

GALPHIMIA (MALPIGHIACEAE) IN SOUTH AMERICA

Christiane Anderson
University of Michigan Herbarium
3600 Varsity Drive, Ann Arbor, Michigan 48108-2287

ABSTRACT. A revision of the South American species of *Galphimia* (Malpighiaceae) is presented. Four species, *G. amambayensis*, *G. australis*, *G. brasiliensis*, and *G. platyphylla*, are recognized. Full descriptions, a key, and two maps are provided. Each taxon is illustrated. One new species, *G. amambayensis*, is proposed.

Galphimia (Malpighiaceae) includes large herbs and shrubs characterized by yellow petals and a schizocarpic fruit separating into three cocci. The calyx lacks the oil glands found in most genera of New World Malpighiaceae; however, in some species of *Galphimia* a small gland, which resembles the leaf glands, is borne at the base of the sinus of some or all adjacent sepals (Castro et al. 2001). Most of the ca. 20 species of the genus occur in Mexico, adjacent Texas, and northern Central America, but the remainder are found in South America, south of the Amazon Basin. The Mexican species may be assigned to one of three groups defined by details of the inflorescence and flower. In two, the flowers are large and borne on a pedicel subtended by a peduncle; in one group the petals are deciduous, in the other they are persistent. The third group includes two species most similar in overall aspect to the South American taxa: the petioles are very short (mostly less than 1 cm long), the peduncle is rudimentary or absent, and the flowers are small (the petals deciduous).

Three species of *Galphimia* have been proposed for South America: *G. australis* Chodat, *G. brasiliensis* (L.) Adr. Juss., and *G. platyphylla* Chodat; however, most botanists have followed Niedenzu (1914, 1928), who recognized only one polymorphic species, *G. brasiliensis*, comprising several varieties and forms. A recent review of the South American collections of *Galphimia* showed them to belong to four species. *Galphimia brasiliensis* occurs in northeastern Brazil (Paraíba, Pernambuco, Piauí, and Bahia). The variable *G. australis* ranges from central Brazil to western Bolivia, southern Paraguay, Uruguay, and adjacent Argentina, and the closely related *G. platyphylla* is found in eastern Paraguay and adjacent Brazil. The material from eastern Paraguay included one collection that represents a species here newly described, *G. amambayensis*. The relationships of the South American taxa with the Mexican ones can be addressed only after a review of the entire genus. The taxonomy of the South American species is presented here as an aid to current floristic projects.

A key to the four species is presented below; however, they are quickly separated by geography and obvious morphological characters. Only *G. brasiliensis* occurs in northeastern Brazil, and has strigose vestiture, composed of hairs with a persistent tuberculate base, and uniformly velutinous ovaries/fruits. *Galphimia amambayensis* occurs within the range of the widespread *G. australis* and near to that of *G. platyphylla*; it differs by its tomentose sepals and inflorescences, and partly velutinous ovaries/fruits; the sepals and ovaries/fruits of *G. australis* and *G. platyphylla* are glabrous. As the specific epithet implies, *G. platyphylla* differs from *G. australis* in its much broader leaves (length/width ratio 1.2–2.3 (–3) vs. (2–) 2.5–7 (–9)).

KEY TO THE SPECIES OF *GALPHIMIA* IN SOUTH AMERICA

1. Sepals abaxially tomentose or patchily so; ovary and fruit velutinous along the sutures and on the proximal 2/3–3/4 of the surface, the distal 1/3–1/4 glabrous; Paraguay (Amambay). *G. amambayensis*
1. Sepals glabrous or with scattered hairs near the base and/or with a tuft of hairs at the apex; ovary and fruit glabrous or uniformly velutinous.
 2. Ovary and fruit velutinous; sepals usually with a tuft of hairs at the apex; petioles 3–10 mm long, strigose with the hairs mostly borne on tubercles, or in older leaves only the persistent tubercles remaining; peduncles present, 0.4–2 (–3) mm long; Brazil (Bahia, Paraíba, Pernambuco, and adjacent Piauí). *G. brasiliensis*
 2. Ovary and fruit glabrous; sepals entirely glabrous; petioles 1.5–6 mm long, glabrous; peduncles absent or rudimentary, sometimes to 1.5 (–2.5) mm long.
 3. Laminas linear to linear-lanceolate to lanceolate to narrowly elliptical, (0.5–) 1–2.5 (–3.3) cm wide, length/width ratio (2–) 2.5–7 (–9); pedicels tomentulose or with scattered hairs or sometimes glabrous; sepals 2.5–3.5 (–4) mm long, 1–1.8 mm wide; petal limb 3–5 mm long; cocci 3–3.8 mm long; widespread throughout southern Brazil, western Uruguay, Paraguay, and adjacent Bolivia and Argentina. *G. australis*
 3. Laminas elliptical, broadly lanceolate, ovate to broadly ovate, occasionally suborbicular, (1.5–) 2–4 cm wide, length/width ratio 1.2–2.3 (–3); pedicels glabrous; sepals 4–5.7 mm long, 2–2.5 mm wide; petal limb 7–8.5 mm long; cocci 4–5 mm long; Paraguay (Amambay, Caaguazú, Canendiyú) and adjacent Brazil (Mato Grosso do Sul). *G. platyphylla*

Galphimia amambayensis C. Anderson, sp. nov.—TYPE: PARAGUAY. Amambay: 30 km al N del cruce Bellavista y Pedro Juan Caballero, en matorral, 11 Feb 1982, *Fernández Casas & Molero 6190* (holotype: NY!; isotype: MO!). Fig. 1.

Suffrutex. Laminae 4.5–6.5 cm longae, 1.5–2.8 cm latae, ellipticae, sparse pubescentes demum glabrescentes, margine integra, glandulis 0.4–0.5 mm diametro, sessilibus; petioli 3.5–6 mm longi; stipulae 4–4.5 mm longae. Inflorescentia racemosa, tomentosa. Petala decidua, subaequalia, ungue ca. 2 mm longo, limbo 5–5.5 mm longo, 4–4.5 mm lato, late triangulari. Antherae ca. 1.3 mm longae. Ovarium velutinum proximaliter, suturis pubescentibus distaliter; styli subaequales, 5.5–6.5 mm longi. Cocci ca. 4.5 mm longi.

Subshrubs to 0.6 m; stems tomentose when young, becoming glabrous in age. Vesture of crisped or curled, reddish brown hairs 0.3–0.7 mm long, except straight and appressed on the laminas. Laminas of the larger leaves 4.5–6.5 cm long, 1.5–2.8 cm wide, elliptical or narrowly so, apex apiculate, base acute, adaxially and abaxially sparsely pubescent when young, mostly glabrous when mature but sometimes with some scattered hairs remaining, costa prominent abaxially, the secondary veins barely prominulous or not evident; margin entire; petioles 3.5–6 mm long, glabrous; leaf glands a pair borne on the margin near the base of the lamina or to 6 mm above it, each gland 0.4–0.5 mm in diameter, circular and flush with the margin; stipules 4–4.5 mm long, 0.7–1 mm wide, linear. Inflorescence a terminal raceme, the axes densely tomentose, glabrescent in age; peduncles absent or rudimentary, pedicels 4–6.5 mm long, densely tomentose; bracts 2.5–3.5 mm long, 0.7–0.8 mm wide, linear, bracteoles 1.2–1.5 mm long, ca. 0.5 mm wide, linear, bracts and bracteoles abaxially tomentulose. Sepals 3.5–5 mm long, 1.3–1.5 mm wide, narrowly elliptical, abaxially tomentulose or patchily so, glands absent. Petals deciduous, subequal (?), yellow, becoming red in age, abaxially sprinkled with hairs on the claw and on the limb on and adjacent to the midrib, or sometimes glabrous; claw ca. 2 mm long, ca. 0.5 mm wide, limb 5–5.5 mm long, 4–4.5 mm wide, broadly triangular, base acute. Stamens with heteromorphic filaments but subequal anthers; filament opposite anterior sepal 3.5–4 mm long,

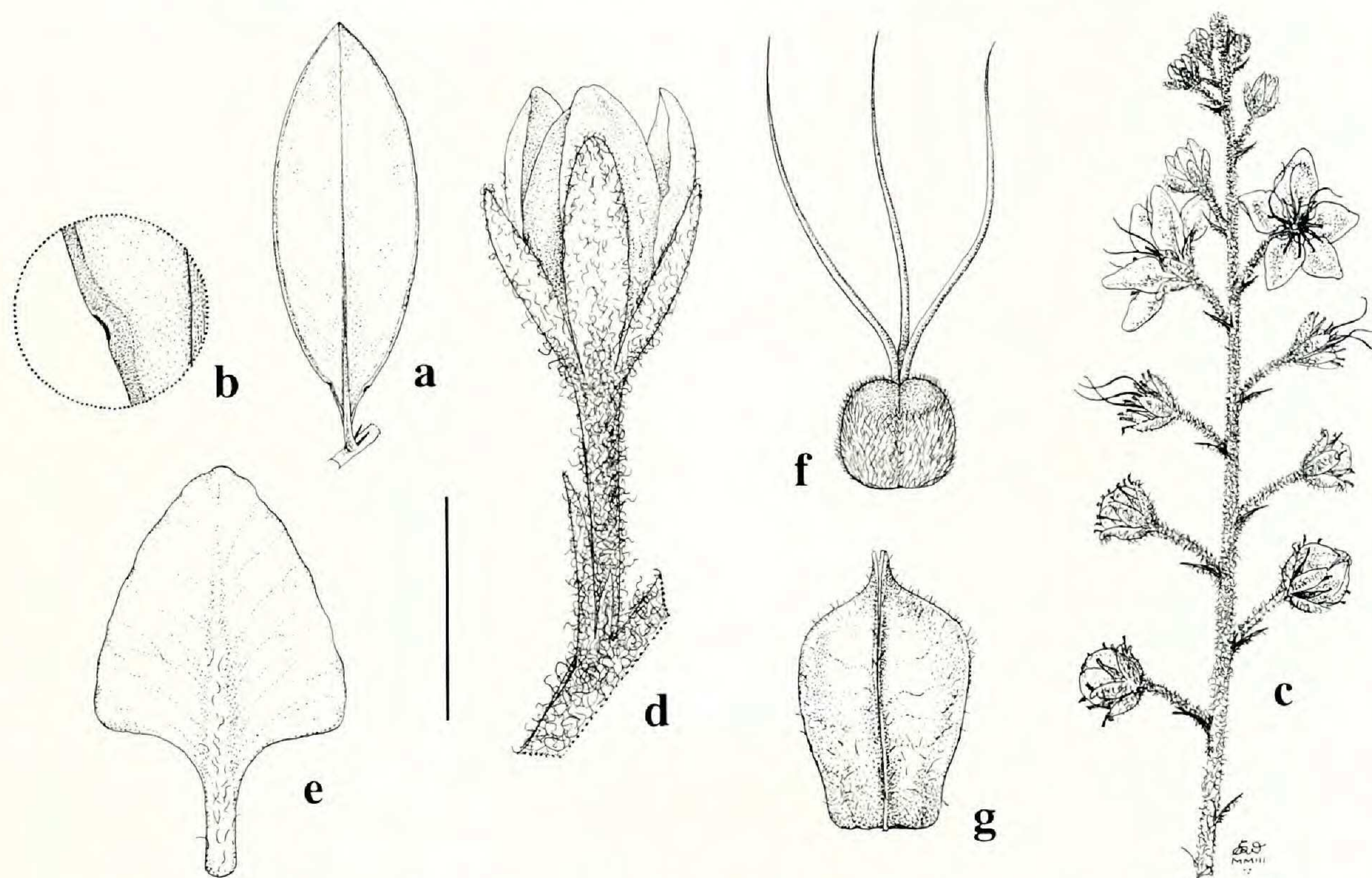


FIG. 1. *Galphimia amambayensis*. a. Leaf. b. Detail of lamina showing marginal gland. c. Portion of inflorescence. d. Opening bud borne on pedicel, with portion of inflorescence axis. e. Petal, abaxial view. f. Gynoecium. g. Coccus, abaxial view. Scale bar = a, 4 cm; b, 8 mm; c, 2 cm; d–g, 4 mm. (Based on Fernández Casas & Molero 6190.)

filaments opposite anterior-lateral petals 4–4.5 mm long, filaments opposite anterior-lateral sepals 3.5–4 mm long, filaments opposite posterior-lateral petals 4.5–5 mm long, filaments opposite posterior-lateral sepals 3.8–4.3 mm long, filament opposite posterior petal 4.8–5.2 mm long; anthers ca. 1.3 mm long. Ovary velutinous, but in the distal 1/3 only on the sutures and adjacent to them and glabrous on the surface; styles subequal (?), 5.5–6.5 mm long. Cocci ca. 4.5 mm long, ca. 3 mm in diameter, velutinous like the ovary but glabrescent in age.

Galphimia amambayensis is known only from the type collection from eastern Paraguay (Fig. 5). It is readily separated from the other three species by its dense tomentum on the calyx and inflorescence axes. The leaves are sparsely pubescent on both surfaces when young. The ovary is velutinous in a distinctive pattern: the vestiture is present along the sutures but on the surfaces only in the proximal 2/3–3/4. In the type collection most of the petals are abaxially sprinkled with hairs but a few are apparently glabrous, though in these instances the hairs may have been broken off. Such petal pubescence occurs sporadically in some species of Malpighiaceae that usually have glabrous petals, and only additional collections of *G. amambayensis* can resolve whether pubescent petals are indeed characteristic of this species.

Galphimia australis Chodat, Arch. Sci. Phys. Nat., sér. 3, 24: 500. 1890. *Galphimia brasiliensis* var. *australis* (Chodat) Chodat, Bull. Soc. Bot. Genève, sér. 2, 9: 96. 1917.—TYPE: PARAGUAY. Guairá: Prairies de Cosme, entre Villa Rica et Caaguazú, Nov 1874, *Balansa* 2393 (lectotype, here designated: G!; isolecotypes: K! P!).

Galphimia brasiliensis var. *pubescens* Adr. Juss. in A. St.-Hil., Fl. bras. merid. 3: 72. 1833 [“1832”].—TYPE: BRAZIL. Rio Grande do Sul: ad ripas Uruguay juxta vicum S.-Francisco de Borja [São Borja], Feb, *St. Hilaire* C2, 2495bis (holotype: P!).

Galphimia australis f. *angustifolia* Chodat, Mém. Soc. Phys. Genève 31(2:3): 23. 1892. *Galphimia brasiliensis* f. *angustifolia* (Chodat) Nied., Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg 5: 22. 1914.—TYPE: PARAGUAY: Guairá: páturage d'Itangu, près de Villa-Rica, 17 Feb 1876, *Balansa* 2394 (holotype: G!). Fig. 2.

Subshrubs or suffrutescent herbs to 1 m. Laminas of the larger leaves 2.5–7 (–8) cm long, (0.5–) 1–2.5 (–3.3) cm wide, length/width ratio 2.5–7 (–9), linear to linear-lanceolate to lanceolate to narrowly elliptical, apex apiculate, base acute; glabrous adaxially and abaxially, costa prominent abaxially, the secondary veins barely prominulous or not evident; margin entire; petioles (1.5–) 2–6 mm long, glabrous; leaf glands borne on the margin near the base of the lamina or to 0.8 cm above it, usually a pair, or sometimes with 1 or 2 additional glands, or sometimes only 1 gland or the glands absent, each gland 0.2–0.5 mm in diameter, circular, flush with the margin or prominent or sometimes with a stalk to 0.5 mm high; stipules (1.5–) 2–4.2 (–5) mm long, 0.5–1 mm wide, linear. Inflorescence a terminal raceme, the axes mostly tomentulose during anthesis, becoming glabrate in age, sometimes glabrous already at anthesis, sometimes the vesture retained in age; peduncles absent or rudimentary, sometimes to 1.5 (–2.5) mm long; pedicels 2–5 (–10) mm long, usually tomentulose or at least with some scattered hairs but sometimes glabrous; bracts 1–5 (–7) mm long, 0.4–1.2 mm wide, linear to narrowly triangular, bracteoles 0.5–1.5 (–2) mm long, 0.2–0.5 (–0.7) mm wide, linear, bracts and bracteoles abaxially glabrous. Sepals 2.5–3.5 (–4) mm long, 1–1.8 mm wide, oblong, glabrous, glands 0.2–0.5 mm in diameter, sessile, mostly 1 but sometimes 2 glands borne in the sinus at the base of 2 sepals, or glands absent. Petals deciduous, subequal, the posterior petal sometimes a little larger, yellow, becoming red in age; claw 1.3–1.5 (–1.7) mm long, limb 3–5 mm long, 2.5–4 mm wide, triangular-ovate, base acute to truncate, apex obtuse. Stamens with heteromorphic filaments but subequal anthers; filament opposite anterior sepal 2.5–3 (–3.4) mm long, filaments opposite anterior-lateral petals 2–2.3 (–2.5) mm long, filaments opposite anterior-lateral sepals 2.3–2.5 (–3) mm long, filaments opposite posterior-lateral petals 1.8–2 (–2.5) mm long, filaments opposite posterior-lateral sepals 2–2.3 (–3) mm long, filament opposite posterior petal (1.8–) 2–2.2 (–2.5) mm long; anthers 1–1.2 mm long. Ovary glabrous; styles subequal but the anterior two always a little longer than the posterior one, anterior styles 3.8–4.6 (–5.2) mm long, posterior style 3.5–4.2 (–5) mm long. Cocci 3–3.8 mm long, 2–2.5 mm in diameter, glabrous.

Phenology. Collected in flower and fruit throughout the year.

Distribution (Fig. 3). Southern Brazil, adjacent Bolivia, Paraguay, northeastern Argentina, western Uruguay; open woodlands and grasslands, cerrado, caatinga, campo limpo, campo sujo, matorral, and secondary sites; 90–900 m.

REPRESENTATIVE SPECIMENS. **Argentina.** CORRIENTES: Depto. Santo Tomé, Playadito 17 km W of Apóstoles, *Anderson* 12362 (CAS, MBM, MICH, NY); Depto. Santo Tomé, Ayo. Chimiray, *Krapovickas & Cristóbal* 25195 (CTES); Depto. Mercedes, Mercedes, a Itá Corá, Ayo. Pay-Ubre, *Quarín & González* 2036 (CTES, ENCB); Depto. Berón de Astrada, 46 km W de Itá Ibaté, Valencia, *Schinini* 14017 (CTES, F, MICH).—ENTRE RÍOS: Depto. Concordia, Parque Rivadavia, *Burkart & Troncoso* 27703 (NY); Depto. Federación, Santa Ana, barranca del Río Uruguay, *Burkart et al.* 29359 (CTES, GH); Concepción del Uruguay, *Lorentz* 563 (BM, F, G, GH, K).—MISIONES: 9 km al NW de Concepción de la Sierra, *Krapovickas et al.* 15148 (C, CTES, MBM, MO, P, WIS); Depto. Caniguás, Puerto Rico, *Montes* 3995 (CTES, MICH); Depto. Apóstoles, Apóstoles, *Xifreda & Maldonado* 381 (MBM). **Bolivia.** SANTA CRUZ: Prov. Velasco, San Ignacio, 100 km N comunidad San Miguelito, *Bruderreck* 24 (CTES, NY); Prov. Ñuflo de Chávez, Embocada del Carmen, ca. 40 km SSW de Concepción, 16°38'S, 62°26'W, *Krapovickas & Schinini* 32151 (CTES, F, MBM, MICH); Prov. Sandoval, San Matías, 16°21'S, 58°26'W, *Krapovickas & Schinini* 36157 (CTES, MICH); Prov. Andrés Ibáñez, Jardín Botánico de Santa Cruz, 12 km E of center of Santa Cruz on road to Cotoca, *Nee* 44434 (NY); Prov. Sara, lomería de Buena Vista, *Steinbach* 7370 (A, BM, F, G, GOET,

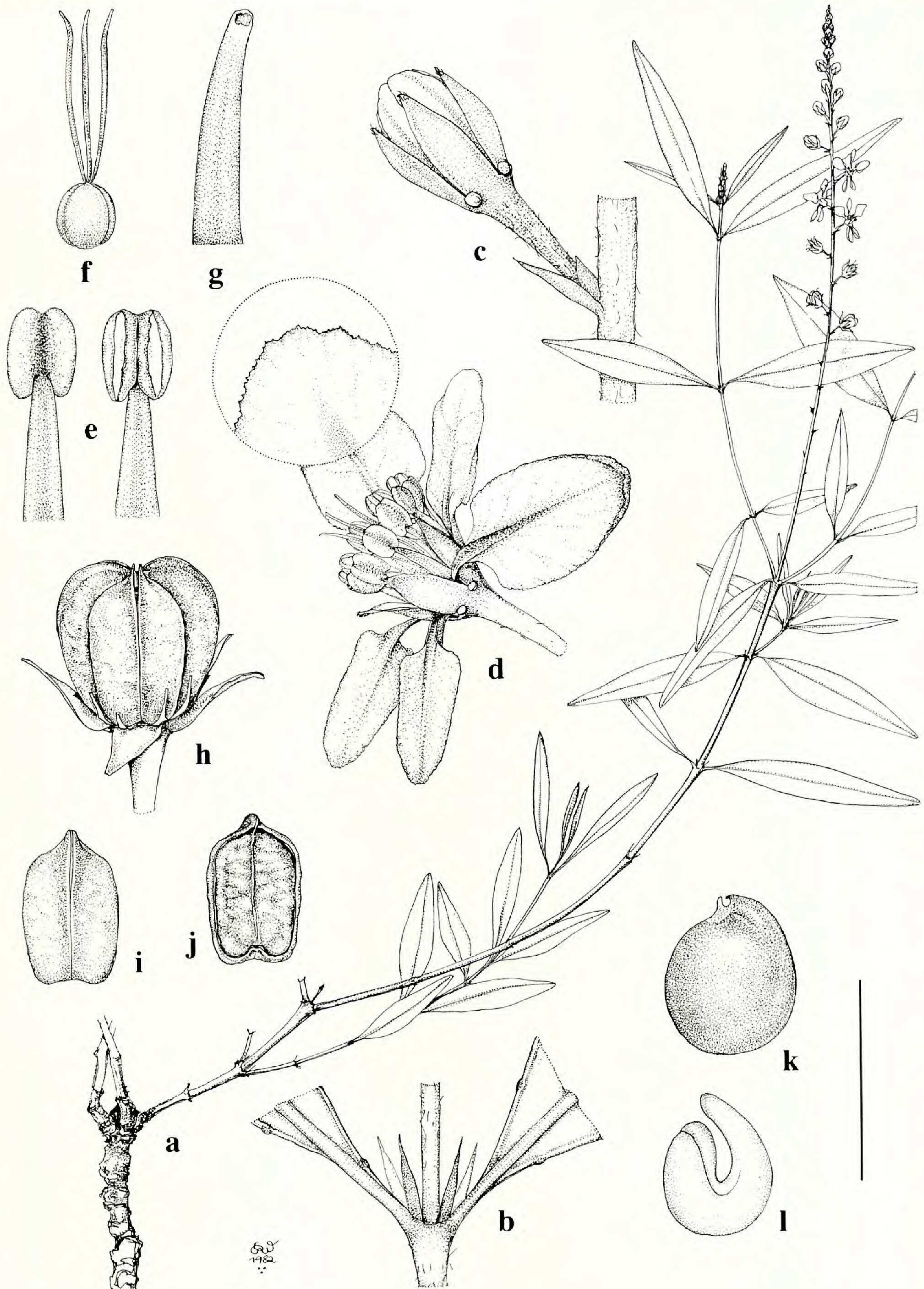


FIG. 2. *Galphimia australis*. a. Habit. b. Node with stipules and basal portions of leaves. c. Bud borne on pedicel, with portion of inflorescence axis; note calyx glands. d. Flower and detail showing petal apex. e. Distal portions of stamens, abaxial (left) and adaxial (right) views. f. Gynoecium. g. Style apex. h. Fruit subtended by calyx and filaments. i. Coccus, abaxial view. j. Coccus, adaxial view. k. Seed. l. Embryo. Scale bar = a, 4 cm; b, 8 mm; c, f, 4 mm; d, 5 mm (apex 4 mm); e, 2.3 mm; g, 0.4 mm; h-j, 5 mm; k, l, 2.8 mm. (Based on: a-g, Schinini 14017; h-l, Krapovickas & Schinini 32151.)

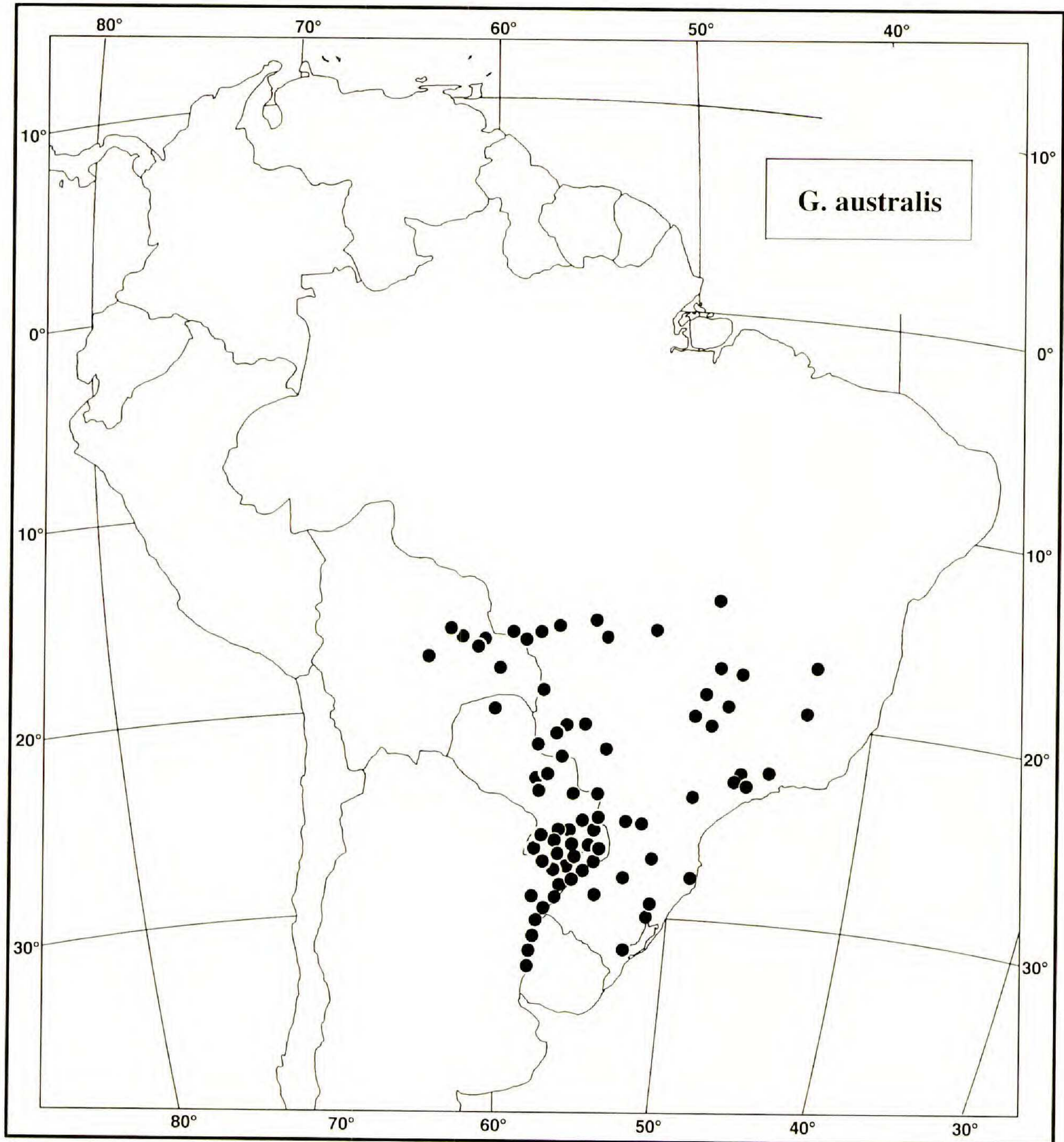


FIG. 3. Distribution of *Galphimia australis*.

MO, S). **Brazil.** GOIÁS: Mpio. Caldas Novas, 12 km due W of the city of Caldas Novas, *Heringer & Eiten 14190* (HB, K, MO, SP, UB); BR-158, 5 km SE de Aragarças, *Krapovickas & Cristóbal 42948* (K, MBM, MICH).—MATO GROSSO: Oasis, 47 km E de Cáceres, BR-070, Km 680, Serra das Araras, *Krapovickas et al. 40260* (MICH); Mpio. Cuiabá, Rod. BR-070, Contorno Sul, *Hatschbach 65660* (MBM).—MATO GROSSO DO SUL: Mpio. Campo Grande, Rio Anhandui, *Hatschbach 21813* (MBM); Mpio. Rio Brillhante, Rod. BR-267, entroncamento, *Hatschbach 25071* (MBM); Bela Vista, 10–15 km O, *Hatschbach 49160* (BR, G, MBM, US); Mpio. Porto Murtinho, Rod. Bonito–Campo dos Índios, Fazenda Agua Doce, *Hatschbach et al. 74009* (MICH); Mpio. Rio Verde, base escarpa de la Serra Alegre, ca. 20 km N de Rio Verde, *Krapovickas 29878* (CTES).—MINAS GERAIS: ca. 5 km SE of Paracatú, *Irwin et al. 26193* (F, MICH, MO, NY); estrada Santo Hipólito a Diamantina, Km 69, *Shepherd et al. 3837* (MBM, NY).—PARANÁ: Ibaré opp., Morungava praedium, *Dusén 17413* (GH, MO, S); Km 127, Mpio. Laranjeiras do Sul, *Hatschbach 23123* (MBM, MICH).—RIO GRANDE DO SUL: BR-101, Km 6, Campo Bonito, ca. 8 km SW de Torres, *Krapovickas & Cristóbal 38484* (CTES, MICH); I. A. S., Pelotas, *Costa Sacco 407* (F, HB, NY).—SANTA CATARINA: Rod. BR-470, Km 354, Mpio. Campos Novos, *Poliquesi 495* (CEPEC, CTES, MBM, UB).—SÃO PAULO: Dist. Rubião Junior, 1–2 km SW da Faculdade de Ciências Médicas e Biológicas de Botucatu, *Gottsberger & Campos 14-301072* (F, MBM, MICH, UB); Jales, Pastos de Retiro, *Hoehne SPF13903* (MBM, RB). **Paraguay.** ALTO PARANÁ: Ea. Santa Elena, Pira Pyta, *Schinini & Caballero M. 27152* (G, MICH).—AMAMBAY: 32 km SE de Bella Vista, Ayo. Negla, *Schinini 21495* (F, G, MICH).—CAAGUAZÚ: Colonia Pindo, camino

entre Itaquyry y Curuguati, 24°35'N, 55°20'W, *Schinini & Caballero M. 30243* (MICH).—CANENDIYÚ: iter ad Yerbales montium Sierra de Maracayú, in regione fluminis Corrientes, *Hassler 4524* (BM, F, G, GH, K, NY, W).—CONCEPCIÓN: prope Concepción, *Hassler 7572* (BM, G, K, NY).—CORDILLERA: Piribebuy, Colonia Pedro Pablo Caballero, *Rojas 12731* (S, W).—GUAIRÁ: Iturbe, *Montes 12595* (CTES, MICH).—ITAPÚA: Capitán Miranda, 4.2 km N del Hotel Tirol detrás del Barrio CONAVI, *Krapovickas & Cristóbal 44463* (CTES, G, MICH).—MISIONES: 16–17 km S de Santa Rosa, camino a General Delgado, *Arbo et al. 6141* (G, MICH).—ÑEEMBUCÚ: San Juan Bautista, *Purvey 390* (CTES, MO).—PARAGUARÍ: National Park Ybycu'i, NW corner of park along Arroyo Mina, 26°01'S, 56°46'W, *Zardini & Tillería 28962* (MO).—PRESIDENTE HAYES: Primavera, *Woolston 192* (NY, S). **Uruguay.** PAYSANDÚ: Chapicuy, orillas del Río Uruguay, Sta. Sofía, *Rosengurt B-3278 1/2* (GH, MO, SP).

Galphimia australis is a widespread and variable species found from central Brazil to Bolivia and eastern Argentina. It is distinguished by glabrous leaves borne on very short petioles (to 6 mm long) and small flowers with a glabrous calyx and ovary. Although the youngest branchlets and inflorescence axes are pubescent, the vesture is soon shed and the more mature parts are usually glabrate to glabrous. In specimens from Rio Grande do Sul (Brazil) the vesture is retained in the racemes and leafy branches, and only the oldest vegetative branches are essentially glabrous. This variant was named by Jussieu (1833) and accepted by Niedenzu (1914, 1928) as *G. brasiliensis* var. *pubescens*. Such exceptional populations with persistent vesture occur occasionally in other parts of the range as well (e.g., Argentina, *Lorentz 563*, Entre Ríos; *Xifreda & Maldonado 381*, Misiones) and are not accorded taxonomic recognition here.

Throughout most of the range *G. australis* bears narrow laminas, ranging from linear to linear-lanceolate to lanceolate to narrowly elliptical, that taper toward the apex and are 3–6 (–9) times as long as wide. Occasionally, some laminas on a specimen are only 2.5 times as long as wide. Chodat (1892) assigned specimens with very narrow leaves to his forma *angustifolia*, based on *Balansa 2394* from Paraguay. *Schinini 14017* and *Schinini et al. 23447*, both from Argentina, are two similarly narrow-leaved collections. In some populations some of the leaves or sometimes even all are wider than usual, and approach the leaf shape found in *G. amambayensis* and *G. platyphylla* (e.g., *Hassler 4524*, *Hatschbach 25071*, *49160*, *Krapovickas 29878*, *Krapovickas & Cristóbal 25195*). These variants match *G. australis* in all other aspects.

Galphimia brasiliensis (L.) Adr. Jussieu in A. St.-Hilaire, Fl. bras. merid. 3: 71. 1833 [“1832”]. *Thryallis brasiliensis* L., Sp. pl., ed. 2, 2: 554. 1762.—TYPE: “Fruticescens herba pisonis. Margr. bras. 79. f. 3” [the illustration; p. 79, in Piso, G.: *De medicina brasiliensi*; Marcgrave, G.: *Historiae rerum naturalium brasiliae*, 1648.]

Galphimia brasiliensis var. *pubescens* f. *ovata* Nied., Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg 5: 22. 1914.—TYPE: BRAZIL. Bahia: without locality, 1830, *Salzmann s.n.* (lectotype, here designated: G!; isolectotypes: MO! P!).

Fig. 4.

Subshrubs and shrubs to 1.5 m, often sprawling and scrambling; stems pubescent when young, becoming glabrous but often roughened by persistent tubercles. Vesture of all vegetative parts of straight to wavy, light brown to white hairs, 0.3–0.8 mm long, each hair borne on a persistent tubercle up to 0.25 mm high or the epidermis only slightly raised at point of attachment. Laminas of the larger leaves 2–5 cm long, 1–3.8 cm wide, ovate or elliptical, apex apiculate or acute, base acute to truncate, glabrous but often with a few scattered hairs on the abaxial costa and along the margin near the base, costa prominent abaxially, secondary veins prominulous or

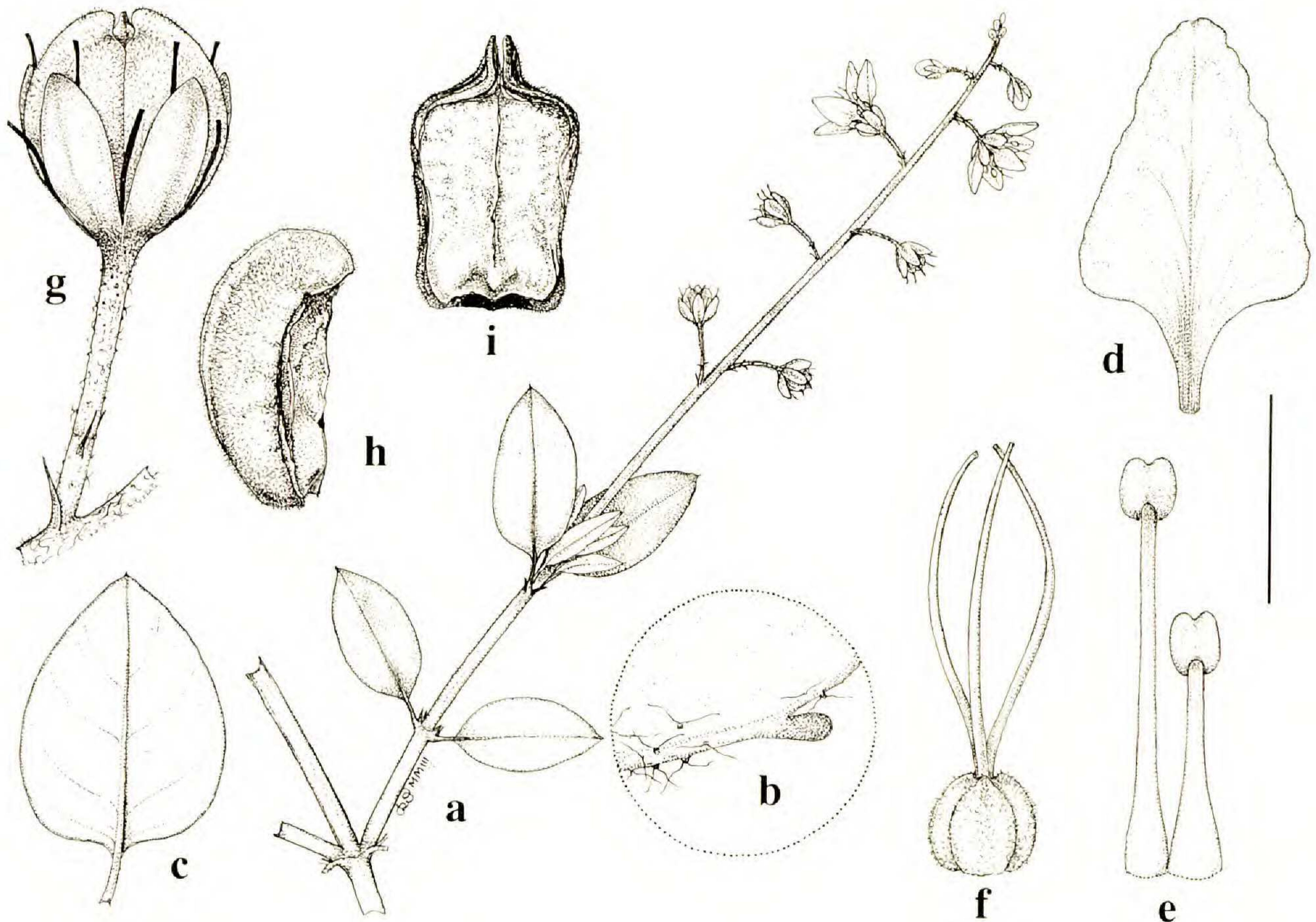


FIG. 4. *Galphimia brasiliensis*. a. Branch with inflorescence. b. Detail of lamina base, showing marginal gland. c. Leaf. d. Petal. e. Stamen opposing posterior-lateral sepal (left) and stamen opposing posterior petal (right); abaxial view. f. Gynoecium. g. Fruit, subtended by calyx and filaments, borne on pedicel and peduncle, with portion of inflorescence axis. h. Coccus, lateral view. i. Coccus, adaxial view. Scale bar = a, c, 2 cm; b, 1 mm; d, h, i, 2.7 mm; e, f, 2 mm; g, 4 mm. (Based on: a, d–g, *Anderson 11737*; b, c, *Harley 16312*; h, i, *Blanchet 3904*.)

barely so abaxially; margin entire or commonly with a few persistent tubercles near the base; petioles 0.3–1 cm long, tuberculate-strigose or only the tubercles remaining; leaf glands borne on the margin, to 6 mm above the base of the lamina, usually a pair, or sometimes with only 1 gland or the glands absent, each gland 0.1–0.3 mm in diameter, disklike and prominent or sometimes drawn out into a tooth to 0.3 (–0.5) mm long; stipules 1.5–2.7 mm long, 0.3–0.6 wide, linear or very narrowly triangular. Inflorescence a terminal raceme, the axes tuberculate and strigose; peduncles 0.4–2 (–3) mm long, glabrate, pedicels 2.5–5.5 mm long, strigose; bracts 1.2–2 mm long, 0.4–0.5 mm wide, linear, bracteoles 0.5–0.8 mm long, 0.3–0.4 mm wide, linear. Sepals ca. 2.5 mm long, 1–1.1 mm wide, narrowly elliptical, glabrous or with scattered hairs at the base, usually with a tuft of hairs at the apex, glands absent. Petals deciduous, subequal but the posterior petal sometimes with a wider claw than the lateral ones, yellow, often marked with red, becoming pink/red in age; claw 0.5–1 mm long, 0.4–0.5 mm wide, limb ca. 4 mm long, ca. 3 mm wide, triangular-ovate, base acute. Stamens with heteromorphic filaments but subequal anthers; filaments of stamens opposing lateral sepals 3.2–3.3 mm long, of stamen opposing anterior sepal ca. 3.5 mm long, filaments of stamens opposing petals subequal, ca. 2 mm long; anthers 0.7–0.8 mm long, cylindrical. Ovary velutinous; styles subequal, 3.3–4.3 mm long. Cocci ca. 3.6 mm long, ca. 2 mm in diameter, velutinous.

Phenology. Collected in flower and fruit throughout the year.

Distribution (Fig. 5). Eastern Brazil (Bahia, Paraíba, Pernambuco, and adjacent Piauí); in caatinga, cerrado, at edges of woods and gallery forests, in thorn scrub; 280–1150 m.

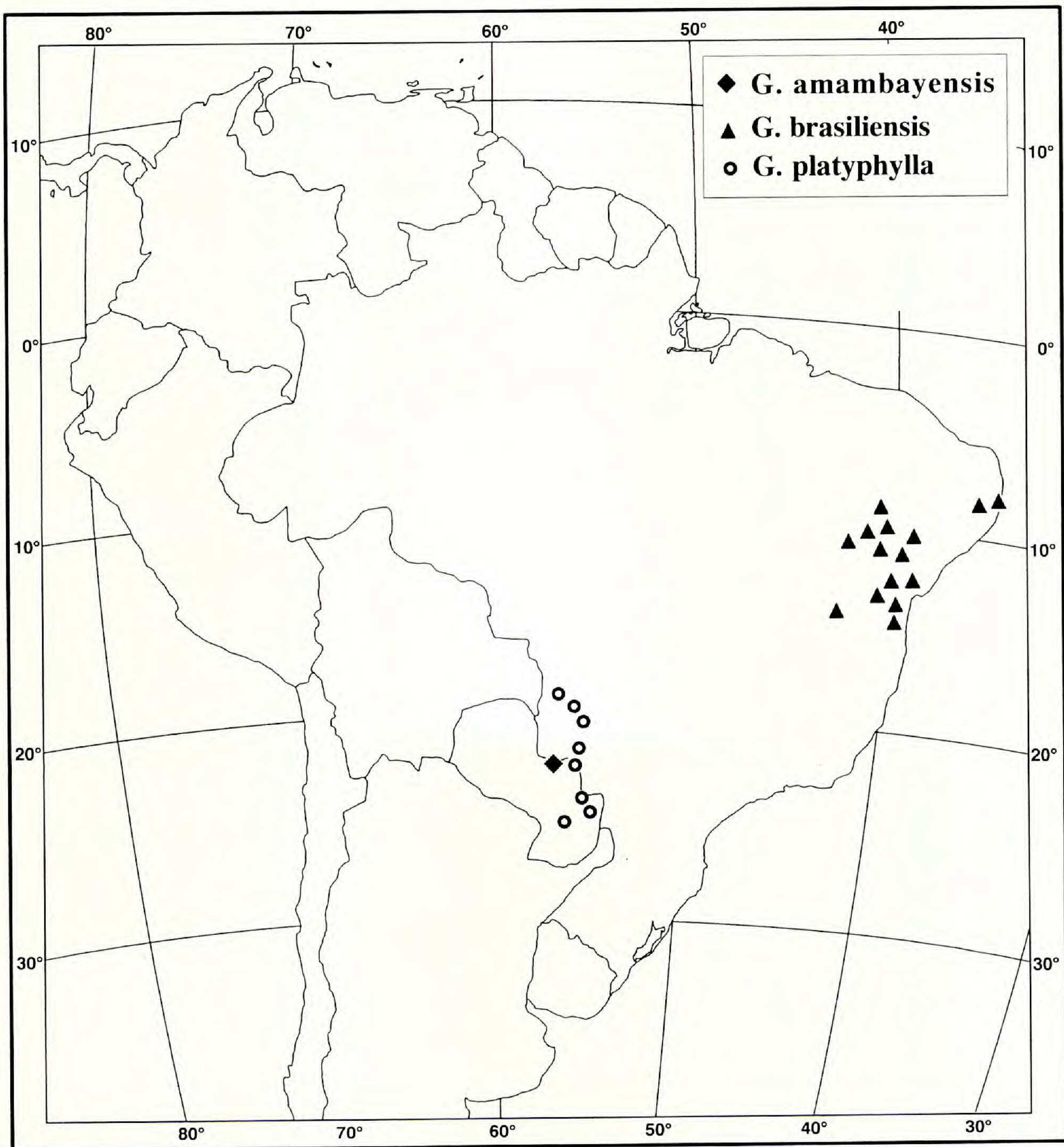


FIG. 5. Distribution of *Galphimia amambayensis*, *G. brasiliensis*, and *G. platyphylla*.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** BAHIA: 10 km W of Serrinha on rd to Conceição do Coité, 11°38'S, 39°W, *Anderson 11737* (CAS, MBM, MICH, NY); Valente, 6 km N of Valente on rd to Santaluz, *Anderson 13689* (MICH); camino de Filadélfia a Pindobaçu, a 14 km de la BR-407, 10°48'S, 40°14'W, *Arbo et al. 7334* (CEPEC); BR-324, 12 km NW de Jacobina, camino a Umburanas, 11°06'S, 40°36'W, *Arbo et al. 7359* (CEPEC); Iaçú, Fda. Lapa, 12°42'S, 39°56'W, *Arouck-Ferreira 256* (MBM); Pasto Barreiro, Faz. Serra da Monta, Itaberaba, *Bastos 162* (CEPEC, MICH); without locality, *Blanchet 1046* (G), *2184* (BM, G), *3904* (BM, F, G); Serra da Jacobina, *Blanchet 2674* (BM, BR, C, G, MO, NY, P, W); Conceição de Feira, margem esquerda do Rio Paraguaçu, 12°32'35"S, 39°03'06"W, *Carvalho et al. 544* (CEPEC, MICH); Barragem de Bananeiras, cachoeira, vale dos rios Paraguaçu e Jacuípe, 12°32'S, 39°05'W, *Cavalo 201* (CEPEC, MICH); entre Jeremoabo e Paulo Afonso, *Gonçalves 41* (CEPEC); Lagôa de Eugenia, southern end near Camaleão, *Harley 16227* (CEPEC); 64 km N of Senhor do Bonfim on BA-130 to Juazeiro, 09°55'S, 40°15'W, *Harley 16312* (K, MICH, MO, NY, RB); Serra da Jacobina, 8 km N of Senhor do Bonfim on BA-130 to Juazeiro, 10°23'S, 40°15'W, *Harley 16500* (K, MICH, MO, NY); Piatã, *Harley 24152* (K); Itaberaba, Fda. Morros, *Hatschbach 1986* (MO); Milagres, arredores, *Hatschbach 42452* (MBM, MICH); Itaberaba, Fda. Morros, *Hatschbach 48206* (BR, CEPEC, MBM, MICH); Morro da Garrafa, 12°45'18"S, 39°51'W, *Melo et al. 2043* (CEPEC); Pasto Buffel, Faz. Serra da Monta, Itaberaba, *Oliveira 544* (MO); Mairí, *Oliveira 647* (MO); Faz. Lagôa do Canto, Ipirá, *Oliveira 682* (MO); Faz. Várzea Ipirá, *Oliveira 713* (CEPEC, MO); Santa Terezinha, 0.6 km NE de Sta. Terezinha, na estrada entre Sta. Terezinha e Monte Cruzeiro, 12°48'56"S, 39°32'05"W, *Queiroz et al. 1540* (CEPEC, F, MBM); Santa Inês, Km 20 da Rod. Ubaíra/Sta. Inês, *Santos*

3070 (CEPEC, MICH); bei Remonso, *Ule 7180* (G); Santa Luz, 30 km W of Queimadas, 15 km NW of Santa Luz, 11°09'S, 39°28'W, *Webster 25670* (CAS, MICH).—PARAÍBA: without locality, *Coelho de Moraes 2116* (A, NY, S).—PERNAMBUCO: Sertânia, Fazenda Coxi, *Alencar 3* (MICH); Area-projeto Suape, Cabo de Sto. Agostinho, parte anterior (Estação D), *Andrade-Lima & Medeiros-Costa 48* (F); Cabo, Area-projeto Suape, Cabo de Santo Agostinho, *Andrade-Lima & Medeiros-Costa 48* (MBM); near Pernambuco, *Gardner 944* (BM, GH, NY, S, W); 20 km de Petrolina em direção a Afrânio, *Heringer et al. 185* (UB); 20 km de Petrolina a Afrânio, *Heringer et al. 975* (RB); without locality, *Houillet s.n.* (BR); Olinda, *Pickel 676* (SP); without locality, *Ridley et al. s.n.* (BM); Alagoinha, SW von Caruarú, *Vogel 129* (MICH).—PIAUI: Lagôa Comprida, *Gardner 2077* (BM, GH).

Galphimia brasiliensis is characterized by the “tuberculate-strigose” vesture, the mostly ovate leaves, and a uniformly velutinous ovary and fruit. The androecium is also distinctive in that the filaments of stamens opposing the petals are only 2/3 as long as those of stamens opposing the sepals. The hairs of vegetative parts are borne on small tubercles, which persist after the hair is sloughed off, so that the stems, axes, petioles, pedicels, and even the abaxial costa and margins of laminas are often tuberculate. Such tubercles are also found in the Mexican species *G. arenicola* C. Anderson, *G. hirsuta* Cav., and *G. tuberculata* (Rose) Nied. The glands of larger laminas are sometimes drawn out into a tooth (Fig. 4b).

Galphimia platyphylla Chodat, Arch. Sci. Phys. Nat., sér. 3, 24: 500. 1890. *Galphimia brasiliensis* var. *platyphylla* (Chodat) Nied. in Chodat & Hassl., Bull. Herb. Boissier, sér. 2, 7: 294. 1907. *Galphimia brasiliensis* f. *platyphylla* (Chodat) Nied., Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg 5: 22. 1914.—TYPE: PARAGUAY. Caaguazú: dans les campos, Caaguazú, Nov 1874, *Balansa 2396* (holotype: P!; isotype: G!). Fig. 6.

Subshrubs to 0.5 m, from a woody caudex; stems sparsely pubescent when young, soon becoming glabrous. Vesture of all vegetative parts of mostly wavy or crisped but sometimes straight, reddish brown hairs 0.2–0.7 mm long. Laminas of the larger leaves 3–7.5 cm long, (1.5–) 2–4 (–5) cm wide, length/width ratio 1.2–2.3 (–3), elliptical to lanceolate to ovate to broadly ovate, occasionally suborbicular, obtuse or acute or sometimes apiculate, acute to truncate, glabrous adaxially and abaxially, costa prominent abaxially, the secondary veins barely prominulous or not evident; margin entire; petioles 1.5–6 mm long; leaf glands borne on the margin near the base of the lamina or to 0.5 cm above it, usually a pair, or sometimes with 1 or 2 additional glands, or sometimes only 1 gland or the glands absent, each gland 0.2–0.5 mm in diameter, circular and prominent; stipules 2–4 mm long, 0.6–1.2 mm wide, triangular to narrowly so. Inflorescence a terminal raceme, the axes mostly tomentulose during anthesis; peduncles absent; pedicels 1.5–8 mm long, glabrous; bracts 1–5 (–7) mm long, 0.4–1.2 mm wide, linear to narrowly triangular, bracteoles 0.5–1.5 (–2) mm long, 0.2–0.5 (–0.7) mm wide, linear, bracts and bracteoles abaxially glabrous. Sepals 4–5.7 mm long, 2–2.5 mm wide, elliptical or sometimes oblong, glabrous, glands 0.3–0.6 mm in diameter, each borne in the sinus at the base of 2 sepals, or occasionally glands absent. Petals deciduous, subequal, the posterior petal sometimes a little larger, yellow, becoming red in age; claw 2–2.5 mm long, limb 7–8.5 mm long, (4–) 5–5.5 mm wide, triangular-ovate, base acute to truncate, apex obtuse. Stamens with heteromorphic filaments but subequal anthers; filament opposite anterior sepal 3.3–4.5 mm long, filaments opposite anterior-lateral petals 2.7–3.5 mm long, filaments opposite anterior-lateral sepals 3–4 mm long, filaments opposite posterior-lateral petals 2.5–3.3 mm long, filaments opposite posterior-lateral sepals 2.8–3.7 mm long, filament opposite posterior petal 2.5–3.5 mm long. Ovary glabrous; styles subequal, 4.2–5.3 mm long. Cocci 4–5 mm long, 3–3.7 mm in diameter, glabrous.

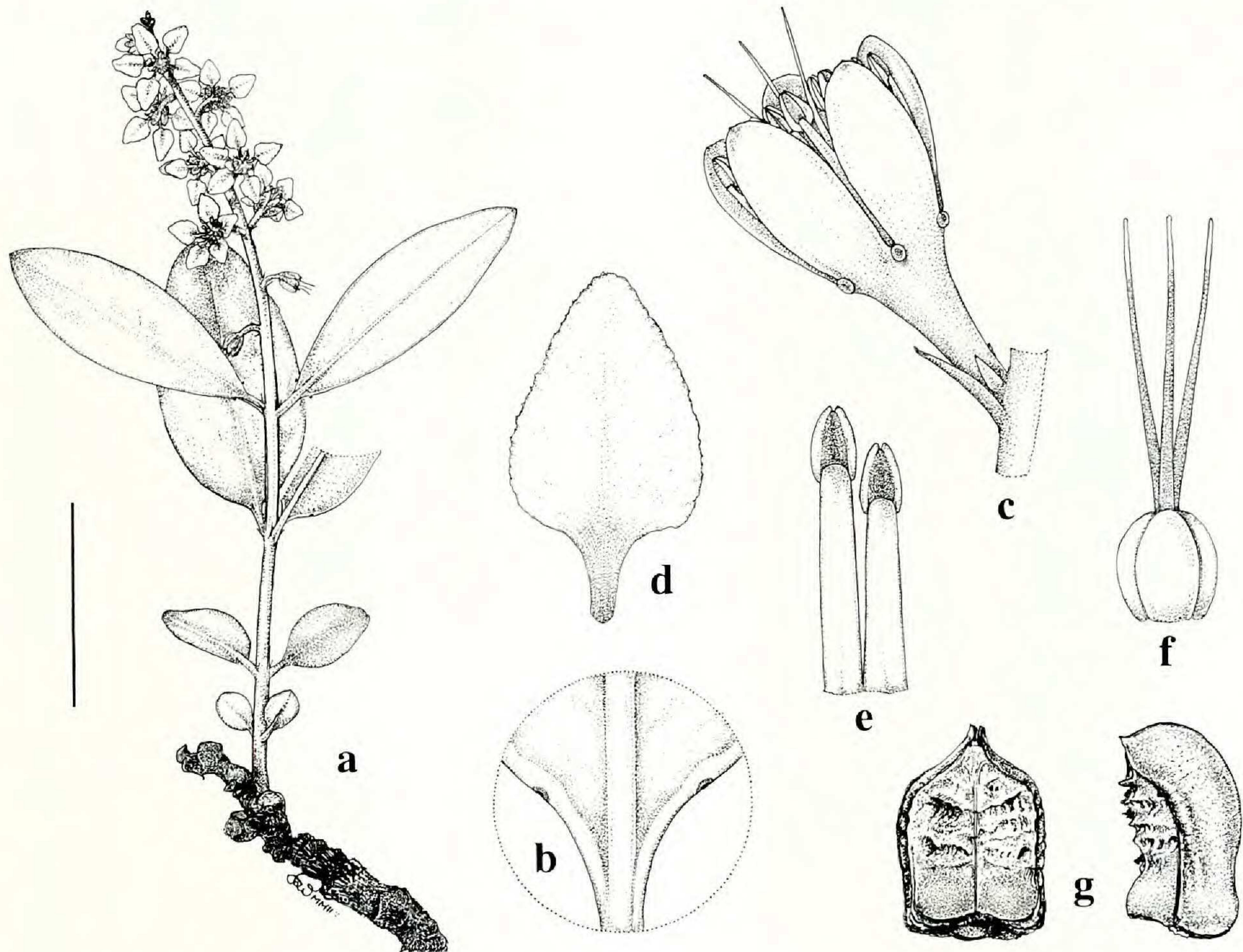


FIG. 6. *Galphimia platyphylla*. a. Habit. b. Lamina base, showing marginal glands. c. Old flower (the petals fallen) borne on pedicel, with portion of inflorescence axis; note calyx glands. d. Petal. e. Stamen opposing posterior-lateral sepal (left) and stamen opposing posterior petal (right); abaxial view. f. Gynoecium. g. Two cocci, adaxial view (left) and lateral view (right). Scale bar = a, 4 cm; b, 8 mm, c, d, 5 mm; e, f, 2.7 mm; g, 4 mm. (Based on: a–c, Hassler 9132; d–f, Pedersen 14726; g, Krapovickas et al. 45943.)

Phenology. Collected in flower and fruit in March and from July through December.

Distribution (Fig. 5). Eastern Paraguay (Amambay, Caaguazú, Canendiyú) and adjacent Brazil (Mato Grosso do Sul); campo, cerrado, campo limpo, open woodlands; 300–400 m.

ADDITIONAL SPECIMENS EXAMINED. **Brazil.** MATO GROSSO DO SUL: Mpio. Camapuã, Capão Redondo, Hatschbach 33058 (MBM, NY); Mpio. Ponta Porã, Pacori, Hatschbach 45921 (BR, G, MBM, MICH); Amambay, rod. p/ Ponta Porã, Hatschbach 48498 (MBM, MICH); Coxim, 5 km S, Oliveira 162 (MBM); Mpio. Guia Lopes de Laguna, on rd (BR-267) from Maracajú to Guia Lopes, ca. 12 km W of Ervania, Pedersen 14726 (C, MICH). **Paraguay.** AMAMBAY: Sierra de Amambay, Hassler 9884 (BM, G, NY, W); alrededores de Pedro Juan Caballero, ruta 5, Krapovickas et al. 45943 (CTES, G, MICH).—CAAGUAZÚ: prope Caaguazú, Hassler 9132 (BM, F, G, GH, K, NY, P, S, W); Ruta 2, Pastoreo, Km A-197, Krapovickas & Cristóbal 13355 (CTES); camino a Ihú, 14 km N de Caaguazú, Schinini et al. 28326 (CTES); Cnia. Pindo, camino entre Itaquyry y Curuguati, Schinini & Caballero M. 30112 (CTES, MICH); near J. E. Estigarribia, Zardini & Guerrero 49141 (MICH).—CANENDIYÚ: in regiones Yerbalium de Maracayú, Apepú et Tajairaguay [?], Hassler 4327 (BM, F, K, NY, P, W); iter ad Yerbales montium Sierra de Maracayú, in regione fluminis Capibary, Hassler 4393 (BM, G, W); Mbaracayú Natural Reserve, around Aguará-Ñú, Zardini & Ramírez B. 51023 (MO).—Depto. unknown: “Alto Paraná,” 22–23°S, Fiebrig 6348 (G).

Galphimia platyphylla is distinctive in its thick and broad leaves. The laminae range from broadly elliptical or broadly lanceolate to broadly ovate or even suborbicular, are only 1.2–2.3 times as long as wide, and often have an obtuse apex. Compared to

G. australis, the flowers and fruits are larger, and the plants are apparently shorter (to 0.5 m vs. to 1 m tall) and more robust, i.e., the axes tend to be stouter. Future fieldwork may uncover ecological differences between these two species.

EXCLUDED NAME

Galphimia pubescens (Adr. Juss.) Herter, Fl. illustr. Uruguay 14(11): 491. 1956.—
The combination is not validly published, because Herter did not cite the basionym (Article 33.3).

ACKNOWLEDGMENTS

I thank William R. Anderson and David Johnson for their advice and helpful comments on the manuscript. Karin Douthit drew the handsome illustrations. The curators of the following herbaria kindly permitted access to their collections and/or provided loans: A, BM, BR, C, CAS, CEPEC, CTES, ENCB, F, G, GH, GOET, HB, K, MICH, MBM, MO, NY, P, RB, S, SP, UB, US, W, WIS.

LITERATURE CITED

- Castro, M. A., A. S. Vega, and M. E. Múlgura. 2001. Structure and ultrastructure of leaf and calyx glands in *Galphimia brasiliensis* (Malpighiaceae). *Amer. J. Bot.* 88: 1935–1944.
- Chodat, R. 1892. Malpighiacées. *Mém. Soc. Phys. Genève* 31(2:3): 1–27.
- Jussieu, Adr. de. 1833 [“1832”]. Malpighiaceae. In *Flora brasiliensis meridionalis* by A. de Saint-Hilaire, 3: 5–86, t. 161–180. Paris: A. Belin.
- Nieden zu, F. 1914. *Galphimia*. *Arbeiten Bot. Inst. Königl. Lyceum Hosianum Braunsberg* 5: 21–28.
- . 1928. Malpighiaceae. In *Das Pflanzenreich*, ed. A. Engler, IV. 141: 1–870. Leipzig: Wilhelm Engelmann.