New Species, Varieties, and Combinations in *Cuphea* (Lythraceae) from Brazil

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Abstract. Six new species and two varieties of *Cuphea* P. Browne (Lythraceae) are described from Brazilian collections. *Cuphea lucens* T. B. Cavalcanti & S. A. Graham from Minas Gerais is described in sect. *Melvilla* Koehne subsect. *Pachycalyx* Koehne where it is similar to *C. cylindracea* S. A. Graham but lacks the prominently descending floral tube spur of that species. *Cuphea alatosperma* T. B. Cavalcanti & S. A. Graham from the Amazon, with inflated-winged seeds, and *C. anamariae* T. B. Cavalcanti & S. A. Graham, a novelty from white sands in Minas Gerais, belong to sect. *Euandra* Koehne subsections *Platypterus* Koehne and *Hilariella* Koehne, respectively. *Cuphea exilis* T. B. Cavalcanti & S. A. Graham, *C. filiformis* T. B. Cavalcanti & S. A. Graham, and *C. rupestris* T. B. Cavalcanti & S. A. Graham, new species with linear-lanceolate leaves and a woody xylopodium (not confirmed in *C. exilis*), are members of sect. *Euandra* subsect. *Oidemation* Koehne, as are the newly recognized variety *C. spermacoce* A. St.-Hilaire var. *arguta* T. B. Cavalcanti & S. A. Graham and the new combination *C. spermacoce* var. *erectifolia* (Koehne) T. B. Cavalcanti & S. A. Graham. Lectotypes are selected for *C. erectifolia* Koehne and two forms of the species. A key to the varieties of *C. spermacoce* is provided.

Resumo. Seis novas espécies e duas novas variedades de *Cuphea* P. Browne (Lythraceae) são descritas a partir de coleções brasileiras. *Cuphea lucens* T. B. Cavalcanti & S. A. Graham, de Minas Gerais, é descrita para a seção *Melvilla* Koehne subseção *Pachycalyx* Koehne onde é semelhante à *C. cylindracea* S. A. Graham, mas difere por não possuir o cálcar proeminentemente descendente como naquela espécie. *Cuphea alatosperma* T. B. Cavalcanti & S. A. Graham, da Amazônia, com sementes de ala inflada e *C. anamariae* T. B. Cavalcanti & S. A. Graham, uma novidade das serras de solos de areia branca de Minas Gerais, pertencente à seção *Euandra* Koehne subseção *Platypterus* Koehne e *Hilariella* Koehne, respectivamente. *Cuphea exilis* T. B. Cavalcanti & S. A. Graham, *C. filiformis* T. B. Cavalcanti & S. A. Graham e *C. rupestris* T. B. Cavalcanti & S. A. Graham, novas espécies com folhas linear-lanceoladas e xilopódio (não confirmado em *C. exilis*), são membros da seção *Euandra* subseção *Oidemation* Koehne, assim como a nova variedade reconhecida *C. spermacoce* A. St.-Hilaire var. *arguta* T. B. Cavalcanti & S. A. Graham e a nova combinação *C. spermacoce* var. *erectifolia* (Koehne) T. B. Cavalcanti & S. A. Graham. Lectótipos são selecionados para *C. erectifolia* Koehne e duas formas das espécies. Uma chave para as variedades de *C. spermacoce* é fornecida.

Key words: Brazil, *Cuphea*, IUCN Red List, Lythraceae.

New taxa are described here as part of a collaborative effort to revise the large (90+ species), primarily Brazilian section *Euandra* Koehne of the genus *Cuphea* P. Browne (Lythraceae), and to identify undetermined material of the genus in the herbaria of Empresa Brasileira de Pesquisa Agropecuária (Embrapa) Genetic Resources and Biotechnology (CEN) and the University of Brasília (UB). The study adds six new species and two varieties to other recent additions of *Cuphea* discovered in the Brazilian flora (Graham & Cavalcanti, 1999; Cavalcanti & Graham, 2005). *Cuphea alatosperma* T. B. Cavalcanti & S. A. Graham (sect. *Euandra* subsect. *Platypterus* Koehne) from the Amazon has seeds with unique inflated seed wings unlike any other seeds in the genus. *Cuphea anamariae* T. B. Cavalcanti & S. A. Graham (sect. *Euandra* subsect. *Hilariella* Koehne) is a new member of the white sands flora in the species-rich Serra do Espinhaço of Minas Gerais state. In sect. *Euandra* subsect. *Oidemation* Koehne, which includes *Cuphea*

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possessing a xylopodium, three new species and two varieties are named: *C. exilis* T. B. Cavalcanti & S. A. Graham, with tiny, glaucous gray-green, uninerved, appressed leaves, discovered in botanically poorly known southern Pará; *C. filiformis* T. B. Cavalcanti & S. A. Graham, a species from Goiás and the Distrito Federal, with long, linear, nearly bladeless leaves that is closely related to *C. spermacoce* A. St.-Hilaire; *C. rupestris* T. B. Cavalcanti & S. A. Graham, an herb with verticillate, linear leaves from Goiás; and *C. spermacoce* var. *arguta* T. B. Cavalcanti & S. A. Graham and *C. spermacoce* var. *erectifolia* (Koehne) T. B. Cavalcanti & S. A. Graham. *Cuphea spermacoce* var. *arguta* is based on plants with 3-verticillate, narrowly linear-lanceolate leaves with a sharply acute-acuminate apex. *Cuphea spermacoce* var. *erectifolia* is reduced from *C. erectifolia*, and *C. erectifolia* forma *angustifolia* Koehne and forma *latifolia* Koehne are new synonyms of *C. spermacoce* var. *erectifolia*. *Cuphea lucens* T. B. Cavalcanti & S. A. Graham, with yellow floral tubes, is described in sect. *Melvilla* Koehne subsect. *Pachycalyx* Koehne. The species is known only from the type collection from southern Minas Gerais. Collections cited below include in brackets the latitude/longitude position to the nearest locality if a specific geographical reference point is not part of the original collection data.

1. **Cuphea alatosperma** T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Amazonas: Km 21 da Rodov. Itacoatiára–Manáus, beira Rio Urubú, [3°08′S, 58°26′W], 8 Nov. 1963, *E. Oliveira 2909* (holotype, UB; isotypes, IAN photo at CEN, MO). Figure 1.

Ad sectionem *Euandram* Koehne subsect. *Platypterum* Koehne pertinens. Species optime distincta tubo florali ampullaceo, 8–8.5 × 2.5–3.5 mm, erecto ad caulem parallelo, pedicellum subbasalem tenenti, etiam seminibus oblongo-obovatis marginibus alatis praeditis, alis seminum conspicuis inflatis, irregularibus, undulatis; caulibus semi-decumbentibus, non ramosis; foliis ovato-ellipticis; petalis 6, subaequalibus, lilacinis; ovulis 16.

Perennial herbaceous subshrubs, ca. 40 cm tall, roots fibrous, stems lax, semi-decumbent, spreading, unbranched, red-brown, densely and minutely hispid to strigose, becoming more densely strigose toward stem apex, the trichomes white, eglandular, sharp-pointed; internodes equal to or longer than the subtending leaves. *Leaves* decussate, spreading to ascending, subsessile, petioles 1–2 mm; blades narrowly ovate-lanceolate to elliptic, 15–33 × 8–15 mm, membranous, base and apex acute, margin plane, slightly undulate; blade surfaces scabrous, the trichomes minute, white, strigose, midvein and secondary veins reddish brown; leaves scarcely to not at all reduced in size toward the stem apex. *Inflorescences* frondose, sparsely flowered, secund racemes; flowers interpetiolar, alternate; pedicels ca. 2 mm, persistent, attached subbasally; bracteoles suborbicular, leaf-like, 1–1.5 × 1.5–2 mm, at midpoint of pedicel. *Floral tubes* oriented at 45° to the stem or some erect and parallel to the stem, 8–8.5 × 2.5–3.5 mm at anthesis, base rounded, not spurred, neck contracted at 5–6 mm from the base, mouth ca. 3 mm diam. in lateral view, neither oblique nor flared, ampullaceous in fruit; outer surface of floral tube pale rose with darker veins, minutely white strigose-hispid as on stems, glandular setae infrequent on the veins; inner surface white, villous above the stamens, retrorsely villous along the veins below the 2 dorsal short stamens, the rest glabrous, vesicles 0; sepals equal, ca. 1 × 2 mm, broadly deltate, apex acute, margin not ciliated; epicalyx segments thickened calluses at the sinus of the sepals, shorter than the sepals, strigose, margin scarcely free; petals 6, subequal, 4–4.5 × ca. 0.5 mm, linear to linear-obovate, clear lilac, caducous, the 2 dorsal petals subtended by a thickened callus, callus free at the margin and extended briefly along the vein; stamens 11, included, 2 dorsalmost shortest and most deeply inserted, the others reaching the sinus of the sepals, densely white villous except the 3 ventral antesepalous stamens glabrous; pollen oval-triangular in polar view, tricolporate, syncolpate, pores strongly protruding, exine striated, striae not reaching the pores, some ca. parallel with the equator, grain diam. 20–22 μm; style included, becoming subexserted in fruit, glabrous; ovary glabrous; ovules 16; nectariferous disc thick, horizontal, slightly cupping ovary, shallowly 3-lobed in dorsal view. *Seeds* oblong to obovate with winged margin conspicuously inflated; seed body ca. 2 × 1.5 mm, narrowly brown-marginate; outer inflated margin paler, undulate, encircling the seed body, irregularly interrupted, 0.1–0.4 mm wide.

Distribution and ecology. Brazil. Amazonas; river and lake margins; 10–50 m.

IUCN Red List category. Although the precise conservation status of *Cuphea alatosperma* is undetermined, the species should be classified as Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001) because the two localities where it has been found are likely to suffer increased disturbance with increasing travel along the roads outside of the large Amazonian city of Manaus and with tourism at Lago do Carauacu.

Phenology. Collected in bud, flower, and fruit in November and probably flowering from late October to February or March.

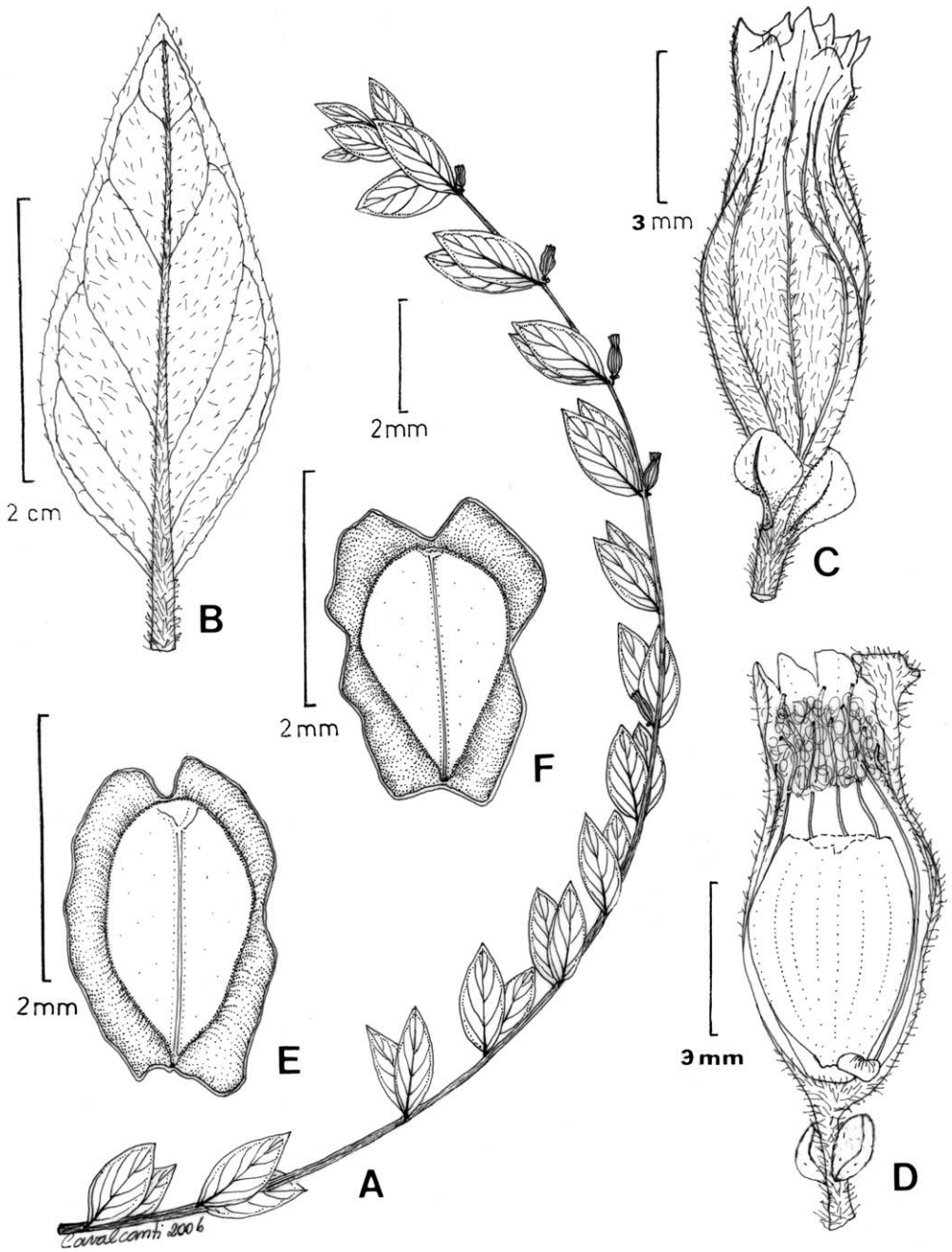

Figure 1. *Cuphea alatosperma* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Leaf, abaxial surface. —C. Floral tube in fruiting stage. —D. Floral tube, opened longitudinally, ovary apex and style removed. —E, F. Seeds, adaxial view, illustrating variation in the enlarged marginal seed wing. Drawn from the holotype (*Oliveira 2909*, UB).

Relationships. The flowers of *Cuphea alatosperma* are some of the most distinctive of the genus due to the subbasal attachment of the pedicel, which causes the nearly regular flower to be held approximately erect. All other *Cuphea*, with the exception of a few species in sections *Archocuphea* Koehne and *Cuphea* that have much smaller (3–7 mm), more bilateral, oppositely arranged flowers, have pedicels attached ventrally and are displayed at a 45°–90° angle to the stem. Furthermore, the seeds of *C. alatosperma* are unique in the genus in having a puffy, undulating wing surrounding the seed body. The inflated margin is

morphologically, although not phylogenetically, intermediate between the true wings seen in seeds of other genera of the Lythraceae such as *Diplusodon* Pohl, *Galpinia* N. E. Brown, *Lafoensia* Vandelli, and *Physocalymma* Pohl and the basically wingless, bilaterally compressed seeds of other *Cuphea*.

The relationships of *Cuphea alatosperma* are unclear. The species, following Koehne's classification (1903), belongs to the highly polymorphic sect. *Euandra* subsect. *Platypterus*, but it is unlike any species of that group. The IAN isotype was annotated by A. Lourteig (undated) as probably new and near *C. chiquitensis* Herzog (= *C. sessiliflora* A. St.-Hilaire; Lourteig, 1986) in sect. *Pseudocircaea* Koehne, but *C. alatosperma* lacks the diagnostic characters of that section, i.e., petals of *C. alatosperma* are not persistent, pollen is not diporate, and glandular-viscous trichomes are absent. Viable pollen is 42% of total pollen based on a count of 200 pollen grains stained in lactophenol cotton blue (Sass, 1958; Kearns & Inouye, 1993). Additional collections of the species are a high priority, given the near basal attachment of the flower, a trait desired by plant breeders who are developing non-shattering lines of *Cuphea* for commercial seed-oil sources (Knapp & Crane, 2000).

Paratype. BRAZIL. **Amazonas**: Rio Amazonas, Lago Carauacu, black water lake margin, [4°18′S, 62°4′W], 2 Nov. 1986, *G. T. Prance 30114* (MO [2], NY not seen).

2. Cuphea anamariae T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Minas Gerais: Joaquim Felício, Serra do Cabral, campo arenoso em topo de morro, com trechos alagáveis e campo rupestre adjacente, 17°45′S, 44°10′W, 13 Mar. 1999, *V. C. Souza & J. P. Souza 22021* (holotype, CEN; isotypes, CEN, ESA, MO). Figure 2.

Ad sectionem *Euandram* Koehne subsect. *Hilariellam* Koehne pertinens, sed foliis anguste lanceolatis, sessilibus (paucis falcatis), base rotundata et margine glandulari-viscosa, ciliata; floribus gracilibus, ca. 9 mm longis, calcari fortiter descendenti, introrsum omnino piloso, vesiculis nullis; ovulis 3; seminibus crassis, marginibus rotundatis et non distincte incrassatus distinguenda.

Perennial herbaceous subshrubs, ca. 35 cm tall, roots fibrous, stems erect, irregularly much branched, highly viscous and minutely glandular-hispid, the trichomes dense, translucent, erect; internodes mostly shorter than the subtending leaves. *Leaves* decussate, sessile; blades narrowly lanceolate tending to become falcate on distal branches, 10–35 × 3–10 mm, typically ca. 30 × 10 mm at midstem, distinctly smaller on the short secondary branches, chartaceous, base rounded, sometimes acute, apex acute, margin plane, younger leaves conspicuously ciliated by red glandular-viscous setae to 0.5 mm; blade surfaces minutely scabrous, appearing glabrous, with sparse red glandular setae as on the margin, prominent intramarginal vein visible on both surfaces; leaves gradually diminishing in size toward the apex of the stem. *Inflorescences* frondose, ± terminal racemes; flowers interpetiolar, alternate; pedicels 8–9 mm, attached ventrally, persistent; bracteoles ovate, to 1 × 0.5 mm, persistent at the apex of the pedicel. *Floral tubes* ca. 9 × 2 mm at anthesis including a distinctly descending, truncated spur 1–1.5 mm long, the tube enlarged basally, narrowed at the neck, mouth blunt, slightly upturned; outer surface wine-colored, sparsely glandular-hispid on the veins, mostly glabrous between veins, the trichomes 0.2–0.4 mm; inner surface pilose or pilose above the stamens and glabrous below them, vesicles 0; sepals equal, ca. 1.1 × 1 mm, deltate; epicalyx segments rounded thickenings, shorter than the sepals, ca. 0.5 mm, bearing 1 to a few short setae; petals 6, equal, ca. 4 × 2 mm, oblong-obovate, clear rose-colored, caducous; stamens 11, included, villous, 2 dorsalmost shortest and most deeply inserted, the others reaching the margin of the floral tube; pollen oval-triangular, tricolporate, syncolpate, pores strongly protruding, exine striate, grain diam. ca. 25 μm; style villous basally, included at anthesis; ovary glabrous; ovules 3; nectariferous disc ca. 0.8 × 0.6 mm, oblique, triangular in dorsal view. *Seeds* suborbicular to oblong, 2.1–2.2 × ca. 2 mm, thick, margin rounded, not distinctively rolled, thinned, or pale.

Distribution and ecology. Brazil. Minas Gerais; collected at the top of Serra do Cabral, a disjunct part of the extensive Serra do Espinhaço, in flooded areas of white sand; 700–1300 m.

IUCN Red List category. *Cuphea anamariae* is known only from the two cited specimens. The conservation status according to IUCN Red List criteria (IUCN, 2001) is estimated as Vulnerable (VU) on the basis of the restriction of the species to a disjunct section of the Serra do Espinhaço in very localized white sand habitats.

Phenology. Collected in flower and fruit in March, probably in flower from January to May.

Etymology. The species is named in honor of Ana Maria Giulietti-Harley (HUEFS), expert on the flora of the Serra do Espinhaço and friend and mentor of countless students of Brazilian botany.

Relationships. *Cuphea anamariae* is yet another novelty from the species-rich cerrado of the Serra do Espinhaço in Minas Gerais. The new species is distinguished by the unique character combination:

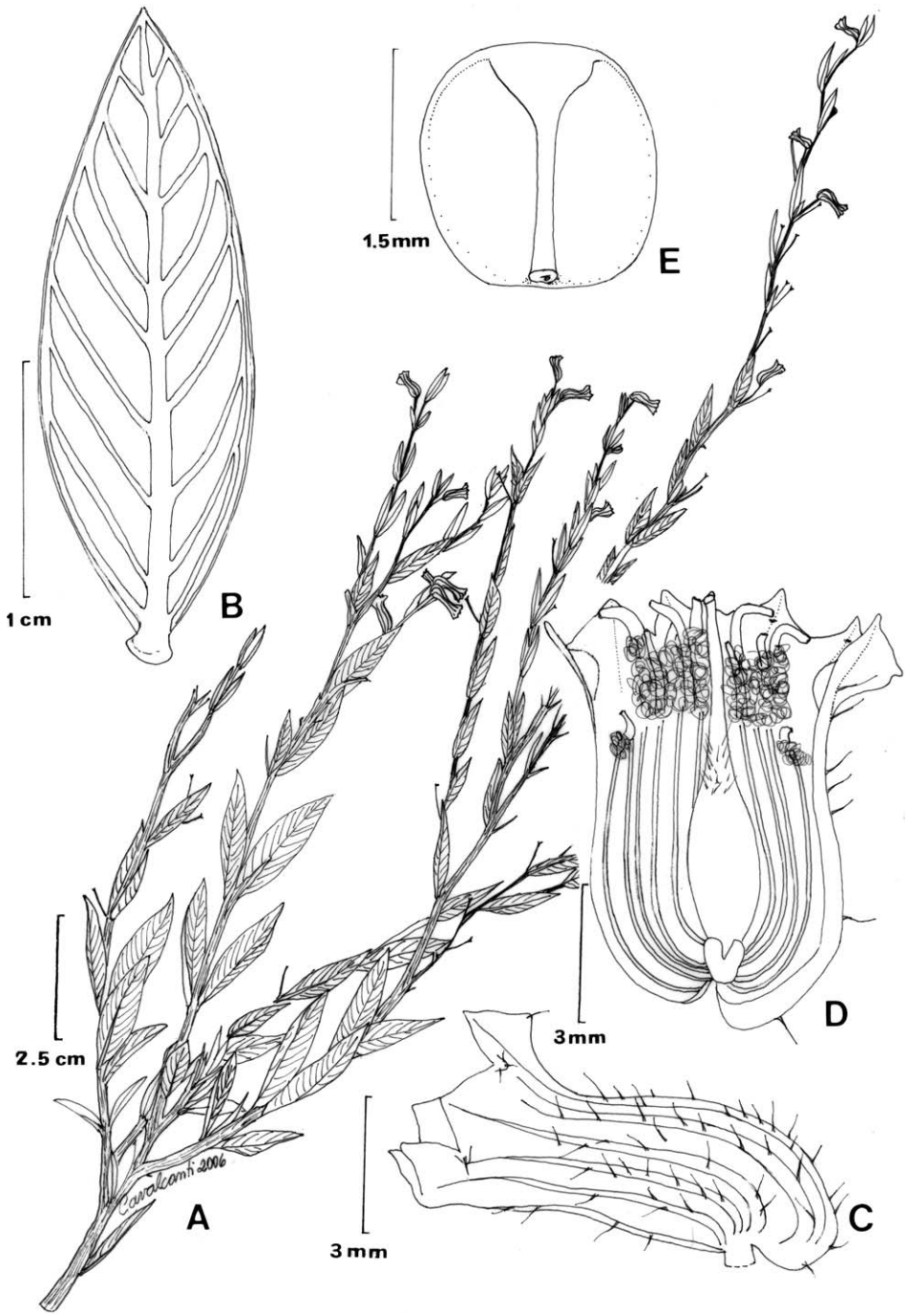

Figure 2. *Cuphea anamariae* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Leaf, abaxial surface. —C. Floral tube, lateral view. —D. Floral tube, opened along the mid-dorsal line. —E. Seed, adaxial view. Drawn from the paratype (*Hatschbach et al. 66217*, CEN).

narrowly lanceolate, sessile leaves, some falcate, with rounded base; slender flowers ca. 9 mm long with a strongly descending spur, floral tube lacking vesicles, internally totally pilose or rarely pilose only above the stamens. The species belongs among those currently classified in sect. *Euandra* subsect. *Hilariella* based on the presence of included stamens that extend to the margin of the floral tube, but no

other species of the section closely resemble it. The type was originally identified as *C. pseudovaccinium* A. St.-Hilaire, a species found in the same geographical area and which it resembles in its irregularly branching subshrub habit, but not at all in the morphology of the floral tube, which is slender (ca. 2 mm wide in lateral view) with a descending spur rather than, as in *C. pseudovaccinium*, thicker (ca. 3 mm wide in lateral view) and enlarged basally with a short, horizontal spur. The leaves of *C. pseudovaccinium* are also typically smaller (9–15 × 4–7 mm) and ovate.

Paratype. BRAZIL. **Minas Gerais**: Joaquim Felício, Serra do Cabral, [17°45′S, 44°10′W], 14 Mar. 1997, *G. Hatschbach*, *E. Barbosa & M. Hatschbach 66217* (CEN, MBM not seen).

3. Cuphea exilis T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Pará: Serra do Cachimbo, [9°18′S, 55°17′W], 425 m, 12 Dec. 1956, *J. M. Pires*, *G. A. Black*, *J. Wurdack & N. T. Silva 6117* (holotype, UB; isotype, IAN). Figure 3.

Ad sectionem *Euandram* Koehne subsect. *Oidemation* Koehne pertinens, sed ab speciebus omnibus uninervis sect. *Euandrae* foliis lanceolato-linearibus, griseo-glaucis, 3–12 × 1–3 mm, arcte cauli appressis, praeter marginem glabris, margine folii pilis setosis, ciliatis ornata; floribus 6–7 mm longis, base horizontali-rotundata, introrsum infra stamina duo brevia villosis, vesiculis nullis, pedicellis 1–2.5 mm longis, epicalyce non evoluto, seminibus oblongis, ca. 3 × 2.5 mm, marginibus crassis distinguenda.

Perennial herbs to 40 cm tall, stems erect, wiry, red-brown, one or more probably from an enlarged xylopodium, unbranched below, sparsely branched in the inflorescence, the branches varying in length, 1–18 cm, stems hirsute and microscopically hispid, the hirsute trichomes glandular-viscous, to 0.2 mm, the hispid trichomes white, erect, sharp; internodes mostly equal to or shorter than the subtending leaves. *Leaves* subopposite, appressed to stem, not imbricate, sessile; blades narrowly lanceolate-linear, uninerved, tapering slightly from base to apex, 3–12 × 1–3 mm, thickly membranous, base obtuse, apex acute, margin thick, plane, sparsely white punctate or short white glandular-ciliate; blade surfaces gray-green, glaucous, glabrous except margin sparsely ciliate, trichomes of young leaves minute, sparse, white, glandular, secondary venation not visible on either surface; leaves very gradually reduced in size toward the stem apex. *Inflorescences* frondose terminal racemes; flowers interpetiolar, alternate; pedicels 1–2.5 mm, attached ventrally, persistent; bracteoles lanceolate-ovate, ca. 0.7 × 0.2 mm, persistent at the apex of the pedicel. *Floral tubes* 6–7 × 1.2–1.5 mm including a rounded, horizontal spur 0.5–0.7 mm long, the spur slightly enlarged dorsally, neck scarcely or not at all contracted, mouth upturned, expanded, 4 mm diam.; outer surface deep wine-colored, minutely white hispid and glandular-hirsute, hirsute trichomes ca. 0.1 mm; inner surface glabrous above the stamens, densely white villous in 2 lines below the 2 dorsalmost short stamens, otherwise lightly pilose to glabrous below the stamens, vesicles 0; sepals equal, ca. 1 × 1 mm, deltate, apex acuminate; epicalyx segments absent or merely thickenings at the edge of the sinus, margin not setose, scarcely free; petals subequal, ca. 2 × 1 mm, linear or narrowly obovate, light purple, caducous; stamens 11, included, 2 dorsalmost shortest and most deeply inserted, the others reaching the sinus of the sepals, filaments densely white villous; pollen oval-triangular, tricolporate, syncolpate, pores strongly protruding, exine striate, 3 or 4 coarse striae flanking the pores, the rest of exine finely striate to psilate, grain diam. 18–20 μm; style included, glabrous; ovary glabrous; ovules 3; nectariferous disc thick, ca. 1 × 1 mm, oblique, slightly trilobed in dorsal view. *Seeds* oblong, ca. 3 × 2.5 mm, margin thick, rounded, slightly paler brown than rest of seed.

Distribution and ecology. Brazil. Pará; Serra do Cachimbo in the southwestern corner of the state; open wet grassy savanna on sandstone; 425 m.

IUCN Red List category. Information from the only two specimens of the species is too limited to determine the conservation status of the taxon. The status of *Cuphea exilis* is consequently considered Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Phenology. In bud and flower in mid-December with mostly immature seeds.

Relationships. There are several species of *Cuphea* sect. *Euandra* subsect. *Oidemation* with uninerved, lanceolate to linear leaves in the cerrado and grassy campos of eastern Brazil. *Cuphea exilis* is distinctive among them in having gray-green glaucous leaves and the leaf margin ciliated by minute white glandular trichomes when young. The pale gray color of the leaves, which are tightly appressed to the stem, contrasts strongly with the red-brown stems. Uniquely, too, for this uninerved group, the seeds of *C. exilis* are oblong, not orbicular with an obtuse to retuse apex as is typical of the subsection. Based on total morphology, the species belongs in subsection *Oidemation* although the presence of a xylopodium, diagnostic of the subsection, has not been confirmed. If roots instead are merely fibrous, the species keys in Koehne's (1903) monograph near

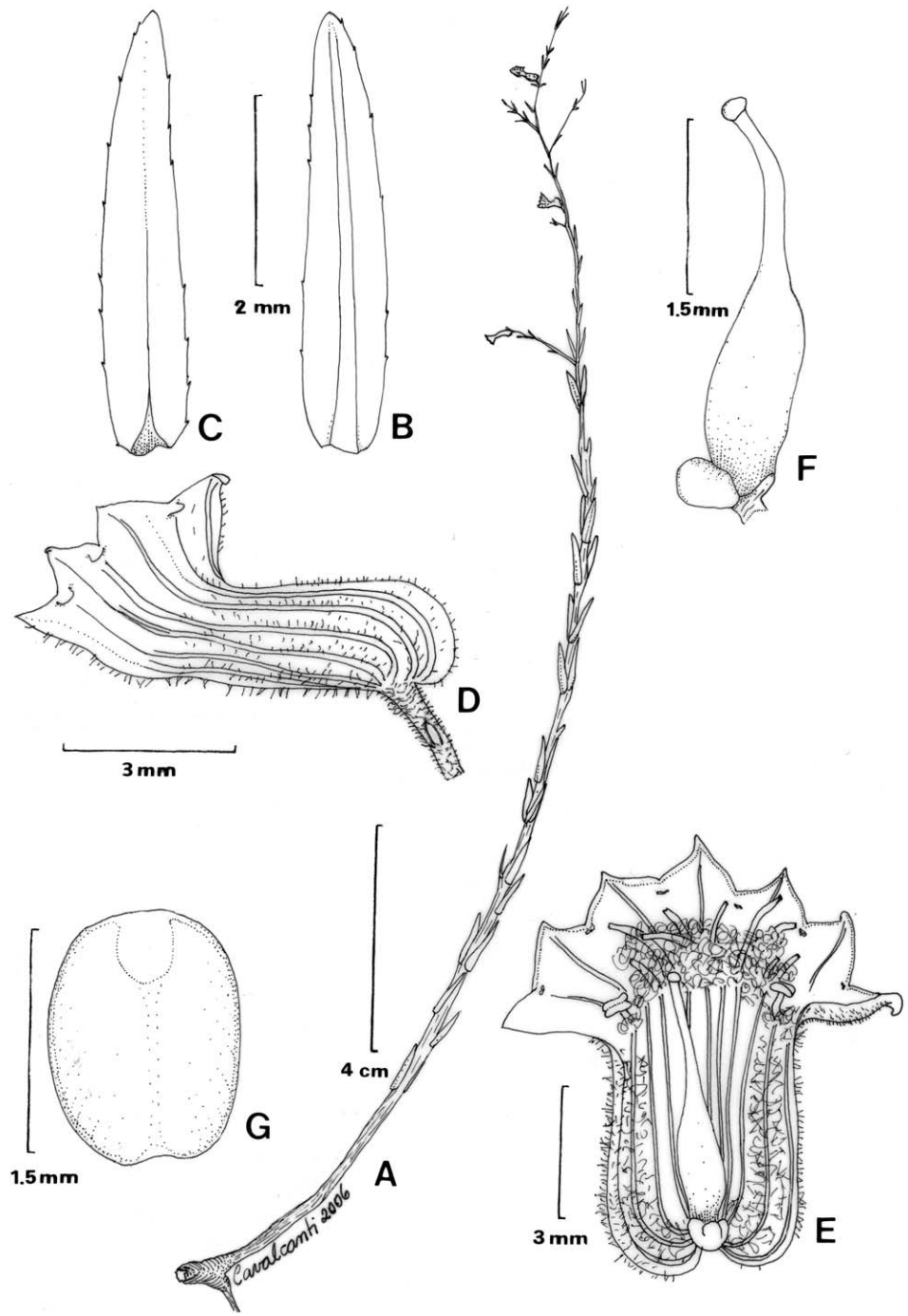

Figure 3. *Cuphea exilis* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Leaf, abaxial surface. —C. Leaf, adaxial surface. —D. Floral tube, lateral view. —E. Floral tube, opened along the mid-dorsal line. —F. Gynoecium, subtended unilaterally by the nectariferous disc. —G. Seed, adaxial view. Drawn from the holotype (*Pires et al. 6117*, UB).

C. sclerophylla Koehne in sect. *Euandra* subsect. *Hilariella*, a species with spreading, long, linear leaves (20–63 mm) and longer flowers (7.5–10 mm). The IAN isotype was annotated by A. Lourteig as *C. ericoides* Chamisso & Schlechtendal, a species of sect. *Trispermum*, and the U paratype as *C. hyssopoides* A. St.-Hilaire of sect. *Euandra* subsect. *Oidemation*.

Paratype. BRAZIL. **Pará**: Km 798, BR-163, Cuiabá–Santarém Hwy., vic. of Cachimbo Airport, Serra do Cachimbo, [9°18′S, 55°17′W], 11 Nov. 1977, *G. T. Prance, A. S. Silva, C. C. Berg, A. J. Henderson, B. W. Nelson, M. Balick, R. P. Bahia & R. dos Santos 25233* (MO, U 16063).

4. Cuphea filiformis T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Distrito Federal: Brasília, cerrado próximo Escola Fazendária, direita, sentido RECOR (IBGE), [15°47′S, 47°55′W], 24 Sep. 1979, *L. Coradin, A. C. Allem, J. G. Vieira & G. Pereira-Silva 2371* (holotype, CEN; isotypes, BHCB, K, MO, SPF, W). Figure 4.

Ad sectionem *Euandram* Koehne subsect. *Oidemation* Koehne pertinens, sed a *Cuphea spermacoce* A. St.-Hilaire foliis laminis fere carentibus, 3(4)-verticillatis, linearibus, griseo-viridibus, 20–55 × 0.7–1.5 mm differt.

Perennial herbs 30–60 cm tall, not viscous, stem solitary from a globose xylopodium, erect, unbranched or sparsely branched distally, minutely strigose with white, antrorsely oriented trichomes mixed with sparse longer, glandular-hirsute trichomes, or the indument entirely minutely hispid; internodes shorter than the subtending leaves. *Leaves* mostly 3(4)-verticillate, subopposite toward base of stem, ascending, not appressed to the stem, sessile; blades narrowly linear, uninerved, 20–55 × 0.7–1.5 mm, consisting primarily of a thick midvein, the blade scarcely developed, base attenuate, apex acute, margins plane, parallel; blade surfaces finely scabrous, gray-green, appearing glabrous, but with dense, minute trichomes; leaves not reduced in size toward the stem apex. *Inflorescences* frondose racemes; flowers interpetiolar, alternate or paired at the nodes; pedicels 4–7 mm, not consistently persistent, attached ventrally; bracteoles ovate, ca. 0.5 × 0.3 mm, at apex of pedicel. *Floral tubes* 7–9 × 2–3 mm at anthesis including a rounded, distinctly descending spur extending ca. 1.5 mm beyond the pedicel attachment, neck scarcely contracted in flower or fruit, mouth blunt to slightly flaring and upturned, 2.5–3 mm diam.; outer surface wine-colored dorsally with dark wine-colored veins, paler ventrally, appressed strigose and sparsely glandular-hispid or finely glandular-hispid and pubescent; inner surface white, villous above the stamens, densely to sparsely villous below them, vesiculate, 8 to 10 vesicles prominent between most or all stamen bases; sepals equal, ca. 1.5 × 1.5 mm, deltate, apex acute, margin not ciliated; epicalyx segments thickened calloses, hispid, scarcely free at the margin; petals 6, subequal, 4.5–6 × 1.5–2 mm, narrowly oblong, rose-colored, caducous; stamens 11, included, 2 dorsalmost shortest and most deeply inserted, the others gathered ventrally, antesepalous stamens reaching the sinuses of the sepals, antepetalous stamens deeper, filaments purple, densely to sparsely white villous, those of the 3 ventral antesepalous stamens sparsely villous to glabrous, anthers white; pollen oval-triangular, tricolporate, syncolpate, pores protruding, exine finely striated, grain diam. ca. 20 μm; style included, reaching the sinus of the sepals at capsule maturity, base of style and apex of ovary pilose; stigma punctiform; ovules 3; nectariferous disc thick, oblique, slightly cupping the ovary, 0.5–1 mm wide × ca. 0.5 mm deep. *Seeds* suborbicular, ca. 3 × 2.7 mm, slightly wider than long, brown, apex obtuse with prominent raphe, margin thick, rounded, neither pale, distinctively rolled, or thinned.

Distribution and ecology. Brazil. Goiás and the Distrito Federal; disjunctly distributed in northern Goiás and the Distrito Federal; cerrado, dry to locally moist or wet to inundated areas; 800–1230 m.

IUCN Red List category. Conservation status for *Cuphea filiformis* is estimated to fall within the Endangered (EN) category according to IUCN Red List criteria (IUCN, 2001). Few specimens are known and where the species has been observed in northern Goiás, the population consists of one to few individuals. Furthermore, the species was not present in 2005 at the type locality, which is now a heavily disturbed area within the city of Brasília.

Phenology. Observed in flower and fruit September to February.

Relationships. *Cuphea filiformis* is immediately recognizable by the long, nearly bladeless, verticillate, uninerved leaves. The flowers, which are long-pedicellate, can scarcely be distinguished from those of *C. spermacoce*, but the uninerved leaves and the predominance of strigose stem indument on three of the four collections suggest it is not merely an extremely narrow-leaved variant of *C. spermacoce*. There are narrow-leaved plants within *C. spermacoce* (described in this study as *C. spermacoce* var. *arguta* T. B. Cavalcanti & S. A. Graham, var. nov.), but the secondary venation is clearly evident on their broader leaves and the stem indument is typical of *C. spermacoce*, i.e., a mix of minute, erect, eglandular trichomes (hispid indument) and longer glandular-viscous trichomes (hirsute indument). *Cuphea filiformis* is clearly closely related to *C. spermacoce*, a species common to Goiás and Minas Gerais, but there are no known intermediate collections. Searches for the species at the type locality in the Distrito Federal were unsuccessful and it is unlikely to be found due to heavy disturbance in that urban area. A paratype locality in the Distrito Federal is now within the grounds of a restricted government naval facility and off-limits to collectors. The paratype collection

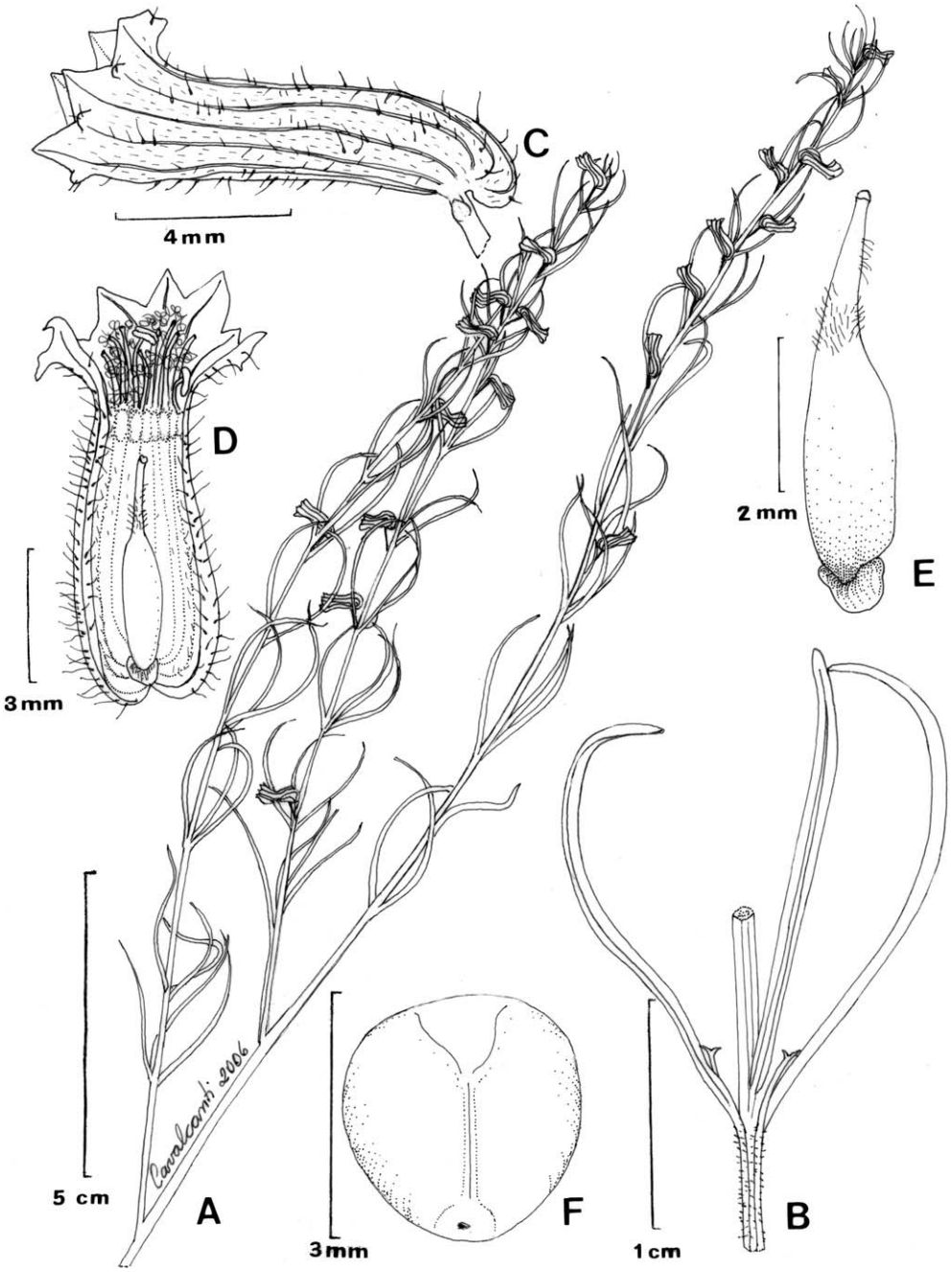

Figure 4. *Cuphea filiformis* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Stem node with 3-verticillate leaves and remains of two interpetiolar pedicels. —C. Floral tube, lateral view. —D. Floral tube, opened along the mid-dorsal line. —E. Gynoecium, subtended by nectariferous disc semi-cupping the ovary. —F. Seed, adaxial view. Drawn from the holotype (*Coradin et al. 2371*, CEN).

Cavalcanti et al. 3641 is isolated in northern Goiás and differs from the specimens collected in the Distrito Federal only by the emphasis on eglandular and glandular trichomes and the absence of minutely strigose indument. In northern Goiás, *C. filiformis* could be confused vegetatively with *C. acicularis* Koehne (sect. *Euandra*, subsect. *Hilariella*). That species, however, has malpighiaceous trichomes

oriented longitudinally on the stem and the floral spur is rounded and horizontal, not distinctly descending as in *C. filiformis*.

Paratypes. BRAZIL. **Distrito Federal**: Saia Velha, [15°47′S, 47°55′W], 15 Feb. 1965, *E. P. Heringer 10081* (UB); Brasília, área da marinha, campo de murundum, [15°47′S, 47°55′W], 19 Dec. 1991, *R. C. Mendonça, M. C. S. Jr., N. R. O. & T. S. Filgueiras 2051* (CEN). **Goiás**: Cavalcante, GO-118, Teresina de Goiás–Alto Paraíso de Goiás, Km 210 da rodovia, 13°53′02″S, 47°20′47″W, 18 Nov. 2005, *T. Cavalcanti, G. Pereira-Silva & S. Graham 3641* (CEN, MO).

5. Cuphea lucens T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Minas Gerais: Indianópolis, Fazenda Seríema, margin of gallery forest, 19°03′S, 47°57′W, 28 Feb. 1986, *G. Gottsberger & J. Döring 31-28286* (holotype, CEN; isotype, L not seen). Figure 5.

Ad sectionem *Melvillam* Koehne subsect. *Pachycalicem* Koehne pertinens, sed a speciebus similibus subsectionis, imprimis specialiter *Cuphea cylindracea* S. A. Graham, caulibus glabris vel leviter et sparse pubescentibus, foliis coriaceis, nitidis; tubo florali flavo, 18–22 mm longo, calcari brevi, 0.5–1 mm longo, horizontali-rotundato, segmentis epicalycis cylindricis et ovulis 7 ad 8 differt.

Perennial herbaceous shrubs 1–1.5 m tall, stems with ascending branches, glabrous or very sparsely pubescent, the trichomes minute, glandular, erect; internodes shorter than the subtending leaves. *Leaves* decussate, often crowded toward the tips of the branches, subsessile, petioles 1–3 mm; blades ovate-lanceolate, 12–37 × 5–20 mm, typically ca. 25 × 12 mm, coriaceous, base rounded or nearly so, apex acute or obtuse with very short acuminate tip, margin thickened to slightly inrolled; blade surfaces shining, glabrous except microscopic scabrous indument ca. 0.5 mm wide bordering the adaxial leaf margins, abaxial surface paler yellow-green, secondary and some tertiary venation conspicuous on both surfaces; leaves gradually reduced in size toward the stem apex. *Inflorescences* frondose racemes; flowers interpetiolar on main stem or on abbreviated axillary branchlets, alternate; pedicels ca. 4 mm; bracteoles ovate, ca. 0.75 × 0.4 mm, at apex of pedicel. *Floral tubes* 18–22 × ca. 4 mm including a rounded, horizontal spur 0.5–1 mm, floral tube uniformly broad in lateral view, neck not contracted in fruit, mouth blunt to slightly oblique by extension of the ventral side; outer surface yellow, the basal ca. 5 mm of the tube sparsely white pubescent to hirsute, the remainder glabrous; inner surface lightly villous above the stamens, glabrous between stamen insertion and level of the ovary, short-villous surrounding the ovary and along the veins of the 2 dorsalmost short stamens, the trichomes ± cylindrical, not flat and wide; epicalyx segments cylindrical, each bearing a glandular seta, erect in bud, exceeding the sepals; sepals broad, shallowly deltate, 0.3–0.5 × 1.5–1.7 mm, margin glabrous; petals 6, equal, 1–2 × 0.3–1 mm, cuneate-oblong, red; stamens 11, 2 dorsalmost shortest, inserted at ca. the same level as the ventral 9, antesepalous stamens glabrous, long exserted at maturity, antepetalous stamens villous, reaching the margin of the tube, filaments and anthers red; pollen diporate, the grain ca. 27 μm long; style included, becoming exserted with capsule maturity, surpassing the stamens, glabrous; ovary non-gibbous, glabrous; ovules 7 or 8; nectariferous disc ca. 3 × 2.5 mm, oblique, thick, semi-clasping the ovary, narrowly triangular in dorsal view, apex slightly deflexed. *Seeds* ca. 3 × 2.5 mm, suborbicular, margin rounded, not distinctively rolled or thinned, apex obtuse to retuse.

Distribution and ecology. Brazil. Minas Gerais, known only from the type collection.

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

Phenology. In flower and fruit in February, probably flowering January to ca. April.

Relationships. *Cuphea lucens* shares a large number of features with the Amazonian species of sect. *Melvilla* subsect. *Pachycalyx* including thick, coriaceous, nitidulous leaves, elongate yellow floral tubes with much-reduced petals, and an ovary surrounded by a villous ring of trichomes (Graham, 1990). Among these species, *C. lucens* most closely resembles *C. cylindracea* from southern Pará but differs by the short horizontal, rather than large descending spur; the nearly glabrous stems; cylindrical, not flattened, epicalyx segments; and seven or eight ovules, rather than five.

The presence of *Cuphea lucens* in southwestern Minas Gerais is notable because morphologically similar species of the subsection are distantly distributed in the savannas of Amazonian Brazil, Venezuela, and Colombia (i.e., *C. annulata* Koehne, *C. andersonii* S. A. Graham, *C. cylindracea*, and *C. egleri* Lourteig). Although four members currently classified in subsection *Pachycalyx* do occur in Minas Gerais, morphological and molecular data (Graham, 1990; Graham et al., 2006) indicate they are not closely related to the Amazonian species of the subsection and presumably not to *C. lucens*. Instead, they are related to species of section *Euandra* and differ from *C. lucens* by their deeply inserted

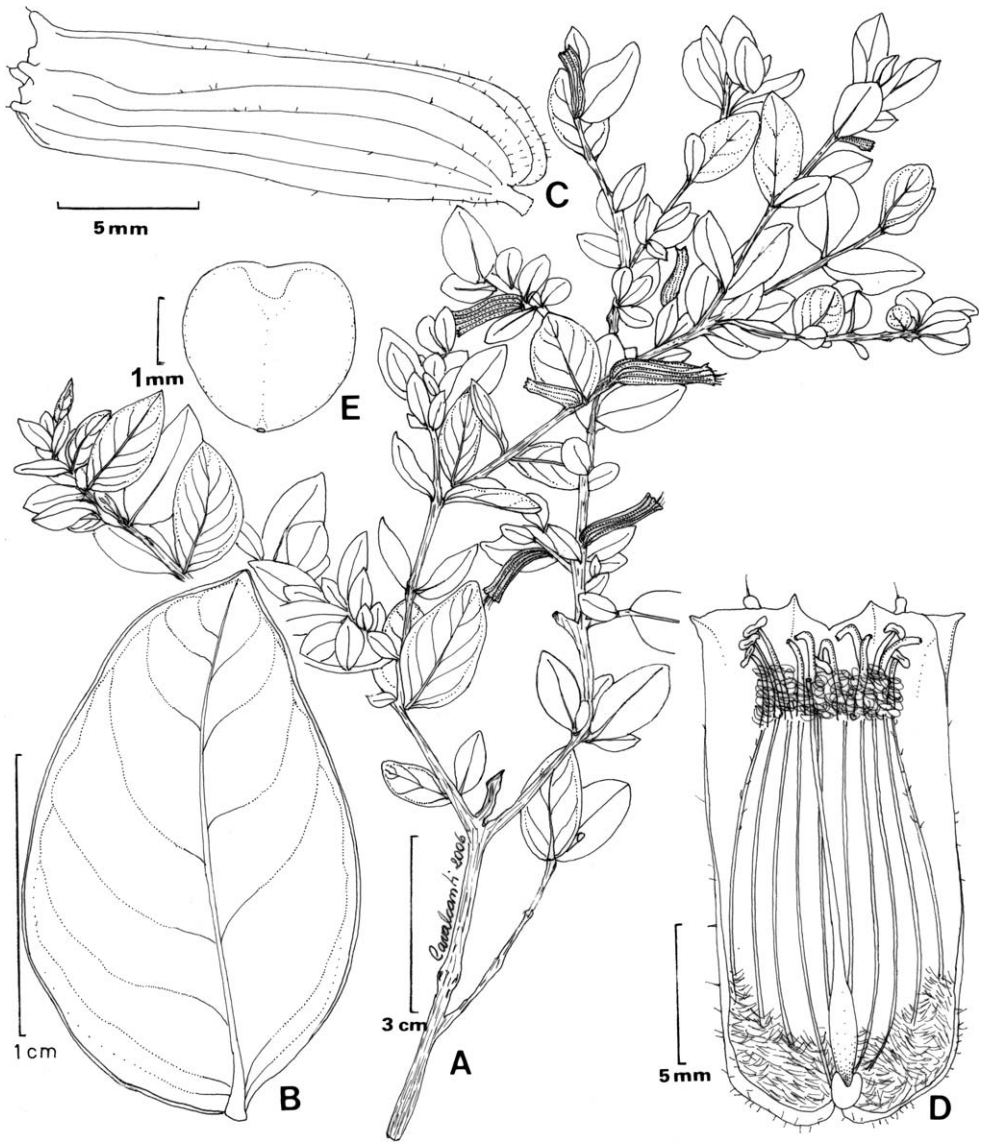

Figure 5. *Cuphea lucens* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Leaf, abaxial surface. —C. Floral tube, lateral view. —D. Floral tube, opened along the mid-dorsal line. —E. Seed, adaxial view. Drawn from the holotype (*Gottsberger & Döring 31-28286*, CEN).

dorsalmost stamens (*C. teleandra* Lourteig); or are more correctly classified in section *Pseudocircaea* by their persistent petals and thin membranous leaves (*C. gardneri* Koehne, *C. fuchsiifolia* A. St.-Hilaire); or are classified in subsection *Pachycalyx* but are morphologically distant from *C. lucens*, having a decumbent herbaceous habit and tiny subfleshy leaves with glandular-ciliate margins (*C. froesii* Lourteig). It is not possible at present to re-collect this interesting species because the type locality is on inaccessible private land.

6. Cuphea rupestris T. B. Cavalcanti & S. A. Graham, sp. nov. TYPE: Brazil. Goiás: Pirenópolis, [15°50′S, 48°57′W], estrada que leva ao Parque Estadual Serra dos Pirineus, 30 Dec. 2004, *J. F. Pastore & E. Suganuma 1209* (holotype, CEN; isotypes, K, NY). Figure 6.

Ad sectionem *Euandram* Koehne subsect. *Oidemation* Koehne pertinens, sed a speciebus sect. *Euandrae* omnibus foliis verticillatis praeditis foliis parvis, 15–25 × 1–5 mm, uninervia apparentibus apicem versus contractis, basim rotundatis vel cordatis, marginibus involutis, trichomatibus

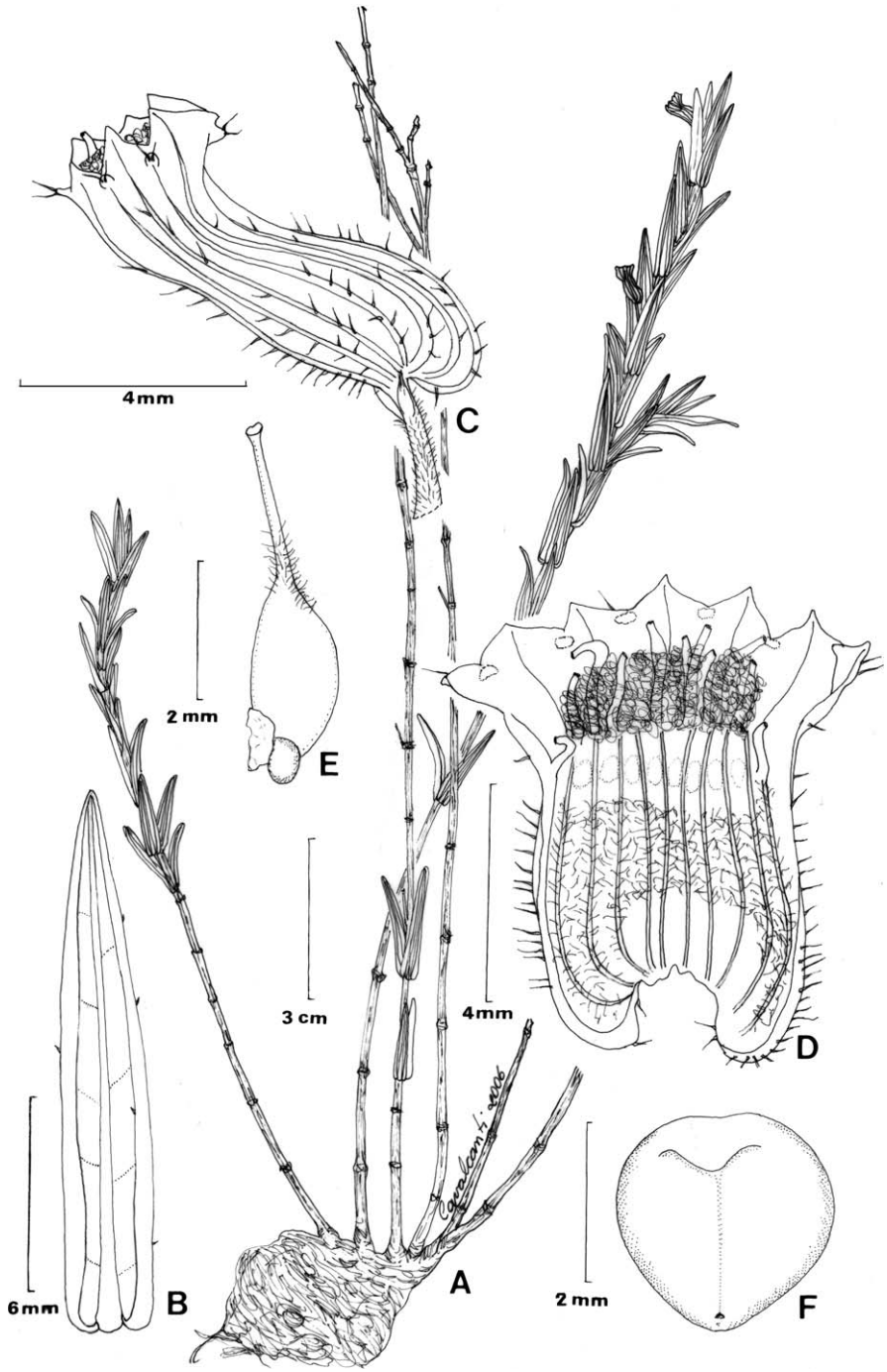

Figure 6. *Cuphea rupestris* T. B. Cavalcanti & S. A. Graham. —A. Habit including xylopodium. —B. Leaf, abaxial surface. —C. Floral tube, lateral view. —D. Floral tube, opened along the mid-dorsal line. —E. Gynoecium, subtended by the nectariferous disc, the disc attached on the left to tissue of the floral tube. —F. Seed, adaxial view. Drawn from the holotype (*Pastore & Suganuma 1209*, CEN).

malpighiaceis transverse orientibus, tubo florali 7–9 mm longo, calcari fortiter descendenti et petalis roseis differt.

Perennial herbs 30–50 cm tall, stems 1 to 6, dark red-brown, from a woody, elongated to globose xylopodium, unbranched or sparsely branched toward the base, minutely hispid and glandular-hirsute, hispid trichomes white, sharp-pointed, slightly ascending, glandular trichomes sparser, erect, ca. 0.5 mm; internodes ca. half as long as the subtending leaves. *Leaves* 3-verticillate or subopposite, erect, appressed against stem, frequently imbricate, sometimes with vegetative fascicles in the axis, sessile; blades linear-lanceolate, distinctly tapered from base to apex, superficially appearing uninerved but secondary venation visible on widest leaves, 15–25 × 1–5 mm, thickly membranous, base rounded to cordate, apex acute, margin slightly to strongly inrolled, on young leaves the margin bearing minute, malpighiaceous, transversely oriented trichomes (at 40× magnification); blade surfaces minutely scabrous, appearing glabrous, abaxially with or without sparse glandular trichomes; leaves not reduced in the inflorescence. *Inflorescences* frondose terminal racemes; flowers interpetiolar, alternate; pedicels 5–9 mm, persistent, attached ventrally; bracteoles narrowly ovate, ca. 0.5 × 0.2 mm. *Floral tubes* 7–9 × ca. 2 mm including a distinctly descending rounded spur extending ca. 1 mm beyond the pedicel, neck slightly contracted, mouth upturned, as wide as the floral tube, not flaring; outer surface deep wine-colored dorsally, green ventrally, sparsely to densely glandular-hirsute; inner surface densely white villous above the stamens, villous to sparsely villous below them, vesicles (0)5 to 8, prominent when present; sepals equal, ca. 1 × 1 mm, deltate; epicalyx segments small thickenings, bearing a few short setae, margin scarcely free; petals 6, subequal, ca. 4 × 1.5 mm, oblong to obovate, rose to light rose; stamens 11, 2 dorsalmost shortest and most deeply exserted, the others slightly exserted, with villous filaments, anthers white; pollen oval-triangular in polar view, tricolporate, syncolpate, pores strongly protruding, exine striate, 1 to 4 coarse striae flanking the pores and extending half or less the distance to the pole, grain diam. 25 μm; style glabrous distally, pilose basally, included, slightly exserted in fruit; ovules 3 or 4; nectariferous disc thick, oblique, slightly cupping base of ovary, ca. 0.5 × 1 mm, triangular in dorsal view. *Seeds* 2.8–3 × ca. 2.5 mm, oblong-ovate, margin rounded, not distinctively rolled or thinned, apex obtuse.

Distribution and ecology. Brazil. Goías; open rocky areas, cerrado, campo rupestre, campo limpo seco, and campo sujo, in sand and rocky sandstone soils; 1100–1350 m.

IUCN Red List category. *Cuphea rupestris* is narrowly distributed in a single serra where it is restricted to higher altitude, relatively undisturbed open, rocky, dry areas. In the Parque Estadual Serra dos Pirineus, the populations of *C. rupestris* are small, scattered, and vulnerable because of unrestricted access to the area. For these reasons, the species is best classified as in the category Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Observed in flower and fruit November to March.

Relationships. *Cuphea rupestris* belongs to the *C. spermacoce* complex of species (sect. *Euandra* subsect. *Oidemation*) as evidenced by the xylopodium, the mix of minute hispid and glandular-hirsute indument, long-pedicellate and vesiculate floral tubes, and the relatively large seeds with an obtuse apex. It differs from other linear, verticillate-leaved species in the subsection by leaves cordate at the base, tapered to the apex, and variably inrolled as far as the midvein, and by floral tubes with rose-colored petals, a deeply descending spur, and ovate bracteoles. There are no malpighiaceous trichomes on the stem, but under 40× magnification dense, malpighiaceous, transversely oriented trichomes appear on the rolled margin of the young leaves. *Cuphea rupestris* can be confused at a superficial level with *C. acicularis* (sect. *Euandra* subsect. *Hilariella*) because of the similar verticillate, linear leaves. In that species, however, the spur of the floral tube is horizontal, not descending; petals are white or, less often, pale pink; and stems bear longitudinally oriented malpighiaceous trichomes. The disjunct distribution pattern of *C. rupestris* is related to its specialized habitat. It is restricted to rocky, open, relatively undisturbed campo rupestre in cerrado at altitudes above 1100 m. This habitat type occurs on the Serra dos Pirineus in central Goiás and disjunctly to the northeast in the Chapada dos Veadeiros, Goiás.

Paratypes. Brazil. **Goiás**: Cavalcante, Aldeia Kalunga de Cavalcante, [13°41′S, 47°28′W], 6 Mar. 2003, *J. F. Pastore 443* (CEN); caminho para povoado de Kalunga, 3 Feb. 2004, *J. F. Pastore 842* (CEN); caminho para a Cachoeira Santa Bárbara, 6 Nov. 2004, *J. F. Pastore 1101* (CEN); Pirenópolis, Serra dos Pirineus, Cocalzinho–Pirenópolis, Km 10 na estrada da Serra, 15°48′S, 48°48′W, 18 Feb. 1999, *T. Cavalcanti & G. Pereira-Silva 2494* (CEN, MO); estrada Cocalzinho–Pirenópolis, via Serra dos Pirineus, 8.1 km, 15°48′S, 48°48′W, 14 Nov. 2005, *T. Cavalcanti, S. Graham & G. Pereira-Silva 3570* (CEN, MO); Serra dos Pirineus, ca. 11 km N of Corumbá de Goiás, 2 Dec. 1965, *H. S. Irwin, R. Souza & R. Reis dos Santos 10916* (NY, UB); 25 km N of Corumbá de Goiás on rd. to Niquelândia, in valley of Corumbá, 13 Jan. 1968, *H. S. Irwin, H. Maxwell & D. C. Wasshausen 18524* (NY, UB); Alto da Serra dos Pirineus, 7 Dec. 1995, *V. L. Klein 2987* (CEN, UFG); subida para Serra dos Pirineus, 26 Dec. 1968, *N. Lima & A. Lima 685* (UB).

7. Cuphea spermacoce A. St.-Hilaire, Fl. Bras. Merid. (A. St.-Hil.) 3(23): 114. 1833. TYPE: Brazil. s. loc., 1816–1821, *A. St.-Hilaire s.n.* (holotype [as type], P not seen, F neg. #038343 ex P).

7a. Cuphea spermacoce var. **spermacoce** A. St.-Hilaire.

Stem indument a mixture of minute hispid and glandular-hirsute types. *Leaves* mostly 3(4)-verticillate, spreading to ascending; blades ovate-elliptic to oblong or oblanceolate, 20–112 × 9–35 mm. Floral tubes 7–14 mm.

7b. Cuphea spermacoce var. **arguta** T. B. Cavalcanti & S. A. Graham, var. nov. TYPE: Brazil. Goiás: Cristalina, [16°45′S, 47°03′W], ca. 30 km ao N de Cristalina, 60-BR-040, 20 Nov. 1976, *A. C. Allem 513* (holotype, CEN). Figure 7.

Ad sectionem *Euandram* Koehne subsect. *Oidemation* Koehne pertinens, sed a varietate typica foliis 3-verticillatis, anguste lanceolato-linearibus, 15–60(–70) × 0.5–6 mm, marginibus gradatim decrescentibus, non revolutis et venis conspicuis secundariis differt.

Stem indument a mixture of minute hispid and glandular-hirsute types. *Leaves* 3-verticillate, sometimes decussate near base of stem, spreading to semi-erect, not appressed, sessile; blades narrowly lanceolate-linear, 15–60(–70) × 0.5–6 mm, typically ca. 40 × 6 mm at midstem, base round or acute, apex sharp, long acute-acuminate, margins tapering toward the apex, plane, not revolute, secondary venation distinctly visible; blade surfaces glabrous or bearing occasional setae. *Floral tubes* 7–9 mm, spur descending.

Distribution and ecology. Brazil. Goiás; cerrado and campo sujo, in sandy and rocky soils, and red-yellow latosols; 800–1200 m.

IUCN Red List category. The conservation status is Data Deficient (DD) based on IUCN Red List criteria (IUCN, 2001). Only two collections are known, and information about population size or threat to the environment in which the species occurs is limited.

Phenology. Known to flower and fruit from September to January; the flowering period probably extending to March based on flowering periods of similar taxa.

Relationships. Cuphea spermacoce var. *arguta* is distinguished from the nominate variety by its long, narrow, sharply acute leaves that, despite the narrow blade, still show the prominent secondary venation and strong intramarginal vein typical of *C. spermacoce*. Stem and floral tube trichomes are the same as in variety *spermacoce*, being a mix of minute hispid and glandular-hirsute types (very sparse glandular-hispid trichomes in the Minaçu paratype). The variety differs from *C. filiformis*, a similar narrow-leaved species of the subsection, by the stem indument and the broader leaf blade. Stems of *C. filiformis* bear antrorse strigose trichomes, and the leaves, consisting almost entirely of midvein, are not tapered as in *C. spermacoce* var. *arguta*. The flowers of the two taxa are indistinguishable.

Paratypes. BRAZIL. **Goiás**: Cristalina, [16°45′S, 47°03′W], 12 km S of Cristalina, 3 Nov. 1965, *H. S. Irwin, R. Souza, R. Reis dos Santos 9876* (NY); Minaçu, [13°31′S, 48°13′W] estrada Nova Minaçu–Serra da Mesa, 24 km do asfalto, 11 Oct. 1991, *T. Cavalcanti, B. M. T. Walter, G. Pereira-Silva, H. Garboggini & S. Pinheiro 990* (CEN, MO).

7c. Cuphea spermacoce var. **erectifolia** (Koehne) T. B. Cavalcanti & S. A. Graham, comb. et stat. nov. Basionym: *Cuphea erectifolia* Koehne, Fl. Bras. 13(2): 277, pl. 50, fig. 2. 1877. TYPE: Brazil. Minas Gerais: "Ad Paracatú," [17°13′S, 46°52′W], *J. B. E. Pohl 861* (lectotype, designated here, W; isotypes, BR, K, M [2], OXF).

Cuphea erectifolia f. *angustifolia* Koehne, Fl. Bras. 13(2): 277. 1877. TYPE: Brazil. Minas Gerais: "Ad Paracatú," *J. B. E. Pohl 861* (lectotype, designated here, W, p.p. [the 7 stems marked "a"]; isotypes, F neg. #19610 ex M, M).

Cuphea erectifolia f. *latifolia* Koehne, Fl. Bras. 13(2): 277. 1877. TYPE: Brazil. Minas Gerais: "Ad Paracatú," *J. B. E. Pohl 861* (lectotype, designated here, W, p.p. [the 3 stems marked "b"]; isotypes, F neg. #19610 ex M, M).

Stem indument a mixture of minute hispid and glandular-hirsute types. *Leaves* decussate, rarely 3-verticillate, erect, closely appressed against the stem, sessile; blades narrowly ovate to ovate-elliptic or ovate-oblong, 10–20 × 3–7 mm, typically ca. 16 × 6 mm at midstem, base rounded to subcordate, margin moderately glandular-ciliate or glabrous, plane, or revolute only to the intramarginal vein, apex acute, blade surfaces minutely scabrous, secondary venation visible on both surfaces. *Floral tubes* 8–10 mm, spur descending or rarely horizontal on smallest flowers.

Distribution and ecology. Brazil. Goías and Minas Gerais, restricted to the area near Pieres do Rio, southeastern Goiás east and northeastward to Conselheiro Mata, Minas Gerais; campo limpo, campo rupestre in sandy, quartzite, and rocky soils; 980–1315 m.

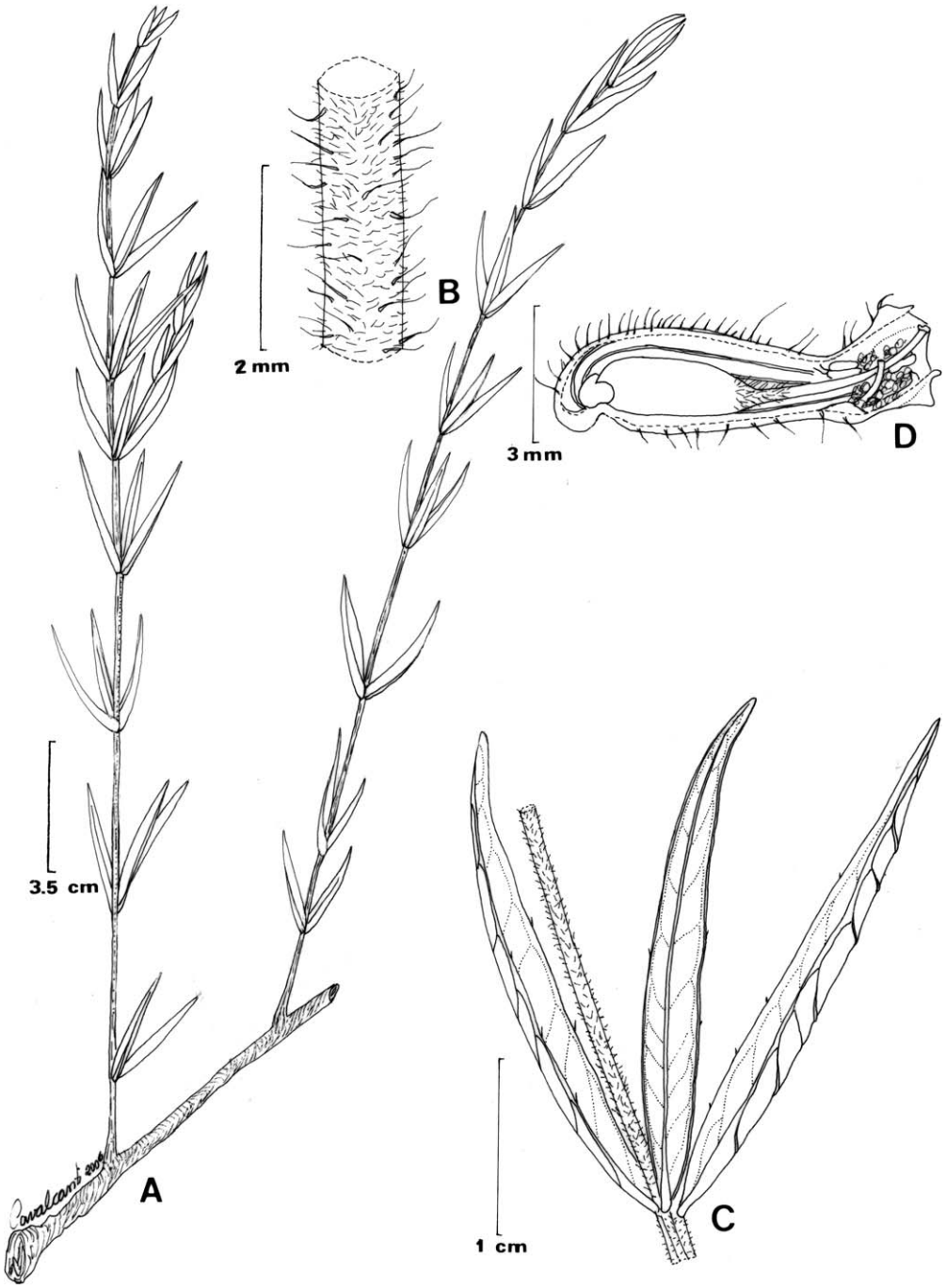

Figure 7. *Cuphea spermacoce* var. *arguta* T. B. Cavalcanti & S. A. Graham. —A. Habit. —B. Minute hispid and glandular-hirsute indument of the stem. —C. Stem node with 3-verticillate leaves. —D. Floral tube, lateral view, opened along one side. Note the pilose ovary apex and large semi-cupping nectariferous disc, typical of *C. spermacoce*. Drawn from the holotype (*Allem 513*, CEN).

IUCN Red List category. Plants of *Cuphea spermacoce* var. *erectifolia*, although occurring at numerous locations, are not present in large numbers. Furthermore, its habitat, on hillsides of relatively natural campo limpo and campo rupestre at elevations typically above 1100 m, is restricted in size and number, fragmented, and part of one of the most threatened ecosystems of northeastern Brazil.

For these reasons, the conservation status of the variety is considered Vulnerable (VU) according to IUCN Red List criteria (IUCN, 2001).

Phenology. Flowering and fruiting August to June, peak flowering December to March.

Relationships. Leaves of variety *erectifolia* are typically ovate with a rounded base and closely appressed to the stem. The prominent secondary venation of the species is apparent on the largest leaves. The flowers do not differ from those of variety *spermacoce* or variety *arguta*. Variety *erectifolia* has narrow ecological parameters, occurring only on hillsides of relatively natural campo limpo and campo rupestre at elevations above 980 m and most commonly above 1100 m.

Cuphea erectifolia was described by Koehne (1877: 277) with the citation "Habitat in provincia Minas Geraës ad Paracatú: *Pohl n. 861* (formae a. et b. intermixtae)." Later references to *C. erectifolia* by Koehne (1881: 158, 1903: 139) added no information as to where the specimens he studied were housed, nor were additional collections cited. Several sheets of *Pohl 861* are known, but because the institution housing the specimens of *Pohl 861* used by Koehne to prepare the description is not known with certainty, the type of *C. erectifolia* therefore, according to Rec. 9A.4 of the *International Code of Botanical Nomenclature* (McNeil et al., 2006), is assumed to have been at Berlin where it was subsequently destroyed. The specimen at W annotated by Koehne is considered the best choice as lectotype for *C. erectifolia* and for the forms found intermixed on the sheet and annotated by Koehne. Among other sheets at M, one including both forms (F neg. #19610 ex M) was seen by Pohl, but the collection number is missing and there is no evidence Koehne ever saw this specimen, thus it was excluded as a lectotype choice.

Paratypes. BRAZIL. **Goiás**: Cristalina, [16°45′S, 47°03′W], rod. de terra Cristalina-PADF, 2.7 km da BR-040, 27 Sep. 2002, *T. Cavalcanti*, *G. Pereira-Silva*, *J. B. Bringel & M. Carvalho-Silva 3059* (CEN, MO, SPF); 6 km NW of Cristalina, 16 Mar. 1982, *S. Graham 891*, *893* (MO, NY); Serra dos Cristais, BR-040, 3–4 km O trevo com a rod. BR-050, 4 Dec. 1992, *G. Hatschbach 58412* (MO); Cristalina, 15 Aug. 1967, *E. P. Heringer 11535* (UB); Serra dos Cristais, 12 km S of Cristalina, 3 Nov. 1965, *H. S. Irwin*, *R. Souza & R. Reis dos Santos 9878* (NY, UB); Pires do Rio, [17°17′S, 48°16′W], BR-050, em direção a Cristalina, 10 Oct. 1988, *R. Kral & M. G. L. Wanderley 75270* (CEN); RPPN Linda Serra dos Topázios, Oct. 1996, *R. S. Oliveira & C. Proença 197* (UB), Dec. 1996, *R. S. Oliveira & C. Proença 204* (UB); RPPN Linda Serra dos Topázios, 13 June 2004, *J. F. Pastore & A. S. Rodrigues 1007* (CEN); Cristalina, 15 Dec. 2004, *J. F. Pastore*, *A. S. Rodrigues & J. B. Pereira 1142*, *1152* (CEN), *J. R. Pirani*, *A. Furlan*, *B. L. Stannard*, *C. Kameyama & R. M. Harley 1518* (CEN), 17 Oct. 1999, *C. Proença et al. 2095* (UB); Km 110 da BR-040, Brasília–Paracatú, 100 m do posto JK-3 Barras, 31 Jan. 1989, *A. O. Scariot*, *G. Pereira-Silva*, *J. H. Kirkbride Jr.*, *L. C. Ramos & W. W. Roath 263* (CEN, SPF); Cristalina, ca. 6 Dec. 1988, *M. G. L. Wanderley & R. Kral 1864* (CEN). **Minas Gerais**: Conselheiro Mata, [18°17′S, 43°58′W], estrada de terra, a 3 km após a saída da cidade de Conselheiro Mata, 19 Jan. 2003, *T. B. Cavalcanti*, *G. Pereira-Silva*, *M. Carvalho-Silva 3121* (CEN).

The three varieties of the vegetatively variable *Cuphea spermacoce* may be identified by the following key. All share the following: stem indument of minute white hispid trichomes and longer glandular-hirsute trichomes; conspicuous secondary venation of the leaves including a prominent intramarginal vein; long-pedicellate, thick-bodied flowers internally furnished with elongate vesicles at the base of the stamens, a pilose style base and ovary apex, and three ovules; and broad seeds with an obtuse or retuse apex.

Key to the Varieties of *Cuphea spermacoce*

1a. Leaves narrowly lanceolate-linear, 15–60(–70) × 0.5–6 mm, typically ca. 40 × 6 mm at midstem, apex sharply long acute-acuminate . . . . . .var. *arguta*
1b. Leaves ovate, ovate-elliptic, oblong, or oblanceolate, 10–112 × 3–35 mm, apex acute to obtuse. . . . 2
2a. Leaves narrowly ovate to ovate-elliptic or ovate-oblong, 10–20 × 3–7 mm, typically ca. 16 × 6 mm at midstem, erect, closely appressed against the stem, mostly decussate . . . . . .var. *erectifolia*
2b. Leaves ovate-elliptic to oblong or oblanceolate, 20–112 × 9–35 mm, spreading to ascending, mostly 3(4)-verticillate . . . . . .var. *spermacoce*

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