

Two new species of *Dilkea* subgenus *Dilkea* (Passifloraceae) from Loreto, Peru

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Abstract

Two new species of *Dilkea* subgenus *Dilkea* (Passifloraceae) are described from Loreto, Peru. *Dilkea hebes* Feuillet, **sp. nov.**, has leaves with elliptic to oblanceolate blades that are dull adaxially, and spherical fruits with thick walls; *D. nitens* Feuillet, **sp. nov.**, has leaves with narrow-ovate blades that are shiny adaxially, and fruits with an apical cone and thin walls. A key to the species of subgenus *Dilkea* is provided.

Keywords

Dilkea hebes, *Dilkea nitens*, Passifloraceae, Loreto, Peru

Introduction

Dilkea Mast. belongs in the Passifloraceae Juss. ex Roussel subfamily Passifloroideae Burnett tribe Passifloreae DC. and currently includes 12 Neotropical species including the two described below. Among the New World genera of Passifloraceae, *Dilkea* is a distant second to *Passiflora* L. with its ca. 550 species.

Dilkea is characterized by tetramerous flowers with 8 stamens, a set of 4 carpels with 4 styles fused in the basal third, an androgynophore lacking or rarely sub-null, the operculum lacking, and seeds of a peanut shape and size, while *Passiflora* has pen-

tamerous flowers with 5 stamens, an androecium with 3 carpels with 3 free styles, a well-developed androgynophore, an operculum of various shapes, and seeds flattened and usually much smaller. The two other Neotropical genera each with 2–3 species are tetramerous like *Dilkea*, but *Mitostemma* Mast. has free styles and the species of *Ancistrothyrsus* Harms are hairy throughout and their fruits are capsular, while *Dilkea* species are glabrous and their fruits are baccate.

In the past few years, I came across many collections of *Dilkea*, a genus previously poorly collected. Six species are presently recognized in subgenus *Epkia* Feuillet (2009) and are often confused with *Clavija* Ruiz & Pav. in the Primulaceae (APG III 2009). New species from the Guiana Shield have been described recently (Feuillet 2010a). The six species of *Dilkea* subg. *Dilkea* have similar white flowers and the useful morphological characters are mainly the position and structure of the inflorescence and the shape of the leaves and the fruits.

Taxonomic treatment

Dilkea subgenus *Dilkea*

Dilkea subgenus *Dilkea* is composed of lianas or climbing shrubs, or small shrubs in the case of *D. margaritae* Cervi, with a continuous growth and thick tendrils trifid at the apex rather than shrubs or small trees with a strongly rhythmic growth and usually without tendrils in subgenus *Epkia*. The six species of subgenus *Dilkea* have been collected from Panama to Amapá (Brazil) and from Amazonian Bolivia to the Guianas.

Dilkea hebes Feuillet, sp. nov.

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Fig. 1

Dilkea hebes foliis super hebeti, exocarpio 4–5 mm crasso, multistrato, suberis simulant, a subgeneris *Dilkea* speciebus mihi notis distincta. Liana in sylvia riparia inundata, in Loreto (Peruvia) crescit.

Type: PERU. **Loreto:** Maynas, District of Iquitos, Río Nanay, above Bellavista, between Pampa Chica and Santa Clara, shoreline forest frequently inundated, 1 June 1976, fr., M. Rimachi Y. 2336 (holotype : US-3393830!; isotype: IBE).

Woody climber, growth continuous, internodes subequal or gradually unequal, twigs drying brown to black; glabrous throughout. Stipules not seen. Leaf: petiole terete, reduced to the pulvinus, 3–6 mm long, swollen but not wrinkled when dry, drying nearly black; blades coriaceous, narrowly elliptic to oblanceolate, widest ca. 2/3 from base, 7.5–19 × 3.5–6.5 cm, base usually slightly acute, angle ca. 45° each



Figure 1. Holotype of *Dilkea hebes* Feuillet: M. Rimachi Y. 2336 (US).

side of the midrib, apex acute or round and short-acuminate, margin undulated on herbarium specimens, probably due to dorsiventrally curved midrib, adaxially dull, drying dark olive-green, abaxially dull, drying pale olive-green, midrib adaxially in a groove, abaxially strongly raised, main veins obscure, 15–20 on each side of the midrib of well-developed leaves. Inflorescences axillary; peduncle axillary, thicker than the stem, bearing 1–2 flowers; bracts thick scale-shaped, 0.5–2 mm long, long and narrow

to short and wide under the same fruit; pedicel and peduncle forming a narrow cone 0.5–1.5 cm long, 0.4–0.6 cm diam. at apex under the fruit. Flowers not seen. Fruits subterminal by withering of the apical part of the stem, spherical, observed still green but well-developed, fruit wall hard, 4–5 mm thick, corky, with 1–2 seeds, partly empty with at least partially dividing membranes; seeds peanut-shaped, slightly asymmetric, $1.7 \times 0.7\text{--}0.8$ cm.

Distribution. Endemic to the district of Iquitos, Maynas, Loreto, Eastern Peru.

The specimen labels did not give geographical coordinates for the collection localities of *Dilkea hebes* in Peru, Loreto, Maynas, Distr. Iquitos. The localities cited for the two specimens, “quebrada de Morropón” or “Pampa Chica”, are not in the gazetteer published by the United States Board on Geographic Names (USBGN 1989), and Santa Clara and Bella Vista are common village names in Peru. A search in the National Geo-spatial-Intelligence Agency database (NGA web site) on Santa Clara brought 11 occurrences in Loreto and Bella Vista / Bellavista 16. Coordinates for those are too uncertain to be presented in the specimen citations, but it is possible that they are Puerto Bellavista Nanay, port of Iquitos on the Río Nanay, ca. $3^{\circ}42'S$, $73^{\circ}15'W$, and Santa Clara de Nanay, near the far end of Iquitos airport on the bank of the Río Nanay, ca. $3^{\circ}47'S$, $73^{\circ}20'W$.

Ecology. *Dilkea hebes* is growing in inundated riparian forest, known only from the vicinity of the type locality, ca. 90 m elev.

Phenology. Fruits immature when collected in February and June.

Preliminary conservation status. *Dilkea hebes* is known from two collections from the same district in Maynas, Loreto, Peru. The data are insufficient to assess an informed status for this species, therefore I suggest that it be classified as DD (Data Deficient) according to IUCN (2001, 2003) categories.

Discussion. *Dilkea hebes* has a few fruit characteristics that distinguish it from all other species of *Dilkea* and that may be related to its frequently inundated habitat. The thick corky fruit wall, the small number of seeds leaving empty space in the fruit, and possibly the thin membranes inside the fruit increase the floatability of the fruit suggesting that the fruits may be disseminated during floods. Cork has been found in some species of *Passiflora*, for example on the bark of mature stems of *P. suberosa* L. and *P. sexocellata* Schlecht. in subg. *Decaloba* (DC.) Rchb. supersect. *Cieca* (Medic.) J.M. MacDougal & Feuillet or even on the young stems and the petioles of *P. phellos* Feuillet in subg. *Passiflora* supersect. *Laurifolia* (Cervi) Feuillet & J.M. MacDougal. The vegetative characters are rather similar to *D. johannesii* Barb.Rodr., which differs by its thin-walled fruit tapering at base and having an apical hard cone (cf. original illustration, reproduced from the Smithsonian Library, Feuillet 2010b).

Etymology. The Latin epithet *hebes* (= dull), refers to the upper surface of the leaves that is not shiny, in contrast with *Dilkea nitens* Feuillet, another species from Loreto described below.

Paratypes. PERU. **Loreto:** Maynas, District of Iquitos, Río Nanay, quebrada de Morropón, inundated bank, ca. 90 m, 14 Feb 1985, fr., *M. Rimachi* Y. 7755 (US!; IBE).

***Dilkea nitens* Feuillet, sp. nov.**

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Fig. 2

Dilkea nitens *foliis anguste ovatis a generis Dilkea speciebus mihi notis distincta. Liana vel frutex; in Loreto (Peruvia) crescit.*

Type: PERU. **Loreto:** Maynas, Pena Negra, 25 km SW of Iquitos, 3°38.6666'S, 73°20.15'W, 1 Aug 1972, fr., T.B. Croat 18649 (holotype: US-2788507!; isotype: MO!)

“Shrub or vine” (fide Croat 18649), growth continuous, internodes subequal or varying gradually in size, twigs with internodes 0.5–1.5 cm long, drying pale brown; glabrous throughout. Stipules not seen. Leaf: petiole terete, 1.5–3 cm long, drying pale brown except for the basal 1/3–1/2 pulvinus, slightly swollen and drying black; blades coriaceous, narrowly ovate, 8.5–19 × 5–6 cm, widest near base, base round, apex acute or round and short-acuminate, margin undulated (in herb., probably because of the dorsiventrally curved midrib), drying pale brown, somewhat shiny, midrib dorsiventrally curved, adaxially raised, abaxially strongly raised, main veins clearly visible abaxially, 12–18 each side of the midrib of well-developed leaves. Inflorescences subterminal by abscission of the apical stem meristem; peduncle as thick as or thicker than the stem bearing it, much shorter than the petioles, ca. 5 mm long, forming apically a nearly flat surface bearing 1–6 flowers; bracts scale-like, triangular, less than 1 mm long; pedicels sub-null to 0.2 cm long. Flowers not seen. Fruits sub-spherical, 4 × 3 cm including a 3–4 mm long narrow apical cone, wall less than 1 mm thick, rigid and brittle, seen immature green; seeds not seen, brown (fide Croat 18649), few.

Distribution. *Dilkea nitens* is known only by the type collection from Loreto (Peru). The geographical coordinates are taken from a gazetteer (USBGN 1989).

Ecology. The label does not give any information about the habitat.

Phenology. It had immature fruits in August.

Preliminary conservation status. *Dilkea nitens* is only known from the type collection from Maynas, Loreto, Peru. The data are insufficient to assess an informed status for this species, therefore I suggest that it be classified as DD (Data Deficient) according to IUCN (2001, 2003) categories.

Discussion. In subgenus *Dilkea* where most species have oblanceolate to obovate leaf blades, *D. nitens* is clearly identified by its narrowly ovate leaf blades, widest a quarter of the length from the base or less, a character shared only with *D. margaritae* Cervi from Mato Grosso (Brazil) which, in contrast with *D. nitens*, is a low shrub with 3.5–7 cm long axillary pedicels.

Etymology. The epithet coming from the Latin adjective *nitens* (= shiny), refers to the upper surface of the leaves, in contrast with *Dilkea hebes*, another species from Loreto described above.



Figure 2. Holotype of *Dilkea nitens* Feuillet: T.B. Croat 18649 (US).

Key to the species of *Dilkea* subg. *Dilkea*

1. Leaf blades narrowly ovate, widest in the basal 1/4.....2
- Leaf blades elliptic to obovate, widest in the apical 1/23
2. Flowers solitary, axillary; pedicels 3.5–7 cm long*D. margaritae* Cervi
- Inflorescences subterminal; peduncle capitate with few flowers, ca. 0.5 cm long; pedicels up to 0.2 cm long *D. nitens* Feuillet, sp. nov.

- 3. Fruit wall 2–4 mm thick, corky *D. hebes* Feuillet, sp. nov.
- Fruit wall about 1 mm thick, brittle..... 4
- 4. Leaf blades membranous or chartaceous *D. granvillei* Feuillet
- Leaf blades coriaceous 5
- 5. Leaf blades elliptic, 5–11 × 4–7.5 cm..... *D. clarkei* Feuillet
- Leaf blades oblanceolate to obovate, 15–28 × (5–)7–14 cm ... *D. retusa* Mast

Corrigendum

In Feuillet (2009), the collection *J. Brandbyge & E. Asanza 31937* (AAU) was cited by mistake as a paratype under both *Dilkea cuneata* Feuillet and *D. tillettii* Feuillet. The correct identification for this collection is *D. tillettii*, as could be easily checked by looking at the scan of the specimen on the AAU web site.

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***Nesogordonia tricarpellata* (Dombeyaceae), a new species from Madagascar that compels modification of the morphological circumscription of the genus**

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Abstract

Nesogordonia tricarpellata Skema & Dorr, **sp. nov.**, a new species from southeastern Madagascar, is described and illustrated. It differs from all other species of *Nesogordonia* Baill. in having 6–9 stamens, 3 staminodes, a 3-carpellate ovary, and a 3-valved capsule. These androecial and gynoecial characters require modification of the long-standing circumscription of the genus. The new species also has the southernmost geographic range of any species in the genus.

Keywords

Anosyenne Mountains, conservation, Dombeyaceae, endemism, Madagascar, Malvaceae, *Nesogordonia*, taxonomy

Introduction

Nesogordonia Baill. (Dombeyaceae, or Malvaceae: Dombeyoideae) is a genus of ca. 20 species of small to large trees (Arènes 1959, Barnett 1988, Dorr and Barnett in Cheek and Dorr 2007). Three species occur in tropical Africa and one in the Comoro Islands (Labat et al. 2000). The majority of species, however, are endemic to Madagascar and as previously unexplored areas of this island are surveyed botanically additional novel-

ties are discovered (Barnett 1987, Callmander et al. 2009, Rakotoarivelo et al. 2010), including the following new species that compels us to modify the long-established morphological circumscription of the genus.

Systematics

Nesogordonia tricarpellata Skema & Dorr, sp. nov.

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Fig. 1

Species gynecio 3-carpello et 3 staminodiis a congeneribus differt.

Type. Madagascar: Toliara: Anosy, Fort-Dauphin, Iabakoho, Antsootso, forêt humide de basse altitude Ivohibe–Bemangidy, près d'un cours d'eau, 24°34'17"S, 047°12'07"E, 90 m. 12 February 2006 (fl.). J. Rabenantoandro, F. Randriatafika, B. Mara, P. Lowry, and E. Lowry 1711 (holotype: US!; isotypes: MO!, TAN!).

Description. *Tree*, 4–8 m tall, to 15 cm d.b.h.; young stems glabrous, pale whitish gray to brown with prominent leaf scars; older stems darker brown; terminal bud to 3 mm long, subulate to falcate, strigose. *Leaves* alternate, entire, persistent; petioles 1–1.5 cm long, glabrous or with a few minute, stellate hairs or with a row of simple hairs (Randriamampionona 470), slightly to noticeably pulvinate basally and apically, drying dark brown; blade elliptic to narrowly elliptic, 5–7.5 × 2.5–3 cm, subcoriaceous, dark green above, lighter green below, base obtuse to rounded or attenuate (Randriamampionona 451), margin shallowly crenulate, slightly revolute, apex long acuminate, mucronulate (as an extension of the 1° vein below), glabrous above and below or with mostly simple, erect to appressed hairs restricted to 1° vein above (Randriamampionona 470), venation brochidodromous, 1° vein conspicuously raised below, 2° veins visible but less prominently raised below; domatia ovoid to almost circular tufts of erect or arching simple and stellate hairs in axils of 1° and 2° veins below, 0.6–0.9 × 0.5–0.6 mm; stipules caducous, not seen. *Inflorescences* axillary, paniculate cymes, to 4.5 cm long, (1–) 2–3-flowered; peduncles to 2.6 cm long, glabrous or with a few minute, stellate hairs; pedicels to 1.5 cm long, articulated 3.2–4.3 mm below base of the flower, glabrous or with a few minute, stellate hairs especially above the articulation. *Epicalyx* fugacious, not seen. *Flower* buds globose, 3–4 × 3–4 mm, sepals valvate, sutures slightly raised. *Calyx* 5-parted, shortly fused at base; *sepals* ovate, 5–5.5 × 1.7–2.2 mm, fleshy, heterotrichous outside with shorter-armed (ca. 0.02 mm long) stellate hairs beneath sparsely distributed longer-armed (ca. 0.2 mm long) stellate hairs, sparingly pubescent inside with few stellate hairs mostly near the sutures, both surfaces with a denser patch of minute stellate or simple hairs apically. *Petals* 5, ovate to elliptic, 3.5–4 × 2–2.5 mm, weakly asymmetric, slightly constricted apically, fleshy, glabrous, white. *Androecium* biseriate, outer whorl of 3 fascicles of 2–3 stamens each (6–9 stamens total), shortly (to 0.5 mm) fused basally, inner whorl of 3 staminodes; stamens

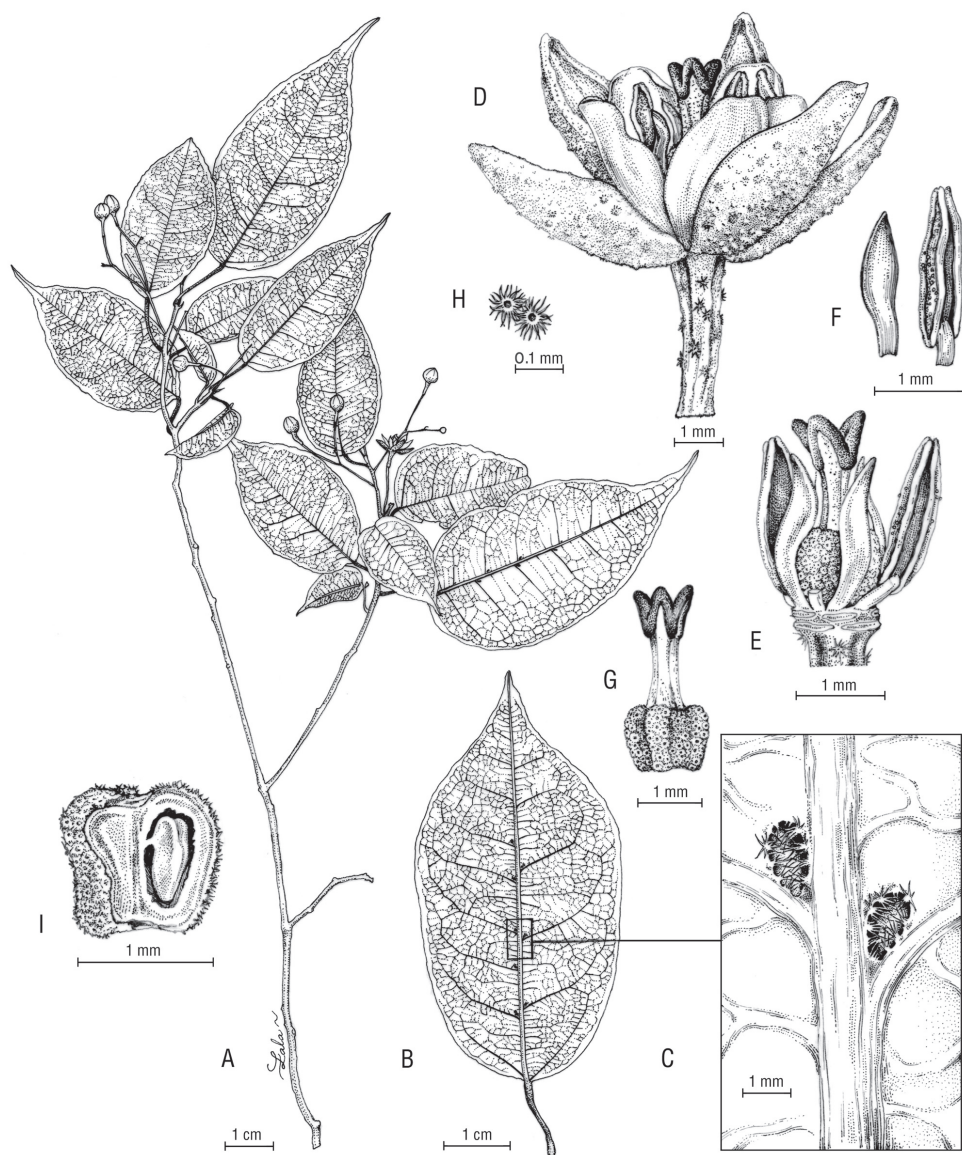


Figure 1. *Nesogordonia tricarpellata* Skema & Dorr. **A** habit **B** leaf blade below **C** leaf blade below, showing detail of domatia **D** flower **E** flower, calyx and corolla removed to show stamens, staminodes, ovary, stigma, and style **F** anther (right) and staminode (left) **G** gynoecium with lepidote scales on ovary and 3-parted style **H** detail of lepidote scales **I** immature fruit, longitudinal section showing position of winged ovule. Line drawing by L.R. Andriamiarisoa from herbarium specimen; voucher Rabenantoandro et al. 1711 (MO).

laminar; anthers 2.7–2.8 × 0.8–1.1 mm; lanceolate to oblong, asymmetric, 2.8–2.9 × 0.8 mm, apex acute to acuminate, fleshy. *Gynoecium* superior, ca. 1.5 × 1.5 mm, 3-carpellate, densely covered by small lepidote scales (ca. 0.15 mm in diameter); ovules 2 per carpel, basally winged, placentation subapical, axile; styles 3, connate, 2–2.5 mm

long; stigma lobes 3, ca. 0.8 mm long, fleshy, stigmatic surface on interior apical portion of lobes, deep red drying black. *Capsules* woody, obconic, 1.5–2 × 1.2–1.5 cm, slightly verrucose with scattered scales or short-armed stellate hairs, chestnut brown, apex depressed with a central umbo, rim not present or scarcely developed. *Seeds* 4–5 × 3–4 mm, seed wings 5–10 × 4–5 mm.

Distribution. Endemic to southeastern Madagascar, where it is known from two collections made in Parcelle 1 of the Parc National d'Andohahela (formerly Réserve Naturelle Intégrale d'Andohahela) and one on the lower slopes of the Ivohibe–Bemangidy forest (Fig. 2).

Ecology. Evidently restricted to humid forest from 90–500 m. Flowering specimens were collected in February (floral buds) and June (mature flowers). A fruiting specimen was collected in June.

Etymology. The epithet was chosen to highlight the fact that the gynoeceum of this species is 3-carpellate.

Conservation status. At present, this species is known from three collections and two localities, only one of which is protected (Parc National d'Andohahela). Based on this and estimates of an extent of occurrence < 100 km² and an area of occupancy < 10 km², *Nesogordonia tricarpellata* is assigned a preliminary status of Critically Endangered (CR B1ab(i-iv) + B2ab(i-iv)) following the criteria and categories of the IUCN (2001).

Specimens examined. Madagascar: Toliara: Intégrale Réserve # 11, Andohahela, Parcelle 1, Isaka Ivondro, 24°40'S, 46°52'E, 100–150 m. 12–23 June 1993 (fl), Randriamampionona 451 (MO), Ibid., 12–23 June 1993 (fr), Randriamampionona 470 (MO).

Discussion. We have no doubt that this new species belongs in *Nesogordonia* as it has the fruit and seeds unique to the genus: an obovoid woody capsule containing seeds with long, basal wings (Fig. 1I). *Nesogordonia tricarpellata* is remarkable in having an androeceum comprised of 6–9 stamens in an outer whorl and 3 staminodes in an inner whorl; a 3-carpellate ovary; 3 style branches and 3 stigma lobes; and a 3-valved capsule (Fig. 1E, G). While the number of stamens is variable in other species of *Nesogordonia*, the outer whorl typically possesses some multiple of five (usually 10–25 total) stamens and the inner whorl possesses either 5 free staminodes (most species) or 5 stamens (*N. abrahamii* L.C. Barnett, *N. ambalabeensis* Arènes, and *N. fertilis* H. Perrier). All other species of *Nesogordonia* have 5-carpellate ovaries, 5 style branches, 5 stigma lobes, and 5-valved capsules. Although the parts of the androeceum and gynoeceum of *N. tricarpellata* are reduced in number, the flowers of the new species are 5-merous with 5 calyx lobes and 5 petals, which also is characteristic of all other species of *Nesogordonia* (Fig. 1D).

Carpel number is variable in the Dombeyaceae, and it even varies within a genus (8 of 19 genera; Bayer and Kubitzki 2003). It is not surprising therefore that carpel number in *Nesogordonia* also is variable and the generic description should be modified to accommodate taxa that are 3-carpellate. Among the Malagasy genera of Dombeyaceae, only *Dombeya* Cav. (2-, 3-, or 5-carpellate) and *Helmiopsis* H. Perrier (3- or 5-carpellate) also

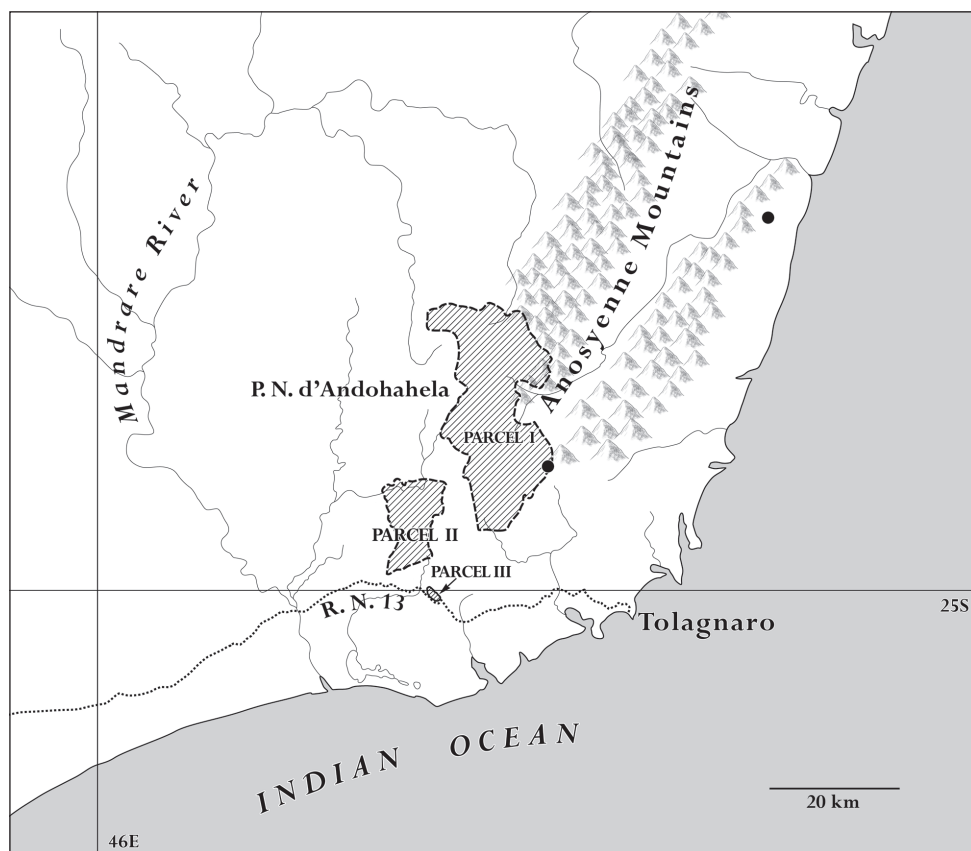


Figure 2. Map of extreme southeastern Madagascar showing where *Nesogordonia tricarpellata* Skema & Dorr has been collected and these two localities in relation to the three parcels that comprise the Parc National d'Andohahelo.

have species that are 3-carpellate (Arènes 1959, Skema and Dorr 2010). Like *Nesogordonia tricarpellata*, these other 3-carpellate species also possess a pentamerous perianth.

Nesogordonia tricarpellata is the only species in the genus with lepidote scales on the ovary (Fig. 1H, I). All other species of *Nesogordonia* have stellate hairs on the ovary (Barnett 1988). As has been noted before (Jenny et al. 1999, Dorr 2001), a number of other genera in the Dombeyaceae have species with either stellate hairs or lepidote scales on the ovary, including *Dombeya*, *Harmsia* K. Schum., and *Helmiopsis*.

Nesogordonia tricarpellata most closely resembles *N. micrantha* Arènes. The two species have similar leaf shape, size, and vestiture; inflorescence morphology; and floral bud shape. The leaf blades of both species are glabrous to sparingly pubescent with domatia of tufted hairs in the axils of the 1° and 2° veins below. The leaves of *N. micrantha*, however, are elliptic to obovate (versus elliptic to narrowly elliptic), 2.2–5 × 1.1–2.8 cm (versus 5–7.5 × 2.5–3 cm), apically acute (versus long acuminate), and the margin is undulate to slightly crenulate (versus slightly crenulate). Both species have

(1–) 2–3-flowered axillary, paniculate cymes and globose floral buds. The floral buds of *N. micrantha*, however, are densely (versus sparingly) stellate pubescent. In addition, the two species have non-overlapping geographical ranges; *N. tricarpellata* appears to be restricted to the Anosyenne Mountains in southeastern Madagascar while *N. micrantha* is known only from western Madagascar having been collected principally in the Forêt d'Antsingy.

The geographical distribution of *Nesogordonia tricarpellata* also is remarkable as the species has the southernmost distribution of any species in the genus. *Nesogordonia tricarpellata* appears to be restricted to humid forest on the eastern slopes of the Anosyenne Mountains in extreme southeastern Madagascar south of the Tropic of Capricorn (Fig. 2). The Parc National d'Andohahela includes the southernmost moist “tropical” forest in Madagascar, a forest that appears to be an extension of the humid montane forest common to the north but found at lower elevations in the Anosyenne Mountains (Goodman 1999).

Sequence data for one nuclear ribosomal (ITS) and five noncoding plastid markers have been gathered for *Nesogordonia tricarpellata* as part of an ongoing phylogenetic study of Dombeyaceae (Skema in prep.). Parsimony analysis of these data group this new species with *N. humbertii* Capuron (Randrianaivo et al. 1391), the only other species of *Nesogordonia* sampled, with high support (bootstrap = 100% from 10,000 replicates).

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***Trichospermum lessertianum* comb. n., the correct name for the Cuban species of *Trichospermum* (Malvaceae, Grewioideae) also found in Mexico and Central America**

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Abstract

The correct name for the Cuban species of *Trichospermum* Bl. (Malvaceae: Grewioideae) also found in Mexico and Central America is *T. lessertianum* (Hochr.) Dorr, **comb. n.** The name *T. mexicanum* (DC.) Baill., incorrectly applied to this Cuban species, should be restricted to a species endemic to western and southern Mexico.

Keywords

Belotia, Cuba, Grewioideae, Malvaceae, Mexico, new combination, Tiliaceae, *Trichospermum*

Introduction

Trichospermum Bl. (Malvaceae: Grewioideae, or Tiliaceae) is a genus of ca. 40 species found in tropical America, Asia, and the Pacific (Kostermans 1962, 1972). *Belotia* A. Rich., a generic synonym of *Trichospermum*, was described from Cuba. Misinterpretations of the legitimacy and identity of its generitype, *B. grewiifolia* A. Rich., have led authors treating *Trichospermum* (or *Belotia*) for various floras and revisions to adopt species names that are incorrect. Sorting out this confusion requires determining where *Belotia* was first published (there are three competing publications); demonstrating that *B. grewiifolia* was

nomenclaturally superfluous when published; and establishing the identity of the name, *Grewia mexicana* DC., that should have been adopted as the generitype of *Belotia*.

Achille Richard published *Belotia* in three different works that appeared in the 1840s; in volume 10 of Ramón de la Sagra's *Historia física, política y natural de la isla de Cuba* (Richard 1845: 82; see also Stafleu and Cowan 1983: no. 10.000), in an unnumbered volume of a French edition of the same work (Richard 1841: 207; see also Stafleu and Cowan 1983: nos. 9150, 10.002), and in the second volume of Charles d'Orbigny's *Dictionnaire universel d'histoire naturelle* (Richard 1842: 539; see also Stafleu and Cowan 1981: no. 7096; Evenhuis 1990). The volumes of the French version of de la Sagra's *Historia*, at least, were issued in parts (livraisons) and these parts were distributed well before the publication dates given on the volumes as a whole (Brizicky 1962: 84–86; see also Stafleu and Cowan 1983: no. 9150). While the title pages of both the French and Spanish volumes of de la Sagra's *Historia* that include *Belotia* have the year 1845, Brizicky (1962: 84–86) determined that the description of *Belotia* in the French edition actually appeared in a part (livraison) issued in 1841. The strongest evidence for this is the review of Richard's contribution to Cuban botany published by Grisebach (1842), which established that the livraison containing *Belotia* was available by the end of 1841. This is the publication date accepted by Stafleu and Cowan (1983: nos. 9150, 10.002). The publication of the second volume of d'Orbigny's *Dictionnaire*, which included a description of *Belotia*, followed in 1842. Stafleu and Cowan (1981: no. 7096) dated this volume 30 July 1842, but Evenhuis (1990) subsequently presented evidence that 20 June 1842 is the latest date at which the livraison containing a description of *Belotia* could have appeared. (The earliest possible, but not probable, date for the publication of this livraison is 24 January 1842). The description of *Belotia* in the *Dictionnaire* cites the paging and plate number (albeit incorrect) of the Spanish edition of de la Sagra's *Historia*, which implies that the latter was typeset but presumably not yet distributed. No other evidence has surfaced indicating that the publication of *Belotia* in the Spanish edition of de la Sagra's *Historia* was earlier than the date on the title page (i.e., 1845; see also Stafleu and Cowan 1983: no. 10.000) and without proof establishing some other date, the one appearing in the printed matter must be accepted as correct (see McNeill et al. 2006: Art. 31.1).

The fact that *Belotia* was first published in the French edition of de la Sagra's *Historia* has nomenclatural implications for the legitimacy of its generitype, *B. grewiifolia*. In the French edition, *B. grewiifolia* (Richard 1841: 209) is a superfluous renaming of *Grewia mexicana* DC. (1824: 510) as the latter name was placed in synonymy and is the name that should have been adopted (McNeill et al. 2006: Art. 52). Later, in both d'Orbigny's *Dictionnaire* and in the Spanish edition of de la Sagra's *Historia*, Richard equivocated with respect to this synonymy. In the former instance, he (1842: 540) wrote "*Belotia greviaefolia* Rich. (*Fl. Cubens* p. 82, t. 22), qui est probablement le *Grewia mexicana* DC." and in the latter (1845: 83) he cited *G. mexicana* in synonymy with a question mark. Sprague (1921), who revised the genus *Belotia*, recognized that the Mexican and Cuban species differed, but he failed to appreciate that *B. grewiifolia* was an illegitimate name and he used this name for one of two species he recognized from Cuba. He also confused *B. mexicana* (DC.) K. Schum. (basionym *G. mexicana*) with yet a different

species occurring in Mexico and Central America. Bullock (1939) continued to use the illegitimate name *B. grewiifolia* for a species from Cuba, but expanded his concept of this taxon's range to include Central America. He also continued to confuse the identity of *B. mexicana*. Farr et al. (1979: 91) and Rodríguez Fuentes (2000: 31) began to clarify the nomenclatural confusion by recognizing that *B. grewiifolia* is illegitimate, but the former did so while citing a place of publication (d'Orbigny's *Dictionnaire*) that if in fact had been the earliest publication would have resulted in the legitimate publication of the name (see McNeill et al. 2006: Art. 52, Note 1, Ex. 12) and the latter although citing the earliest place of publication failed to realize that *G. mexicana* is not conspecific with the Cuban species of *Trichospermum*.

Although the plate accompanying the description of *Belotia grewiifolia* is numbered tab. 21, the protologues of both Spanish and French versions of de la Sagra's *Historia* incorrectly cite tab. 22, which is a plate illustrating *Triumfetta grossulariifolia* A. Rich. (Malvaceae: Grewioideae). The plate caption for *B. grewiifolia* in the French (Richard 1841: 211), but not the Spanish version (Richard 1845: 84), however, is correctly labeled tab. 21. Although the plates today invariably are bound separately from the text in a folio volume, text and plates originally were probably available at the same time as each livraison of the French version, at least, of de la Sagra's *Historia* was projected to contain four folio plates accompanied by four sheets of text in octavo (see Stafleu and Cowan 1983: no. 9150). As early as March–June 1842 there is a published reference (Endlicher 1842: 108; “*Belotia* A. Richard *Flor. cub.* 207. t. 22”) to the French text of *B. grewiifolia* and its plate (albeit misnumbered).

The type of *Grewia mexicana* agrees well with the species treated as *Trichospermum insigne* (Baill.) Kosterm. in the *Flora Nova–Galiciana* (Fryxell 2001), which has broadly ovate leaf blades with acute apices and a dense and evenly stellate–tomentum below, flowers with sepals and petals ca. 10 mm long, and capsules 16–18 × 24–28 mm. This Mexican species is very distinct from the material of *Trichospermum* collected in Cuba, which has ovate leaf blades with acuminate to long acuminate apices and a sparse stellate–tomentum below, flowers with sepals and petals 4–6 mm long, and capsules 8–10 × 10–12 mm. A new combination for the Cuban species of *Trichospermum* is necessary as the earliest available epithet belongs to a species of *Belotia*. The name *T. mexicanum*, misapplied to the Cuban species, is here considered to apply to a species endemic to western and southern Mexico that is frequently but incorrectly cited as *T. insigne*.

Taxonomic summary

Trichospermum lessertianum (Hochr.) Dorr, comb. nov.

urn:lsid:ipni.org:names:77109528-1

Basionym: *Belotia lessertiana* Hochr., *Annuaire Conserv. Jard Bot. Genève* 18–19: 90. 1914, as “*Lessertiana*.” *Belotia grewiifolia* var. *lessertiana* (Hochr.) Vict., *Contr. Inst.*

- Bot. Univ. Montréal 63: 13. 1948. TYPE: CUBA. La Havane, s.d. (fl), *Delessert s.n.* (holotype: G-DEL; isotypes: K, NY! [00084148], P).
- Belotia caribaea* Sprague, Bull. Misc. Inform. Kew 1921(7): 276. 1921. *Trichospermum caribaeum* (Sprague) Kosterm., Reinwardtia 6(3): 278. 1962. TYPE: ST. LUCIA, s.d. (fl, fr), *Anderson s.n.* (holotype: K! [K000381875]).
- Belotia reticulata* Sprague, Bull. Misc. Inform. Kew 1921(7): 277. 1921. *Trichospermum reticulatum* (Sprague) Kosterm., Reinwardtia 6(3): 279. 1962. TYPE: NICARAGUA. Chontales, *Seemann 11* (holotype: K).
- Belotia campbellii* Sprague, Bull. Misc. Inform. Kew 1921(7): 277. 1921, as “*Campbellii*.” TYPE: BELIZE. Seven Hills Estate, s.d. (fl, fr), *E.J.F. Campbell 75* (holotype: K! [K000381880]; isotype: F).
- Belotia tabascana* Sprague, Bull. Misc. Inform. Kew 1921(7): 278. 1921. *Trichospermum tabascanum* (Sprague) Kosterm., Reinwardtia 6(3): 279. 1962. TYPE: MEXICO. Tabasco: Lomas de San Sebastián, 26 Mar 1889 (fl), *Rovirosa 416* (holotype: K; isotypes: F, NY! [00546807], US! [00098426]).

Distribution. Southern Mexico to Costa Rica, and in western Cuba. A collection stated to be from St. Lucia (the type of *Belotia caribaea*) represents either material cultivated in the St. Vincent Botanic Garden or mislabeled material from Cuba (Bornstein 1989: 185–186).

Note. The name *Trichospermum grewiifolium* (A. Rich.) Kosterm. is frequently applied to this species, but it is illegitimate because as explained in the text *Belotia grewiifolia* A. Rich. was nomenclaturally superfluous when published (McNeill et al. 2006: Art. 52.1) and cannot serve as the basionym for this combination. More recently, Rodríguez Fuentes (2000: 32) accepted *T. grewiifolium* as a new species published by Kostermans (1962) apparently in the belief that Kostermans had explicitly excluded the purported basionym’s type, but this is debatable and in any case *T. grewiifolium* is not a valid name as Kostermans failed to designate a nomenclatural type (McNeill et al. 2006: Art. 37.1).

Trichospermum mexicanum (DC.)

- Trichospermum mexicanum* (DC.) Baill., Hist. Pl. 4: 179. 1872 (excluding synonym *Adenodiscus mexicanus* Turcz.). *Grewia mexicana* DC., Prodr. 1: 510. 1824. *Belotia mexicana* (DC.) K. Schum. in Engler & Prantl, Nat. Pflanzenfam. 3(6): 28. 1890. *Belotia grewiifolia* A. Rich. in R. de la Sagra, Hist. Phys. Cuba, Pl. Vasc.: 209, t. 21. 1841 [1845], as “*greviaefolia*,” nom. illeg. TYPE: MEXICO. “Nova Hispania,” 1807 (fl), *Lagasca y Segura 86* (holotype: G-DC [IDC microfiche 216!]).
- Belotia insignis* Baill., Adansonia 10: 182. 1872. *Trichospermum insigne* (Baill.) Kosterm., Reinwardtia 6(3): 279. 1962, as “*insignis*.” TYPE: MEXICO. “Andes of Mexico,” *Ghiesbreght 356* (holotype: P, photo [F neg. no. 35430] US!; isotype: F).

Distribution. Endemic to western and southern Mexico, where it appears to be restricted to the Pacific lowlands and hills from Sinaloa to Oaxaca.

Note. McVaugh (2000: 526–527) speculated that the type of *Grewia mexicana* may have been a garden specimen grown at Madrid from Mexican seed contributed by the Expedición Real.

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Lectotypifications, synonymy, and a new name in *Capsicum* (Solanaceae)

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Abstract

Considerable confusion exists within *Capsicum* (Solanaceae) regarding the status and typification of several names, in part due to misidentifications. Some types were destroyed in Berlin during the Second World War, some have not been found by modern systematics, while others exhibit uncertain locality data or contain material from more than one species. Fourteen lectotypes, synonyms, and a new name, *Capsicum eshbaughii* Barboza **nom. nov.**, are proposed here.

Keywords

Capsicum, nomenclature, taxonomy, typification, “ulupicas”

Introduction

Capsicum L. (Solanaceae) comprises approximately 32 species, including five species (*C. annuum* L., *C. frutescens* L., *C. chinense* Jacq., *C. baccatum* L., and *C. pubescens* Ruiz & Pav.) known for their pungent fruits under the common names “chile”, “aji”, “paprika”, “chili”, “chilli pepper”, “tabasco”, “habanero”, pimenta-de-cheiro”, “rocoto”, etc. and the non-pungent *C. annuum* cultivars known as “sweet bell pepper” and “pimiento”.

This genus has been known since the beginning of civilizations in the Western Hemisphere and has been part of the human diet since 6000–7500 BC (Basu and De 2003; Perry et al. 2007). After Columbus introduced *Capsicum* seeds into Spain, the crop was widely spread all over the world. Currently, five domesticated species are

cultivated in many countries for their great economic value as vegetables, pungent food additives, colourants, pharmaceuticals, and even as popular medicines (Bosland and Votava 2000; Reifschneider 2000; Buckenhüskes 2003; Thampi 2003; Ravishankar et al. 2003; Barceloux 2008; Yamamoto and Nawata 2009). The fruits of most *Capsicum* species contain significant quantities of a great variety of metabolites (vitamins, carotenoids, minerals, proteins, carbohydrates, fats, fibre) but their importance is derived from their possession of the major pungent compounds capsaicin and dihydrocapsaicin (Bosland and Zewdie 2001; Pruthi 2003; Manirakiza et al. 2003) which accumulate in the secretory epidermis of the septum (Filippa and Bernardello 1992).

Tournefort (1719: 152) gave the name *Capsicum* to the genus which was later taken up by Linnaeus (1753: 188); since then there has been no consensus about the number of species included in it or its circumscription. Many species recognized as *Capsicum* today were originally described in different solanaceous genera such as *Acnistus* Schott, *Bassovia* Aubl., *Brachistus* Miers, *Fregirardia* Dunal ex Delile, *Solanum* L., and *Witheringia* L'Hér., while species now placed in diverse genera were originally described as members of *Capsicum*. The delimitation of *Capsicum* was chaotic until Hunziker and collaborators provided revisions of the morphologically similar genera *Witheringia* (Hunziker 1969), *Acnistus* (Hunziker 1982), *Vassobia* Rusby (Hunziker 1977, 1984), *Athenaea* Sendtn. (Barboza and Hunziker 1989), *Aureliana* Sendtn. (Hunziker and Barboza 1991), and *Lycianthes* (Dunal) Hassl. (Barboza and Hunziker 1992). A convincing circumscription of *Capsicum* (Hunziker 2001; Barboza and Bianchetti 2005; Barboza et al. 2010) has now been made possible using flower and fruit characters.

There is currently no consensus classification of *Capsicum* itself. The infrageneric taxa proposed by Kuntze (1891), Wettstein (1891), Bitter (1921) and Hunziker (1956) have later been recognized as the segregate genera: *Witheringia*, *Brachistus*, *Saracha* Ruiz & Pav., *Tubocapsicum* (Wettst.) Makino, *Aureliana* (Hunziker 2001). More recently, different classical and molecular cytogenetic analyses, crossing experiments, enzymatic studies, and chloroplast and nuclear DNA sequence studies (see references in Moscone et al. 2007 and Barboza et al. 2010), have allowed considerable progress in the characterization of infrageneric groups in *Capsicum*. At present, there is no formal infrageneric classification. Two attempts at grouping species were made based on cytogenetic studies (Moscone et al. 2007), and a combination of data from enzyme, crossing and molecular studies (Walsh and Hoot 2001). In both studies the informal classification is still considered provisional despite more than 50% of the species having been analyzed.

Working towards a complete treatment of wild *Capsicum* species I became aware of several instances of confusion regarding erroneous or uncertain names. In addition, some type specimens have not been found or have been destroyed in Berlin during the Second World War while others exhibit uncertain locality data or are composed of material from more than one species.

In this paper, lectotypes are designated for 14 names, and these are synonymized under their accepted names in *Capsicum*. In addition, a new name in *Capsicum* is proposed. In each case below, the locality information given for the lectotype corresponds with the information found on the specimen itself.

Lectotypifications

Acnistus geminifolius Damm., Bot. Jahrb. 36(4): 384. 1905. Type citation: [ECUADOR]. “Crescit in declivibus montis Carazou pr. Miligally (S[odiro]. n. 114/82 – Mai 1882); in silvis subandinis et subtropicis pr. Couzauho (S[odiro]. n. 114/81 – Mai 1882; in silvis m. Carazou (S[odiro]. n. 114/84)”.- Lectotype (designated here): [ECUADOR. Pichincha]. “In silv. Monte Corazón, Sep 1873, Sodiro 114/84” – P! (P00410128) = *Capsicum geminifolium* (Damm.) Hunz. (Hunziker 1956).

The original collections of Sodiro are thought to be deposited at QPLS and Q, both in Ecuador. No syntype collections of *A. geminifolium* I found in these or in B, G, MO, NY, SI, or US. A photograph of the destroyed specimen at B of Sodiro 114/82 exists at F (Field Museum Negative #2487). The only collection found, Sodiro 114/84, is housed at P and is here chosen as lectotype.

Brachistus coccineus Rusby, Bull. New York Bot. Gard. 8(28): 117. 1912 ≡ *Lycianthes coccinea* (Rusby) Rusby, Bull. Torrey Bot. Club 53: 210. 1926. Type citation. [BOLIVIA]. “Six feet high; San Buena Ventura, 1400 ft., Nov. 30, 1901 ([Williams] Nos. 623 and 634)”.- Lectotype (designated here): [BOLIVIA. Dpto. La Paz, Prov. A. Iturralde]. “San Buena Ventura, 1400 ft, 8 Nov 1901, R.S.Williams 634”.- NY! (NY00138552); isolectotypes: BM! (BM0000884131), K! = *Capsicum coccineum* (Rusby) Hunz. (Hunziker 1956).

Williams 634 at NY is the best and the most complete of the two cited Williams collections, with flower buds, flowers and mature fruits; it is selected here as lectotype. The second collection (Williams 623: BM!, K!, NY!, US!) is predominantly in fruit. After describing *B. coccineus*, Rusby (1926) transferred his species to *Lycianthes*, a placement later accepted by Morton (1944). This was due to Rusby's inspiration by Bitter's monograph on *Lycianthes* (Bitter 1919), which states that the possession of calyx teeth is a basic feature of *Lycianthes*. Hunziker (1956), on the other hand, emphasized the importance of the androecium (more so than the calyx) for the generic delimitation of *Capsicum* and retained *C. coccineum*. In relation to *B. coccineus*, Hunziker noted that the anthers are longitudinally dehiscent and the typical prominent staped (base of the filament broadened and fused to the corolla tube, with lateral auriculate appendages) of *Capsicum* species present in both syntypes.

Brachistus hookerianus Miers, Ann. Mag. Nat. Hist., ser. 2, 3 (16): 268. 1849. Type citation: “Ecuador, v. s. in herb. Hook. (Cerro de Lantana, Guayaquil, Jameson, et in horto Kewensis cultus)”. – Lectotype (designated here): [ECUADOR]. “Guayaquil, Cerro of Lantana, Jan 1846, W.Jameson s.n.” – K! (K000585919); isolectotype: US! photo + fragm. = *Capsicum hookerianum* (Miers) Kuntze (Jørgensen and León-Yáñez 1999).

Analysis of the original material suggests that Miers (1849) described *B. hookerianus* based mostly on the plant cultivated at Kew Gardens, now represented as a specimen at K. This specimen (with a duplicate at BM) has a small pubescent calyx with entire margin and 5 teeth, and a subcampanulate corolla as described in Miers' (1849) protologue. Three sheets of Jameson's field collection from Ecuador are deposited in Kew as *B. hookerianus*. In two of them (K000585918!, K000585920!), the only label data present is "Guayaquil" whereas in the third sheet (K000585919!), the label information is exactly as in the protologue. In addition, this specimen and a fragment of it at US show a 10-toothed calyx and a subcampanulate corolla. My analysis of the cultivated specimens at K and BM cited by Miers indicates that they belong to *C. rhomboideum* (Dunal) Kuntze. Hence the original material of *B. hookerianus* belongs to more than one taxon. Jameson's field collected material matches current usage of the name *C. hookerianum* (calyx conspicuously 10-toothed, corolla brilliant yellow, subcampanulate to campanulate, mostly with simple hairs, and leaves strongly attenuate) and is selected here as the lectotype.

Brachistus pubescens Stewart, Proc. Calif. Acad. Sci., ser. 4, 1: 137. 1911 $\equiv$ *Capsicum galapagoense* Heiser & P.G.Sm., Brittonia 10: 200. 1958. Type citation. [ECUADOR]. "Albamarle Isl.: Villamil, bushes in woodland, 450–600 ft. ([Stewart] nos. 3351–3352). James Isl.: James Bay, occasional bushes above 1600 ft. ([Stewart] n^o. 3353)".- Lectotype (designated here): [ECUADOR. Galapagos: Isla Isabela]. "Albamarle Island, Villamil, 450–600 ft., bushes in woodland, 3 Jan 1906, A.Stewart 3352". CAS!; isolectotypes: GH!, US! = *Capsicum galapagoense* Hunz. (Hunziker 1956).

The transfer of *B. pubescens* to *Capsicum* necessitates a new epithet due to the earlier publication of *C. pubescens* Ruiz & Pav. (Ruiz and Pavón 1799). Both Hunziker (1956) and Heiser and Smith (1958) chose epithets alluding to its origin in the Galapagos Islands, with Hunziker's name having priority. Erroneous type citations in Jørgensen and León-Yáñez (1999) citing Stewart 3353 at CAS as the holotype, with an isotype at GH should be corrected to syntype and isosyntype respectively (see ICBN Art. 9.8; McNeill et al., 2006). Only two of the syntype collections have been critically examined (Stewart 3351: CAS!, GH!, NY!, MO!, US!; Stewart 3352: CAS!, GH!, US!); no duplicates of Stewart 3353 could be found at either CAS nor GH. The best preserved of these specimens is Stewart 3352 (CAS!) which includes a flower, numerous flower buds and fruits, and has label data in accordance with the protologue description; the other sheets of Stewart 3352 (GH!, US!) have mainly only flower buds. *Capsicum galapagoense* is rare and is the only endemic species of *Capsicum* in the Galapagos (Isla Isabela [Albamarle] and Santa Cruz [Indefatigable]), known as "Galápagos pepper" (Mc Mullen 1999). It is superficially similar to *C. annuum* var. *glabriusculum*.

Capsicum campylopodium forma *magis-puberula* Chodat, Bull. Herb. Boissier ser. 2, 2: 815. 1902, syn. nov. Type citation. [PARAGUAY]. "In silvis pr. Sapucay, Dec.,

[Hassler] 1607; in silva Ipé-hu, Sierra Maracayu, Oct., [Hassler] 5134".- Lectotype (designated here): [PARAGUAY]. "In altoplanitie et decliviis "Serra de Maracayú", in silva Ipé-hu, Oct., Hassler 5134. Frutex 1–2, petala alba"- G!; isolectotypes: A!, K!, P! (P00410080, P00410081), S!, UC! (UC-944853), W! = *Capsicum flexuosum* Sendtn.

Chodat (1902) described this form using specimens from Paraguay he considered to belong to *C. campylopodium*, a Brazilian endemic. The type collections mentioned in the protologue (Hassler 1607 & 5134: A!, BM!, G!, K!, P!, S!, UC!, W!), and distributed in many herbaria constitute abundant and complete material, with buds, flowers and fruits corresponding to the original description. The specimen Hassler 5134 in G is designated lectotype since it bears more flowers. These plants have non-geniculate pedicels, similar to the situation observed in *C. flexuosum*, but not in *C. campylopodium* (Hunziker 1998; Barboza and Bianchetti 2005). The more abundant pubescence attributed to this form in the protologue is included within the variation of *C. flexuosum*.

Capsicum hispidum Dunal var. *glabriusculum* Dunal, Prodr. 13(1): 420. 1852. Type citation. "In Mexico circa Bejar (Berland[ier] n. 1863, in h. Moric.); circa Tampica de Tamaulipas. (Berl[andier], n. 95, in herb. Moric.)".- Lectotype (designated here): [UNITED STATES OF AMERICA, Texas, Bexar Co. San Antonio]. "Bejar, Sep 1828, Berlandier n. 1863" P! (P00410138); isolectotypes: BM! (BM000775839), F!, G!, NY! (NY00138591), P! (P00409852) = *Capsicum annuum* var. *glabriusculum* (Dunal) Heiser & Pickersgill (Heiser & Pickersgill 1975).

Among the original material cited by Dunal (1852), only the first widely distributed collection was successfully located. Dunal's protologue gives the collection locality as "In Mexico circa Bejar," now part of Texas (USA). After many searches for the correct name for the spontaneous variety of *C. annuum* (Shinners 1956; Heiser 1964; Heiser and Pickersgill 1969; D'Arcy and Eshbaugh 1973, 1974), Heiser and Pickersgill (1975) confirmed that *C. hispidum* var. *glabriusculum* is the correct basionym for the wild variety of *C. annuum* widely distributed in the Americas.

Capsicum microcarpum DC. var. *tomentosum* Chodat & Hassl., Bull. Herb. Boissier 2,4:80.1903. Type citation. [PARAGUAY]. "In dumetis collis Cerro hu, pr. Paraguay, Dec., [Hassler] n. 6498, in rupestribus pr. Cerro pyta, Febr., [Hassler] n. 1926".- Lectotype (designated here): [PARAGUAY]. "Prope Paraguari, in dumetis collis Cerro Hu, Dec 1900, E.Hassler 6498. Suffrutex 1–1.5 petala albivirentia interne avellanes punctata" – G!; isolectotypes: BM! (BM000087632a), K! (K000585894), P! (P00410166), MO!, S!, UC!, W! = *Capsicum baccatum* L. var. *baccatum* (Hunziker 1998).

Chodat and Hassler (1903) described this variety based on two very pubescent collections. Both specimens are complete and match the diagnosis, but the second one (Hassler 1926: BM!, G!, P!) has been found in fewer herbaria. Thus, I designate the widely distributed collection Hassler 6498 held in G as the lectotype. This variety was described as a xerophytic entity with a dense indumentum. Pubescence is a highly variable character in many *Capsicum* species (*C. chacoense* Hunz., *C. rhomboideum* (Dunal) Kuntze, *C. parvifolium* Sendtn., *C. baccatum* L., among others). After studying the original material of *C. microcarpum* var. *tomentosum*, Hunziker (1998) concluded that this taxon should be included in the range of variation existing in wild *C. baccatum* populations. This latter species is one of the few in *Capsicum* with a wide range of distribution in different habitats where ecological conditions do not determine the degree of pubescence of the populations (Barboza, pers. obs.). For this reason, I agree with Hunziker's statement since the dense pubescence of *Capsicum microcarpum* var. *tomentosum* does not justify the validity of this taxon but fits very well under the wild *C. baccatum* var. *baccatum*

Capsicum microcarpum DC. var. *glabrescens* Hassl., Repert. Spec. Nov. Regni Veg. 15: 244. 1918. syn. nov. Type citation. [PARAGUAY]. "Hassler 215, 5703, 6070, 12385".- Lectotype (designated here) [PARAGUAY]. "Iter ad Yerbales montium Sierra de Maracayu, in regione cursus superioris fluminis Jejui guazú, Dec., Hassler 5703"- G!; isolectotypes: BM!, GH!, K! (K000585896), MO! (MO503802), NY! (NY00138600), P! (P00410160, P00410161, P00482076), UC!, W! = *Capsicum baccatum* L. var. *baccatum*

The four syntypes of *C. microcarpum* var. *glabrescens* have been examined. All of them are good quality complete collections preserved in many herbaria (Hassler 215: G!, K!; Hassler 6070: G!, GH!, K!, MO!, NY!, P!, W!, UC!, US!; Hassler 12385: G!, GH!, K!, L!, MO!, NY! two sheets, UC!, US!, Z!). The sheet of Hassler 5703 at G is the most complete and is designated here as lectotype. As stated above under *C. microcarpum* var. *tomentosum*, both the tomentose and glabrescent populations of *C. microcarpum* correspond to the entity recognized as *C. baccatum* var. *baccatum*.

Capsicum microphyllum Dunal, Prodr. 13(1): 421. 1852, syn. nov. Type citation. "In Habaná (de la Sagra in h. DC.), in Texas, circa Rio de Medina prope Bejar (Berland[ier] 1907, in h. Moric.)."- Lectotype (designated here): [UNITED STATES]. "Texas, à Rio de Medina, Berlandier 1907", G!; isolectotypes: BM! (BM000775841), GH!, MO!, NY! (NY00138590), P! (P00409956, P00409851) = *Capsicum annuum* var. *glabriusculum* (Dunal) Heiser & Pickersgill

Both syntypes are good quality specimens in agreement with the diagnosis. Berlandier 1907 at G is selected as the lectotype as its duplicates are broadly distributed. De la Sagra's specimen (nº 3, [año]1888) appears to be preserved only at G-DC!

Berlandier's collections held at G!, GH! (date on label: Oct. 1828), NY!, and P! are mainly in fruit whereas the ones at BM! and MO! also have flower buds or flowers. The calyx shape and the fruit colour and shape are among the characters most useful for establishing the correct placement of this name. Thus, the small, cup-shaped and sub-dentate calyx and the globose-ovate red berry together with the presence of the solitary pedicels and white corolla (in sched. "corolla albida") clearly observed in these specimens are good matches for *Capsicum annuum* var. *glabriusculum*. The small size of the leaves is within the range of variation of this wild variety.

Solanum mendax Van Heurck & Müll. Arg., Observ. Bot. 61. 1870 $\equiv$ *Capsicum mendax* (Van Heurck & Müll. Arg.) J.F. Macbr., Candollea 5: 402. 1934. Type citation. "In Andibus Peruviae ecuadorensis (R. Spruce n. 5117! in hb. van Heurck et n. 5050! in hb. DC)". Lectotype (designated here): [ECUADOR]. "Baños, in sepibus, muris delapsis Aug 1857, Spruce 5050. Frutex valde ramosus; 8-pedalis. Flores flavi. Baccae nigrae" – K! (K000201915); isolectotypes: BM! (BM000777290), C!, G!, GH!, K! (K000201792), MO! (MO1287475, MO1287476), OXF!, P! (P00410209), W!, fragment at CORD! = *Capsicum rhomboideum* (Dunal) Kuntze (Jørgensen and León-Yáñez 1999)

Both syntypes cited in the original description are from the Andes of Ecuador. The specimen Spruce 5117 is deposited at K (K000201905!, K000201904!) and BM (BM000072741!) and apparently also at AWH. A note on sheet K000201904, states "Although Van Heurck quotes this number it does not agree with his description which answers to 5050 and is a *Brachistus*. N.E. Brown". According to Knapp (2002: 395), Spruce 5117 belongs to *Solanum nudum* Dunal. The collection Spruce 5050 has been widely distributed in different herbaria, and is very complete. Two sheets of Spruce 5050 are held at Kew, where Spruce's original set is deposited; K000201915 is the better sheet with more complete data in the label, and is here chosen as lectotype. Spruce has handwritten "baccae nigrae" on this sheet, and the dense pubescence, the rhomboidal to elliptic leaves, 5-toothed calyx, and campanulate corolla are clearly visible and match the protologue. The calyx with clearly observable teeth and anthers with longitudinal dehiscence are typical of the genus *Capsicum* and the combination of characters cited above fits under *C. rhomboideum*. The mature fruits of this species are bright red more than black but often become purple or darker on dry specimens.

Capsicum campylopodium Sendtn., Fl. Bras. 10(6): 144. 1846. Type citation: [BRAZIL]. "In Serra d'Estrella, prov. Rio de Janeiro: Schott; in Brasilia australiore: Sellow".- Lectotype (designated here): "Brasilia, Sellow 6"- P! (P00410022); isolectotypes: BM!, CORD!: fragment, K! (K000585891, right plant), F!: B photo n° 2865 + fragment.

Both syntypes were successfully located. Duplicates of Schott 5409 are housed at F!, GH!, and W!, and all of them are plants in flower. The Sellow collection has been distributed more widely; a photograph and a fragment (with fruit and seeds) of the Berlin specimen (“B 1543”) destroyed during World War II are held at F; the P sheet of Sellow includes flowering and fruiting material and has an original handwritten label assigning the number 6 to this collection. Of the two syntypes, the Sellow specimen at P is selected as lectotype since it is a complete one and it is possible to distinguish the most distinctive characters of *C. campylopodium* (toothless calyx, geniculate pedicels at anthesis, and black seeds with spine-like projections) (Barboza and Bianchetti 2005).

Capsicum eximium Hunz., Darwiniana 9(2): 235. 1950. Type citation. “Argentina. Salta. Quebrada de San Antonio, Pampa Grande, 1600 m, Dpto. Guachipas, leg. Armando T. Hunziker n° 1907, 6 May 1942. Ejemplar fructificado. (ATH[unziker]).- Semillas del ejemplar n° 1907 cultivadas en el Jardín Botánico de la Facultad de Agronomía y Veterinaria de Buenos Aires, leg. Armando T. Hunziker 7346, 4 Mar 1943. Ejemplares floríferos (ATH[unziker]).”.- Lectotype (designated here): “ARGENTINA: Semillas del ejemplar n° 1907 cultivadas en el Jardín Botánico de la Facultad de Agronomía y Veterinaria de Buenos Aires, A.T. Hunziker 7346, 4 Mar 1943” – CORD!; isolectotype: CORD!.

Hunziker cited two syntypes. The first collection (Hunziker 1907), is abundant consisting of 18 fruiting specimens held at CORD. The second one (Hunziker 7346) is here designated as lectotype; it originates from plants cultivated from seeds of the original collection and consists of two flowering branches on a single sheet. A duplicate of this latter collection is a small specimen also in flower. Fruiting specimens of *Capsicum* are not only difficult to distinguish from other species of *Capsicum* but sometimes also from some species of *Lycianthes* as both genera share the similar calyx features. The flowering collection is designated here as lectotype since the corolla is the best organ with which to characterize *C. eximium* (Hunziker 1950).

Capsicum mirabile Sendtn., Fl. Bras. 10(6): 143. 1846. Type citation: [BRAZIL]. “In sylvis fere ubique per prov. Sebastianopolitana et Paulinam, Decembri florens: Martius, Karwinski; in irriguis lapidosis in Serra de S. Geraldo, prov. Minarum, Aprili florens: Martius”.- Lectotype (designated here): [BRAZIL]: “In sylvis fere ubique per prov. Sebastianopol. et Paulinam, Dec., Martius s.n.”- M!

The three syntypes were examined. Even though the second syntype, deposited at BR! ([Brazil] “Prope Rio de Janeiro, L.B. de Karwinski s.n., 1823”), matches the protologue, the Martius specimen at M is chosen here as the lectotype as it is more complete and better preserved. Both specimens show the characteristic features of *C. mirabile* such as the narrowly elliptic and glabrous leaves (young leaves with scarce short hairs

on the margins), geniculate pedicels, glabrous calyx with 5 long teeth, stellate corolla, and black seeds with spine-like projections (Fig. 1). The third syntype (the Martius collection from Serra de S. Geraldo, Minas Gerais [M!, M photo n° 6522 at F!]) is unusually pubescent for this species.

Capsicum villosum Sendtn. var. *muticum* Sendtn., Fl. Bras. 10(6): 145. 1846. Type citation: [BRAZIL]. "In Serra d'Estrella ejusdem prov. [prov. Sebastianopolitanae]: Schott; in Brasilia australiore: Sellow".- Lectotype (designated here): [BRAZIL. Rio de Janeiro]: "Serra d'Estrella, Schott 5416"- W!

One of the two syntypes, the Sellow specimen at B (Sellow 79, in sched.), was destroyed and the only elements remaining of it are F neg. #2874 and an incomplete fragment at F! The other syntype (Schott 5416), here designated as the lectotype, is not a well-preserved specimen but the diagnostic characters of this variety (yellowish and

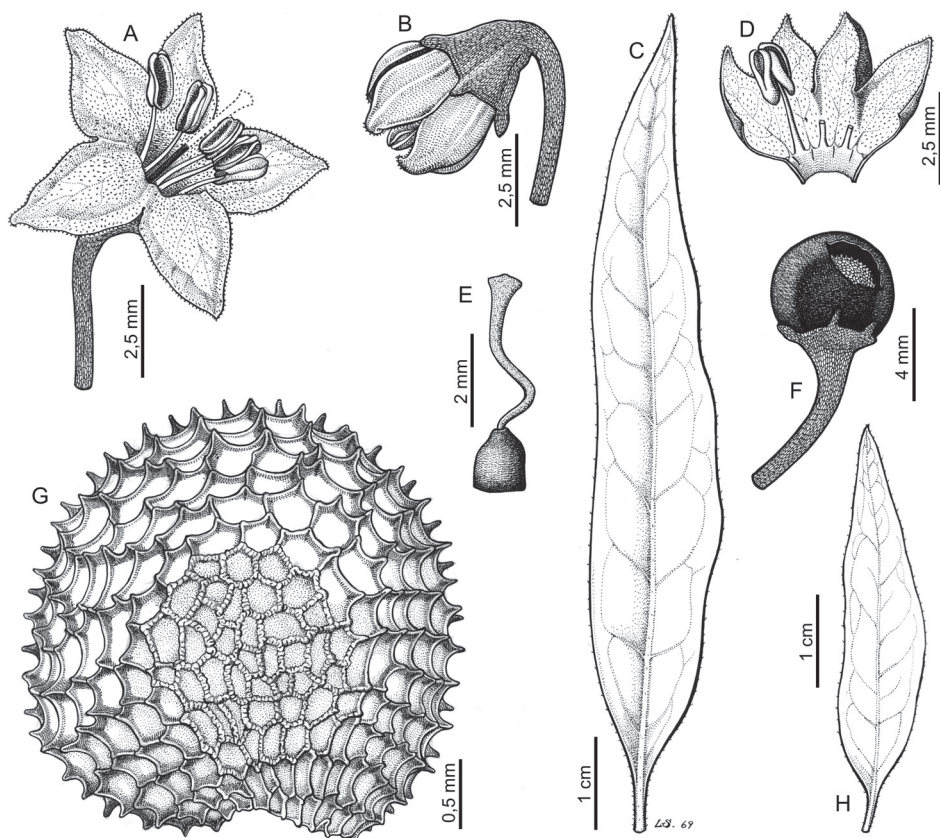


Figure 1. *Capsicum mirabile*. **A** flower **B** flower bud **C, H** leaf **D** open corolla **E** gynoecium **F** fruit **G** seed. Line drawing by L. Sánchez; voucher Martius s. n., lectotype.

long patent hairs on stem and pedicels, leaves densely pubescent in both surfaces, and angulate calyx with 5 short teeth), can be seen.

A new name for *Capsicum eximium* var. *tomentosum*

***Capsicum eshbaughii* Barboza, nom. nov.**

urn:lsid:ipni.org:names:77109529-1

Capsicum eximium var. *tomentosum* Eshbaugh & P.G.Sm., *Baileya* 18: 15. 1971, non *Capsicum tomentosum* Kuntze, 1891. - Holotype: BOLIVIA, Dpto. Santa Cruz, Prov. Florida, Mairana area, 1300 m, P.G.Smith Sa281 (holotype, IND!; isotypes: MU! (MU-153648, MU-153649). Fig. 2

Capsicum eximium var. *tomentosum* was described as an unusual glandular tomentose variety of *C. eximium* Hunz. The presence of this kind of pubescence densely covering the vegetative organs, pedicels, and calyx, and of a 5–10 toothed-calyx (Fig. 2 N) in specimens from a restricted area in south-central Bolivia (Dpto. Santa Cruz and Cochabamba) makes them quite different from *C. eximium*. In fact, *C. eximium* has non- glandular pubescence (Fig. 3 M), a calyx with only 5 teeth (Fig. 3 C, E), and is distributed in a larger area (Bolivia: La Paz to Tarija and Argentina: Jujuy to Tucumán).

Glandular hairs are rare in *Capsicum*. The dense indumentum of *C. eshbaughii* consists of different types of glandular trichomes, some of them observed only in this species. The hair variations are: long simple hairs with multicellular and verrucate stalks and unicellular stipitate (Fig. 2 F) or not stipitate (Fig. 2 B) heads; short hairs with bicellular smooth stalks and multicellular heads (Fig. 2 J); and bifurcate hairs with both branches ending in a unicellular head (Fig. 2 L) or one branch non-glandular and the other longer and glandular (Fig. 2 H).

Capsicum eshbaughii, together with *C. eximium* and *C. cardenasii* Heiser & P.G.Sm., is known as “ulupica” (Eshbaugh 1943 C); their very pungent fruits are very much appreciated as a spice or as pickles in the kitchens of Bolivia (Eshbaugh and Smith 1971).

This species is named in honor to Dr. W.H. Eshbaugh (Miami University) who first recognised the distinctness of this species and devoted part of his research to the taxonomy of chili peppers.

Specimens Examined. Bolivia. Cochabamba: José Carrasco Torrico, camino Cochabamba-Comarapa, Copachuncho, ca. 3000 m, 29 Mar 1987, D.Flores 89 (CORD, LPB). Santa Cruz: Florida, El Sauce, west of Samaipata, elev. 1730 m, 30 Mar 1987, W.H.Eshbaugh 1943 C & D (CORD); same locality, 1 Aug 1990, W.H.Eshbaugh 1943 a (CORD); 5 km (by air) SE of Mairana, on road to Samaipata, at “Quebrada Seca”, 18° 09' S, 63° 56' W, ca. 1550 m, 4 Feb 1988, M.Nee 36164 (CORD).

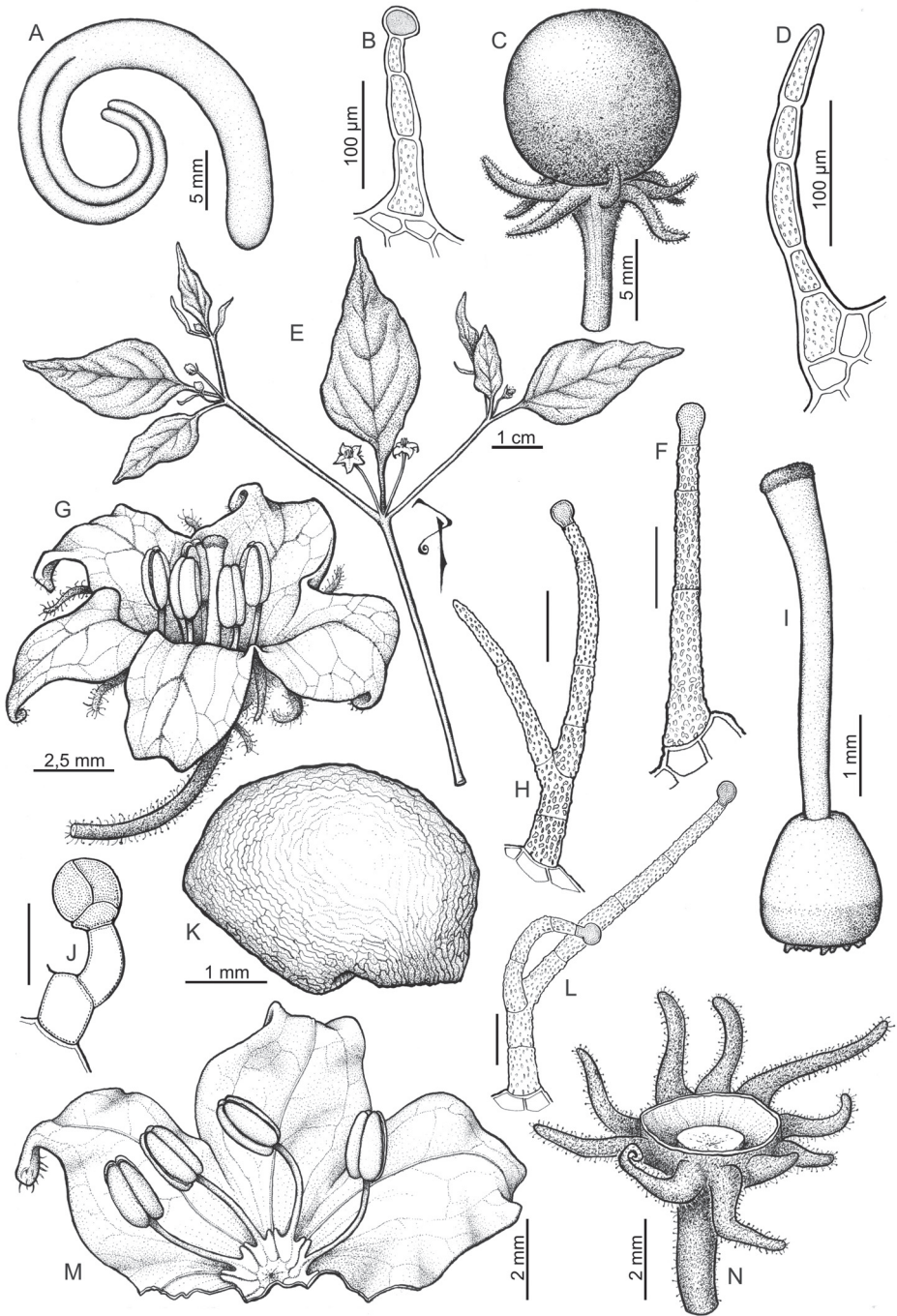


Figure 2. *Capsicum eshbaughii*. **A** embryo **B, H, F, J, L** glandular trichomes **C** fruit **D** non-glandular trichome **E** flowering branch **G** flower **I** gynoecium **K** seed **M** open corolla **N** fruiting calyx. Line drawing by P. Peralta; voucher A, C, K, N Nee 36164; B, D-J, L, M Eshbaugh 1943 b.

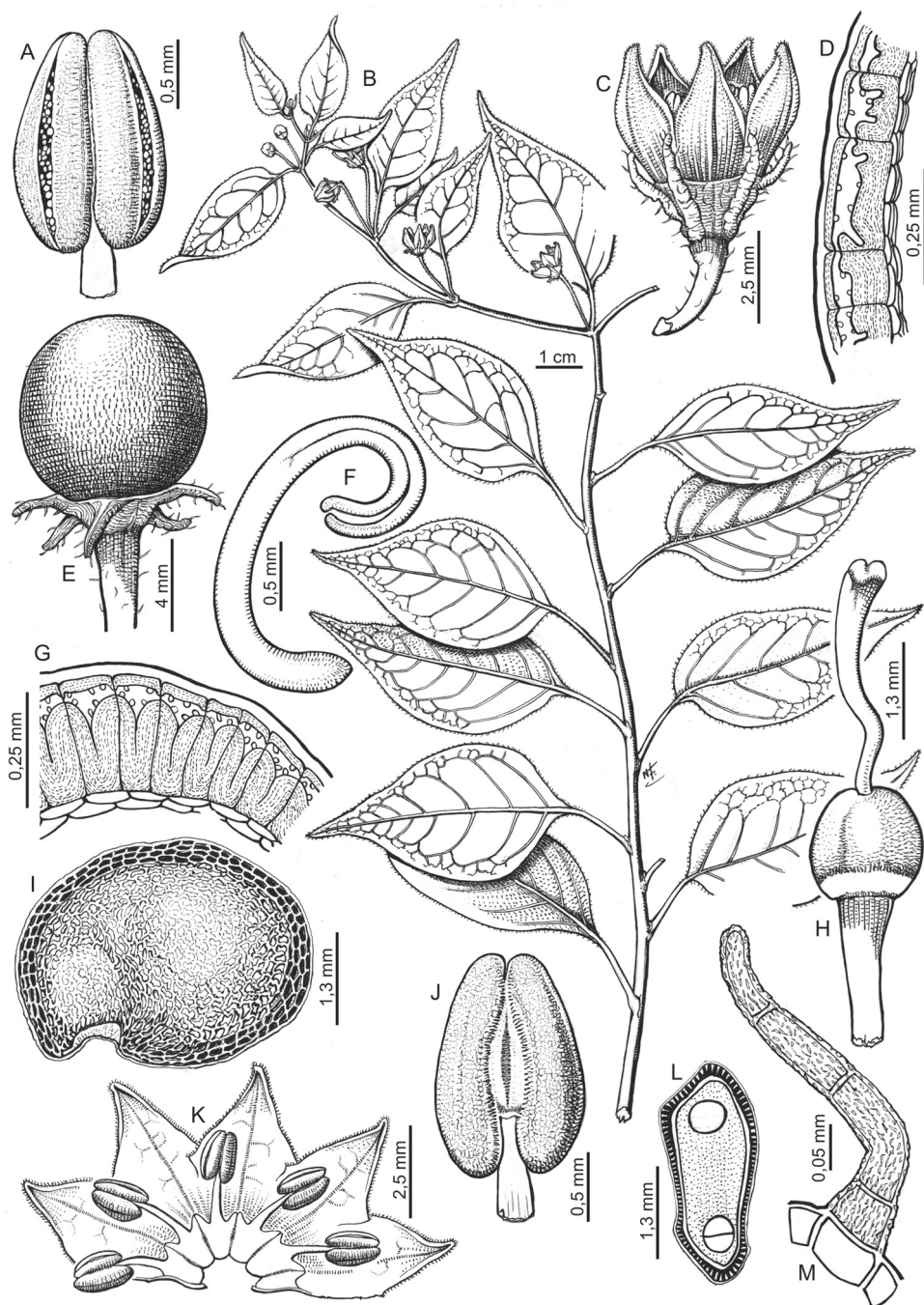


Figure 3. *Capsicum eximium*. **A, J** anthers in ventral and dorsal view respectively **B** flowering branch **C** flower **D, G** transverse section of the seed coat **E** fruit **F** embryo **H** gynoecium **I** seed **K** open corolla **L** seed in cross section **M** non-glandular trichome. Line drawing by N. Flury; voucher A, C–M: Hunziker 1907; B, Hunziker 7346.

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