, curved just before the margin to be united with an intramarginal vein; petals white to pale yellow or yellowish green; thecae not septate **17**

– Leaf blade with lateral veins gradually and distinctly curved up towards the margin and finally subparallel to it; petals yellow to pale green; thecae septate ..... ***G. afzelii*** **Engl.**

17 Flowers and fruits on a 1–4 mm long pedicel..... ***G. epunctata*** **Stapf**

– Flowers and fruits on a 7–18 mm long pedicel..... ***G. preussii*** **Engl.**

Remaining insufficiently known species

Garcinia arbuscula **Engl.**
http://species-id.net/wiki/Garcinia_arbuscula

Protologue: Bot. Jahrb. Syst. 55: 391 (1919).

Syntypes: CAMEROON. Mfongu, am Muti-abhang, 1700–1900 m alt., Ledermann 5863 & 5943. Not located, probably lost at B, no duplicates traced yet.

The protologue states there are 20–30 stamens in 4 bundles (so some 5–8(–9) per bundle), fused until halfway, and leaves similar to *G. ovalifolia*, but with less pronounced veins and a cuneate base, on 1–1.5 cm long petioles. Flowers are positioned in glomerules on the twigs, below the leaves. This description fits that of *G. smeathmannii* and we momentarily place this name under that species.

***Garcinia danckelmanniana* Engl.**
http://species-id.net/wiki/Garcinia_danckelmanniana

Protologue: Bot. Jahrb. Syst. 55: 394 (1919).

Syntypes: CAMEROON. Genderogebirge, Tschape pass, 1420 m alt., Ledermann 2671 & 2750. Not located, probably lost at B, no duplicates traced yet, but a sketch of Ledermann 2750 is present at BM.

The protologue states there are 30−40 stamens in 4 bundles, fused almost to the top, a distinct foveola, leaves with 12−15 lateral veins and flowers in many-flowered bundles on the nodes. The sketch at BM shows large leaves (12–19 × 3.5–8 cm) with an acute apex and flowers on pedicels of 1.5–2 cm. All this fits *G. smeathmannii* best, and for the moment we regard it as a synonym of that species.

***Garcinia laurifolia* Hutch. & Dalziel**
http://species-id.net/wiki/Garcinia_laurifolia

Protologue: Fl. W. trop. Afr. 1: 236 (1927).

Type: SIERRA LEONE. Scott-Elliot 4806.

The type collection was located through the JSTOR Plant Sciences website (http://plants.jstor.org) at BM. It was identified as a Rutaceae belonging to the genus *Teclea*. It shows a twig with alternate leaves and a single young fruit.

***Garcinia tschapensis* Engl.**
http://species-id.net/wiki/Garcinia_tschapensis

Protologue: Bot. Jahrb. Syst. 55: 393 (1919).

Type: CAMEROON. Genderogebirge, Tschape pass, 1430 m alt., Ledermann 2771. Not located, probably lost at B, no duplicates traced yet, but a sketch of Ledermann 2771 is present at BM.

The protologue states the material concerns a fairly large tree (18−22 m), with twigs soon rounded, rugose petioles of 1.5−2 cm long with a distinct foveola, leaf blade coriaceous and shiny, male flowers 4−7 in a fascicle, pedicel 2.5 cm, white petals, stamens 20, in 4 bundles, fused to halfway, alternating with verrucose disc lobes. The sketch at BM shows large elliptic-obovate leaves with slightly acuminate apex and a fasciculate inflorescence with three flowers on 22–28 mm long pedicels.

Again, this description, as well as the sketch, fit *G. smeathmannii* and for now we regard it as a synonym of that species.

Acknowledgements

The following herbaria are kindly thanked for giving access and support to both authors: BM, BR, K, L, LBV, P. Herbarium material was kindly send on loan by MO. Dr. P. Bamps (BR) has very generously and freely shared his thoughts and partial manuscripts on West and Central African *Garcinia*, which was highly appreciated. The PhD project of G.D. was funded by the FRIA. His visit to WAG was funded by the European Commission's Research Infrastructure action via the SYNTHESYS Project (application NL-TAF-1244). Field surveys carried out by G.D. in Gabon have been financed by the Communauté Française de Belgique, the Belgian Fund for Scientific Research (FRS-FNRS), the Fond Cassel and the United States Agency for International Development (USAID) through the Central Africa Regional Program for the Environment (CARPE). We are very grateful to the CENAREST, in particular the Herbier National du Gabon (IPHAMETRA), for permission to conduct research in Gabon and to the Central Africa program of Missouri Botanical Garden for logistic support. Tariq Stévart, Diosdado Nguema, Etienne Mounoumoulossi and Prince Bissiemou are acknowledged for their help during the field expeditions.

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PhytoKeys 17: 63–68 (2012)
doi: 10.3897/phytokeys.17.3642
www.phytokeys.com

RESEARCH ARTICLE

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A new combination in *Lapanthus* (Bromeliaceae)

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Academic editor: *L. Versieux* | Received 8 July 2012 | Accepted 17 October 2012 | Published 26 October 2012

Citation: Louzada RB, Wanderley MGL (2012) A new combination in *Lapanthus* (Bromeliaceae). PhytoKeys 17: 63–68. doi: 10.3897/phytokeys.17.3642

Abstract

A new combination, *Lapanthus vidaliorum* (O.B.C. Ribeiro & C.C. Paula) Louzada & Wand. is proposed for *Orthophytum vidaliorum* O.B.C. Ribeiro & C.C. Paula. In addition notes on taxonomy, geographic distribution and conservation are provided.

Keywords

Bromelioideae, *Cryptanthus*, Espinhaço Range, Minas Gerais, *Orthophytum*

Introduction

Lapanthus Louzada & Versieux is a small genus comprising two species occurring in the southern portion of the Espinhaço Range in the Brazilian state of Minas Gerais. The species inhabits quartzitic rocky outcrops near waterfalls and gallery forests in rocky fields or areas of transitional vegetation between semideciduous seasonal forests and rocky fields (Louzada and Versieux 2010).

Lapanthus was established to accommodate two species, one previously included in *Orthophytum* Beer and the other in *Cryptanthus* Otto & A. Dietr. (Louzada and Versieux 2010). The two originally recognized species of *Lapanthus* (*L. duartei* (L.B. Sm.) Louzada & Versieux and *L. itambensis* (Versieux & Leme) Louzada & Versieux) were segregated from *Cryptanthus* and *Orthophytum* respectively due to the presence of characters apparently contradictory to the current circumscriptions of those genera, which include ciliate petal margins, presence of a pair of lanceolate petal appendages, and free stamens (Louzada and Versieux 2010). The decision to describe a new genus

to accommodate the species with these characters was also supported by the evidence of paraphyletism of *Orthophytum* presented in the molecular phylogeny of Bromelioideae (Schulte et al. 2009). In this study, *Orthophytum supthutii* E. Gross & Barthlott, recently synonymized under *Lapanthus duartei,* arises as the sister group of a clade including *Cryptanthus glaziovii* Mez, *O. disjunctum* L.B. Sm. and *O. maracasense* L.B. Sm.

The phylogenetic relationship of the genus is further elucidated by a study on molecular phylogeny where *Lapanthus* arises as a monophyletic group, sister to a *Cryptanthus* clade comprising species of *Cryptanthus* subgen. *Cryptanthus* (Louzada et al. in prep.).

The recently described species *Orthophytum vidaliorum* is morphologically related to *O. itambense* (=*Lapanthus itambensis*) and presents the same combination of characters that Louzada and Versieux (2010) used to recognize *Lapanthus*. Therefore, based on the morphological evidence presented in the protologue and after the analysis of the holotype of *O. vidaliorum*, we propose here a new combination in *Lapanthus*. This note also provides comments, a table with diagnostic characters (Table 1), photos of the three species, and a distribution map.

Table 1. Comparison of some diagnostic characters of *Lapanthus*, *Cryptanthus* and *Orthophytum*.

Character	*Lapanthus*	*Cryptanthus*	*Orthophytum*
Inflorescence	sessile	sessile	pedunculate or sessile
Sepals	white	green	green or red
Petal margins	ciliate	entire or ciliate	entire
Petal appendages type	lanceolate	absent	sacciform, cupuliform or fimbriate
Antepetalous stamens	free	adnate, rarely free	adnate
Epigynous tube	absent	absent or short	present
Meiotic chromosome number	$n = 50$	$n = 17$	$n = 25$
Mitotic chromosome number	$2n = 50$	$2n = 34, 36, 54$	$2n = 50, 100, 150$

Taxonomy

***Lapanthus vidaliorum* (O.B.C.Ribeiro & C.C. Paula) Louzada & Wand., comb. nov.**
urn:lsid:ipni.org:names:77122665-1
http://species-id.net/wiki/Lapanthus_vidaliorum
Figs 1, A–B, 2

Basionym: *Orthophytum vidaliorum* O.B.C. Ribeiro & C.C. Paula. Brittonia 62: 145, f. 1. 2010. Type: Brazil. Minas Gerais: Santa Bárbara, Serra de Capanema, 20°11'29"S, 43°35'05.1"W, 1469 m elev., 19 Aug 2008, *O.B.C. Ribeiro 208* (holotype: VIC!; isotype: HB).

Notes. When *Orthophytum vidaliorum* was described, Ribeiro and Paula (2010) discussed its morphological relationship with *O. itambense*. It was emphasized that these species share similar habitat, plant size, leaves, inflorescence and flower structure. Moreover, they state that *O. vidaliorum* is also closely related to *O. supthutii* which was recently synonymized under *Lapanthus duartei*. In the same article the authors also

Figure 1. A–B. *Lapanthus vidaliorum*. **A** Habitat **B** Habitat in the wild **C** *Lapanthus duartei* in the wild **D** *Lapanthus itambensis* in cultivation (Photo: **A–B** Otávio Ribeiro).

mentioned that *O. vidaliorum* could be included in a different and unpublished genus proposed by Louzada (2008) in his master's thesis, which later was validly published under the name *Lapanthus* by Louzada and Versieux (2010).

Besides, some morphological characters such as the rosette shape, the morphology and size of the leaves and the size of the flowers support the decision to include *O. vidaliorum* under *Lapanthus*.

Table 2. Comparison of diagnostic characters in *Lapanthus* species.

Character	*Lapanthus vidaliorum*	*Lapanthus duartei*	*Lapanthus itambensis*
Leaf-blade indument	glabrous	lepidote	lepidote
Inflorescence branching	simple	compound	pseudo-simple
Petal length	2.5–2.6 mm	2.8–3.8 mm	4.1 mm
Petal color	greenish-yellow	orange	white
Petal appendages	obdeltoid	lanceolate	lanceolate

Figure 2. Holotype of *Lapanthus vidaliorum* (Photo: Elídio Guarçoni).

Identification key for the species of *Lapanthus*

1a Inflorescence compound, sepals high connate .....***L. duartei***
1b Inflorescence simple or pseudo-simple, sepals free or nearly so **2**

2a Inflorescence simple, petals greenish-yellow, petal appendages obdeltoid..... ..... ***L. vidaliorum***

2b Inflorescence pseudo-simple, petals white, petal appendages lanceolate .... ***L. itambensis***

Distribution. *Lapanthus vidaliorum* occurs in the southernmost part of the Espinhaço Range, in an iron–rich region called Quadrilátero Ferrífero (Iron Quadrangle) in the Brazilian state of Minas Gerais. Although it occurs in an iron–rich area, *L. vidaliorum* was found inhabiting quartizitic–sandstone rocky outcrops (Ribeiro and Paula 2010) The present combination extends the genus distribution approximately 120 km southward (Fig. 3).

Conservation. *Lapanthus vidaliorum* is an endangered species, known only from the type–population, which is small in number of individuals, being about 3.5 kilometers from the iron ore mine Capanema and surrounded by an *Eucalyptus* plantation. Therefore, according to IUCN (2001) criteria this species is considered critically endangered (criteria B2a).

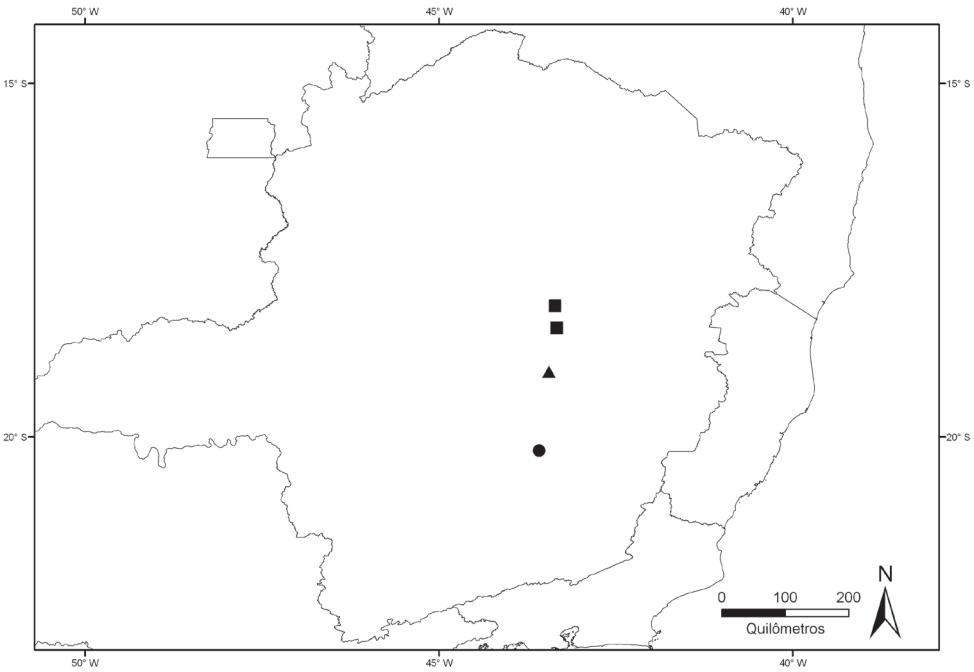

Figure 3. Distribution map of *Lapanthus vidaliorum* (circle), *Lapanthus duartei* (triangle), and *Lapanthus itambensis* (square).

Acknowledgements

We acknowledge the support from the Brazilian agencies: Fundação de Amparo à Pesquisa (FAPESP) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). We thank Tarciso Filgueiras and Derek Butcher for the language

editing and suggestions to improve the manuscript, Elídio Guarçoni for sending the photo of the holotype and two anonymous reviewers and Leonardo M. Versieux for their comments on the paper.

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