

TWO NEW SPECIES OF GALPHIMIA (MALPIGHIACEAE), AND A KEY TO THE MEXICAN SPECIES WITH DECIDUOUS PETALS

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ABSTRACT. *Galphimia mirandae* and *G. oaxacana*, two new Mexican species with deciduous petals, are described and illustrated. A key to all 14 Mexican species of *Galphimia* with deciduous petals is presented.

INTRODUCTION

Galphimia Cav. (Malpighiaceae) comprises ca. 20 species of large herbs, shrubs, and treelets, all but four occurring in Mexico. Species of *Galphimia* have yellow petals, often suffused with red. The petals are deciduous in most species, but in those grouped in the *G. glauca* complex the petals become stiff and spreading, and are persistent. The calyx lacks the oil glands that are found in most genera of New World Malpighiaceae; however, in a few species 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). The fruit is a schizocarp breaking into three cocci. The genus is placed in the tribe Galphimieae, along with *Lophanthera* Adr. Juss., *Spachea* Adr. Juss., and *Verrucularia* Adr. Juss. (W. R. Anderson 1978; Cameron et al. 2001; Davis et al. 2001). Many species included in *Galphimia* were first described in *Thryallis* L. or were transferred to it; however, the name *Thryallis* Mart. is conserved over *Thryallis* L. (C. Anderson 1995, 2003), and *Galphimia* Cav. is the correct name for this genus.

A few of the Mexican species with deciduous petals are aptly named and easily recognized, e.g., *G. angustifolia*, *G. sessilifolia*, *G. vestita*; however, most species are less distinctive, and the name “*G. gracilis*” is widely misapplied to them. *Galphimia gracilis* occurs in Tamaulipas and Veracruz, as well as in adjacent regions of Hidalgo, Puebla, Querétaro, and San Luis Potosí. It is also widely cultivated as an ornamental in warm regions worldwide. A recent review of the Mexican collections of *Galphimia* revealed three undescribed species among material that was associated with *G. langlassei* (C. Anderson 2003), and two additional novelties, *G. mirandae* and *G. oaxacana*, are described here.

A key is presented below to aid in the correct identification of the 14 Mexican species with deciduous petals. Commonly encountered synonyms for some names are noted in brackets.

NEW SPECIES

Galphimia mirandae C. Anderson, sp. nov.—TYPE: MEXICO. Puebla: Mpio. Tehuiztingo, 12 km al NW de El Pitayo, carr. a Izúcar de Matamoros, 1350 m, 28 Jul 1983, Torres C. 3296 (holotype: MEXU!; isotype: MBM!) Fig. 1.

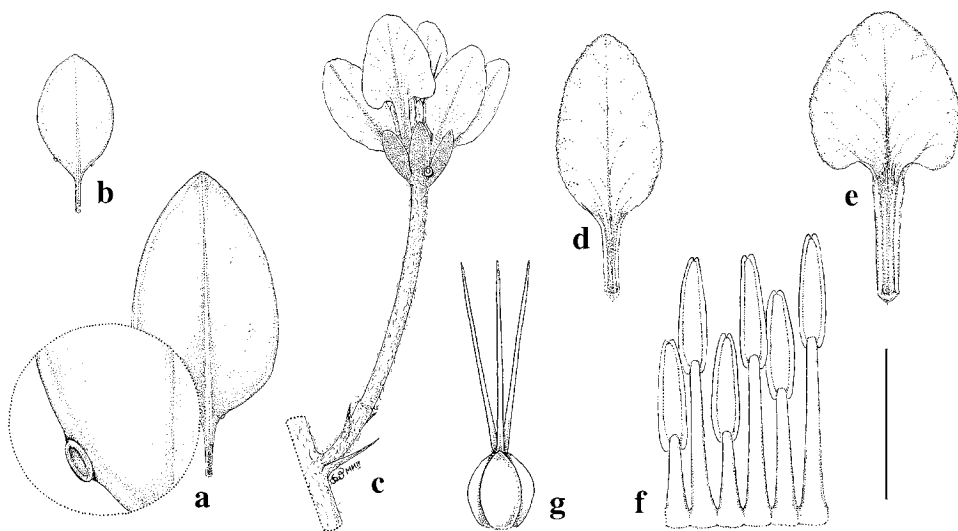


FIG. 1. *Galphimia mirandae*. a. Leaf with ovate lamina; detail of base of lamina, showing marginal gland. b. Leaf with elliptical lamina. c. Flower borne on pedicel and peduncle, with portion of inflorescence axis; note calyx gland. d. Lateral petal. e. Posterior petal. f. Abaxial view of six stamens; outermost stamen at left opposes posterior petal, outermost stamen at right opposes anterior sepal. g. Gynoecium. Scale bar = a, 4 cm, inset 4 mm; b, 4 cm; c, 1 cm; d, e, 5.7 mm; f, g, 4 mm. (Based on: a, *Miranda* 2147; b-g, *Torres* C. 3296.)

Frutex vel arbor parva. Laminae 3–6.5 cm longae, 2–4 cm latae, ellipticae vel ovatae vel obovatae vel rhombicae, glabrae, succulentae, margine integra, glandibus 0.5–1 mm diametro, sessilibus; petioli 0.5–1 cm longi; stipulae 2–4 mm longae. Inflorescentia racemosa. Petala decidua; petala lateralia ungue 2.5–2.8 mm longo, 0.5 mm lato, limbo 7–8.5 mm longo, 4.5–5.5 mm lato, elliptico vel anguste triangulari; petalum posticum ungue 4–4.2 mm longo, 1–1.2 mm lato, limbo 6.2–7.5 mm longo, 6–7 mm lato, triangulari vel interdum suborbiculari. Antherae 3.3–3.7 mm longae. Ovarium glabrum vel suturis pubescens; styli anteriores 6–6.6 mm longi, stylus posticus 5–5.7 mm longus. Fructus ignotus.

Shrub or treelet to 4 m, stems tomentulose, soon glabrescent to glabrous. Vesture of all vegetative parts of sessile, wavy to crisped, reddish brown hairs 0.4–1 mm long. Laminae of the larger leaves (1.5–) 3–6.5 cm long, (1–) 2–4 cm wide, elliptical to broadly so, obovate, rhombic, or ovate, apex obtuse to acute, base acute to decurrent (especially in larger leaves), glabrous, succulent, costa prominent abaxially, secondary veins prominulous or not evident; margin entire; petioles 0.5–1 cm long, glabrous; leaf glands commonly a pair, borne on the margin of the lamina well above or at the base, if base decurrent then superficially appearing placed on the petiole, sometimes 1 or more additional glands borne on the margin of the lamina, each gland discoid and with a thick rim, 0.5–1 mm in diameter; stipules 2–4 mm long, 0.7–1.2 mm wide, narrowly triangular. Inflorescence a terminal raceme, the axes, peduncles, and pedicels tomentulose but becoming sparsely so in age; peduncles 3–6 mm long, pedicels 14.5–18.5 mm long, the pubescence often concentrated in a line, with a ring of hairs at the articulation, peduncles 0.2–0.3 times as long as pedicels; bracts 2.5–3.2 mm long, 0.5–0.8 mm wide, bracteoles 1.5–2 mm long, 0.3–0.5 mm wide, bracts and bracteoles linear, abaxially glabrous or with a few scattered hairs; bracteoles borne at about the middle of the peduncle, subopposite or up to 0.3 mm apart. Sepals 3.5–4.2 mm long,

1–1.5 mm wide, narrowly ovate to oblong, glabrous or at the apex red-ciliate, glands absent or rarely with a gland 0.5 mm in diameter. Petals deciduous, unequal, yellow; lateral petals: claw 2.5–2.8 mm long, 0.5 mm wide, limb 7–8.5 mm long, 4.5–5.5 mm wide, elliptical or narrowly triangular; posterior petal: claw 4–4.2 mm long, 1–1.2 mm wide, limb 6.2–7.5 mm long, 6–7 mm wide, triangular or sometimes suborbicular. Stamens with heteromorphic filaments but subequal anthers; filament opposite anterior sepal 4–4.5 mm long, filaments opposite anterior-lateral petals 3–3.2 mm long, filaments opposite anterior-lateral sepals 3.7–4 mm long, filaments opposite posterior-lateral petals 2–2.2 mm long, filaments opposite posterior-lateral sepals 3.6–4 mm long, filament opposite posterior petal 2–2.3 mm long; anthers 3.3–3.7 mm long, tapered from the base to the apex. Ovary glabrous or with a row of hairs along the sutures in the proximal 2/3–4/5, sometimes only with a few hairs scattered along the sutures; styles unequal, anterior styles 6–6.6 mm long, posterior style 5–5.7 mm long. Mature fruit not seen.

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** GUERRERO: 8 km al NW de Chilpancingo, sobre la carretera a Chichihualco, 1350 m, 7 Jul 1966, *Asteinza* (ENCB), *M. Cabrera s.n.* (ENCB), *Rzedowski 22755* (DS, ENCB, MICH, TEX).—PUEBLA: [Izúcar de] Matamoros, 24 Jul 1942, *Miranda 2147* (MEXU).

Galphimia mirandae is recognized by its succulent laminas with large, thick-rimmed glands on the margin; if the base is decurrent the glands may at first glance appear to be borne on the petiole, but careful examination shows them embedded in the laminar tissue. The pedicels are quite long (14.5–18.5 mm), and the anterior styles slightly exceed the posterior one. The label data for the type collection include the note “suelo pedregoso”; perhaps this species is associated with substrates derived from volcanic deposits.

This species is named for the eminent Mexican botanist Faustino Miranda (1905–1964), who first collected it.

Galphimia oaxacana C. Anderson, sp. nov.—TYPE: MEXICO. Oaxaca: Dtto. Tehuantepec, Rancho Ricardo, al N de Buenos Aires, entrando por Hierba Santa, 12 Sep 1985, *Torres C. 7306* (holotype: MICH! isotypes: F! MEXU!). Fig. 2.

Frutex vel arbor parva. Laminae 3.5–6 cm longae, 1.5–3.5 cm latae, ellipticae vel ovatae vel lanceolatae, adaxialiter glabrae, abaxialiter papillosae vel parum papillosae, coriaceae, margine integra, glandibus 0.4–0.7 mm diametro, sessilibus; petioli 0.8–1.5 cm longi; stipulae 1.5–2.5 mm longae. Inflorescentia racemosa. Petala decidua; petala lateralia ungue (1.5–) 2–2.5 mm longo, 0.5 mm lato, limbo (5–) 6.5–8 mm longo, (3.8–) 4–4.5 mm lato, elliptico vel anguste ovato; petalum posticum ungue (3–) 4–5 mm longo, (1–) 1.2–1.5 mm lato, limbo (4.5–) 5–6.5 mm longo, (4–) 5.5–6 mm lato, triangulari. Antherae (2.5–) 2.8–3.5 mm longae. Ovarium suturis pubescens; styli subaequales, (4.7–) 5–5.3 mm longi. Coccus ca. 3.5 mm longus, suturis pubescens.

Shrub or treelet to 6 m; stems sparsely pubescent, soon glabrous. Vesture of all vegetative parts of sessile, straight to wavy, reddish brown hairs 0.3–0.8 mm long. Laminas of the larger leaves 3.5–6 cm long, 1.5–3.5 cm wide, elliptical or ovate to lanceolate, apex apiculate or sometimes acute, base acute, adaxially glabrous, abaxially papillose or sometimes only slightly so (the epidermis at least blistered), coriaceous, costa and secondary veins (at least the first two pairs) prominent abaxially (usually appearing white in dry material), the tertiary veins slightly or not at all evident; margin entire; petioles 0.8–1.5 cm long, glabrous or with a few scattered

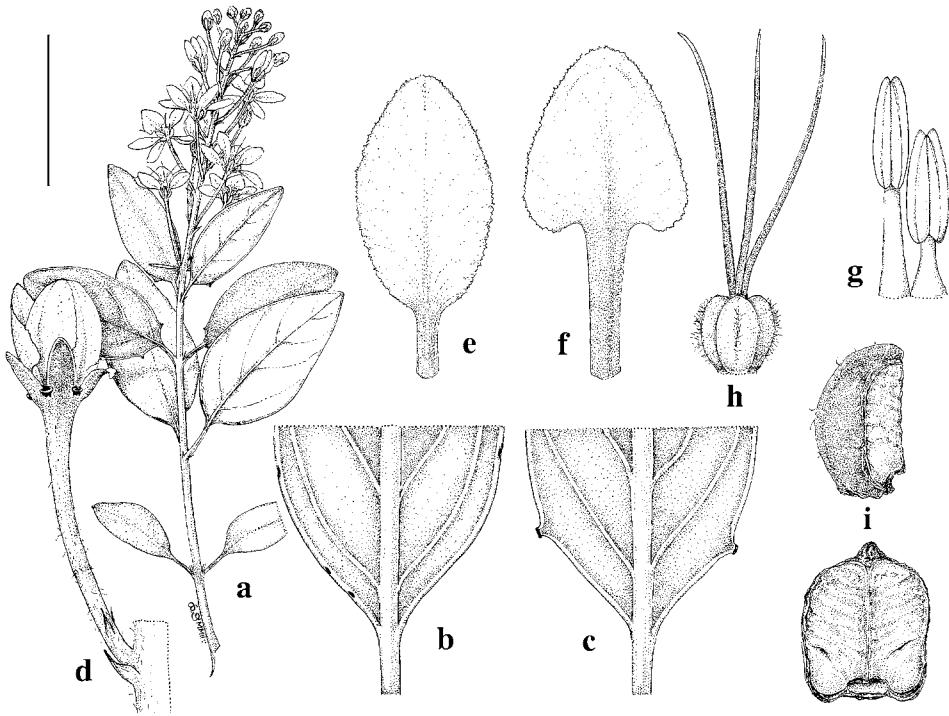


FIG. 2. *Galphimia oaxacana*. a. Flowering branch. b, c. Proximal portion of two leaves, abaxial view. d. Flower borne on pedicel and peduncle, with portion of inflorescence axis; note calyx glands. e. Lateral petal. f. Posterior petal. g. Adaxial view of stamen opposing posterior petal (at right) and posterior-lateral sepal (at left). h. Gynoecium. i. Two cocci, shown in adaxial and lateral view. Scale bar = a, 4 cm; b–d, 8 mm; e, f, 5 mm; g, 4 mm; h, 2.7 mm; i, 3.3 mm. (Based on: a, b, g, i, *Martínez R. 55*; c–f, h, *Torres C. 122*.)

hairs; leaf glands usually a pair borne on the margin of the lamina 8–15 mm above the base or sometimes with 3–6 glands, each gland 0.4–0.7 mm in diameter, disklike and sessile or raised ca. 0.2 mm above the epidermis, or sometimes embedded in the margin; stipules 1.5–2.5 mm long, 0.8–1 mm wide, narrowly triangular, abaxially glabrous. Inflorescence a terminal raceme, the axes sparsely tomentulose or strigose; peduncles 3.5–6.5 mm long, pedicels (7–) 10–15 mm long, both sparsely tomentulose, often more densely at the articulation, in the pedicel the hairs often concentrated in a line extending from the articulation to the calyx, peduncles 0.3–0.5 times as long as pedicels; bracts (1.5–) 2–2.8 mm long, 0.5–0.9 mm wide, linear, bracteoles 0.8–1.7 mm long, 0.3–0.6 mm wide, linear, bracts and bracteoles glabrous; bracteoles borne in the proximal 1/5–1/2 of the peduncle, subopposite. [Sometimes shrubs with only the terminal branches bearing a flush of small leaves along short internodes (to ca. 1 cm long) and a short inflorescence, the leaves 1–2.5 cm long, 0.5–0.9 cm wide; see discussion.] Sepals 2.5–3 mm long, 1.3–1.5 mm wide, oblong, glabrous, occasionally the margin distally fringed with hairs to 0.2 mm long, the calyx with 1–3 (–4) glands, each borne in the sinus at the base of two sepals, glands 0.3–0.5 mm in diameter, prominent and raised to 0.2 mm above the epidermis. Petals deciduous, unequal, yellow, the claws suffused with red; lateral petals: claw (1.5–) 2–2.5 mm long, 0.5 mm wide, limb (5–) 6.5–8 mm long, (3.8–) 4–4.5 mm wide, narrowly ovate to elliptical; posterior petal: claw (3–) 4–5 mm long, (1–) 1.2–1.5 mm wide, limb (4.5–) 5–6.5 mm long, (4–) 5.5–6 mm wide, triangular, apex broadly obtuse. Stamens with heteromorphic

filaments but subequal anthers; filament opposite anterior sepal 4–4.5 mm long, filaments opposite anterior-lateral petals 2.5–3 mm long, filaments opposite anterior-lateral sepals 3.6–4.2 mm long, filaments opposite posterior-lateral petals 1.5–2 mm long, filaments opposite posterior-lateral sepals 3.3–3.5 mm long, filament opposite posterior petal 1.5–2 mm long; anthers (2.5–) 2.8–3.5 mm long, tapered toward the apex. Ovary pubescent along the dorsal sutures, otherwise glabrous; styles subequal, (4.7–) 5–5.3 mm long. Coccus ca. 3.5 mm long, ca. 2.7 mm in diameter, dorsal crest to 0.5 mm wide and pubescent on the suture, otherwise glabrous; areole ca. 3 mm long, ca. 2.5 mm wide; mature seed not seen.

Phenology. Collected in flower from August to October, in fruit from September to December.

Distribution. Mexico (Oaxaca); in deciduous forest (“selva baja caducifolia”) and transition to pine-oak forest; 500–1100 m.

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** OAXACA: alrededores del Cerro Guiengola, a 10 km aprox. al NW de Tehuantepec, *Cabrera 7413* (MEXU, MO); Dtto. Santo Domingo Tehuantepec, Mpio. Mixtequilla, a 18 km de Mixtequilla, carretera a Paso Escondido, 16°27'N, 95°19'W, *Calzada 19255* (MEXU); Mpio. Santiago Laollaga, recorrido por el aguaje Coyol, al W de Laollaga, 16°34'N, 95°14'W, *Campos V. 4039* (F, MEXU, MO); Mpio. Santiago Laollaga, recorrido hacia y por el Arroyo de Hierba Santa, al E de Guichixu, brecha Laollaga–Guevea de Humboldt, 16°41'N, 95°16'W, *Campos V. 4129* (F, MEXU, MO); Dtto. Tehuantepec, Mpio. Buenos Aires, Buenos Aires, rumbo a El Cerro Arenal, *Martínez R. 55* (IEB, MICH); Dtto. Tehuantepec, ruinas del Cerro Guiengola, *Torres C. 40* (MEXU, MO); Dtto. Tehuantepec, “Las Palmitas,” ladera oriente del Cerro Guiengola, *Torres C. 122* (IEB, MEXU, MO); Dtto. Tehuantepec, 11 km al W de la Chiviza, hacia Lachiguiri, *Torres C. 5717* (MEXU, MICH, XAL); Dtto. Tehuantepec, 12.2 km al W de la Chiviza, hacia Lachiguiri, *Torres C. 5720* (F, MEXU); Dtto. Tehuantepec, 11.3 km al N de La Chiviza, *Torres C. & Martínez 5880* (MEXU, MICH).

Galphimia oxacana, known only from the Pacific slope of the Isthmus of Tehuantepec, is distinctive in its leaves and flowers. The abaxial surface of the thick laminae is commonly papillose, and the costa and secondary veins are prominent. Calyx glands are present in all or nearly all flowers of an inflorescence, and the ovaries and cocci are beset with fine hairs along the dorsal sutures.

The collections *Torres C. 122*, *Torres C. 5717*, and *Torres C. & Martínez 5880* differ in that they consist of terminal branches bearing a flush of small leaves along short internodes (to ca. 1 cm long) and a short inflorescence; the leaves are 1–2.5 cm long, 0.5–0.9 cm wide. This growth form may reflect particularly dry conditions.

KEY TO THE MEXICAN SPECIES OF GALPHIMIA WITH DECIDUOUS PETALS

1. Peduncles absent, the pedicels subtended by a bract and a pair of bracteoles.
 2. Leaves essentially glabrous or with a few scattered hairs, especially on the midrib abaxially; Baja California, Baja California Sur, Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, Sinaloa, Sonora, Tamaulipas. *G. angustifolia* Benth. [synonym: *G. linifolia* A. Gray].
 2. Leaves densely white-pubescent; Nayarit, Sinaloa, Sonora. *G. vestita* S. Watson
1. Peduncles present, subtended by a bract and bearing a pair of bracteoles, the articulation commonly marked with a band of hairs.
 3. Ovaries and fruits densely and evenly pubescent.
 4. Inflorescence entirely glabrous (except for pubescent ovary); calyx glands present; petals mostly red with yellow markings; leaf glands borne on the petiole, commonly in the proximal 1/6–1/2 (rarely distally); Guerrero, Jalisco, México, Michoacán, Sinaloa. *G. glandulosa* Cav. [synonyms: *Thryallis palmeri* Rose, *T. dasycarpa* Small]
 4. Inflorescence sparsely or abundantly pubescent; calyx glands absent or present; petals yellow, usually with red markings; leaf glands borne on the margin of the lamina.

5. Petioles beset with hairs borne on persistent tubercles and/or only with the tubercles (the hairs already shed); branchlets commonly roughened by the persistent tubercles; Colima, Jalisco, Nayarit, Sinaloa.
G. tuberculata (Rose) Nied. [synonym: *G. humilis* (Rose) Nied.]
5. Petioles smooth, glabrous or with sessile or subsessile hairs; branchlets smooth or the bark lightly fissured.
6. Anthers 3–4 mm long, narrowly triangular in outline (the base ca. twice as wide as the apex); filament of stamen opposing the anterior sepal 3.5–4 mm long, filament of stamen opposing the posterior petal shorter than that of stamens opposing the posterior-lateral sepals (1.6–2.6 mm vs. 3.5–4.6 mm); peduncles 0.6–1.2 (–1.6) times as long as pedicels; Colima, Guerrero, Jalisco, Michoacán.
G. langlassei (Blake) C. Anderson
6. Anthers 2.3–2.5 (–2.8) mm long, oblong or elliptical in outline (equally wide at base and apex); filament of stamen opposing the anterior sepal 2.2–2.6 mm long, filament of stamen opposing the posterior petal and those of stamens opposing the posterior-lateral sepals subequal [1.5–1.7 (–2) mm vs. 1.5–1.8 (–2.2) mm]; peduncles 0.3–0.5 (–0.7) times as long as pedicels; southern Nayarit and adjacent Jalisco.
G. mexiae C. Anderson
3. Ovaries and fruits glabrous, or with hairs concentrated on the sutures.
7. Petioles beset with hairs borne on persistent tubercles and/or only the tubercles (the hairs already shed); branchlets commonly roughened by the persistent tubercles (in *G. gracilis* not or only slightly so).
8. Laminas abundantly pubescent above and below with hairs borne on tubercles, the hairs eventually sloughed off and the laminar surfaces retaining the persistent tubercles; Guerrero.
G. hirsuta Cav.
8. Laminas glabrous or glabrate, often with some scattered hairs on the midrib below, the laminar surfaces smooth.
9. Margin of lamina entire, leaf glands prominent or flush with the margin; bracteoles borne at or just below the apex of the peduncle; pedicels 5–10 mm long, peduncles 0.5–1 times as long as the pedicels; Tamaulipas and Veracruz, and adjacent regions of Hidalgo, Puebla, Querétaro, and San Luis Potosí.
G. gracilis Bartling
9. Margin of lamina beset with scattered tubercles and/or somewhat longer epidermal processes, leaf glands prominent to stalked; bracteoles borne on the peduncle in the proximal 1/4 to 1/2; pedicels 2–5 mm long, peduncles 1.2–3 times as long as the pedicels; coastal Oaxaca.
G. arenicola C. Anderson
7. Petioles smooth, glabrous or with sessile or subsessile hairs; branchlets smooth or the bark lightly fissured.
10. Leaves subsessile, the petioles rudimentary; leaf glands mostly absent; Oaxaca.
G. sessilifolia Rose
10. Leaves petiolate; leaf glands usually present.
11. Petals subequal; hairs on ovaries/fruits to 0.5 mm long; petioles 1.5–2.3 cm long, laminas 7–12 cm long; Guerrero.
G. radialis C. Anderson
11. Petals unequal, limb of lateral petals narrower than limb of posterior petal; hairs on ovaries/fruits to 0.1 mm long or ovaries/fruits glabrous; petioles 0.4–1.5 cm long, laminas 2–6 cm long.
12. Calyx glands present in all (or almost all) flowers of an inflorescence; laminas abaxially commonly papillose (or the epidermis at least blistered), coriaceous, the secondary veins prominent abaxially; ovaries/fruits with hairs on the sutures; Pacific slope of Oaxaca.
G. oaxacana C. Anderson
12. Calyx glands absent, or one or a few flowers of an inflorescence with 1 or 2 calyx glands (rarely many flowers with calyx glands); laminas abaxially smooth, succulent or chartaceous, the secondary veins not prominent; ovaries/fruits glabrous or with hairs on the sutures.
13. Laminas succulent, elliptical to broadly ovate to suborbicular, the base often decurrent, glands 0.6–1 mm in diameter, sessile on the margin; pedicels 14.5–18.5 mm long; Guerrero, Puebla.
G. mirandae C. Anderson
13. Laminas chartaceous, ovate or elliptical or narrowly elliptical, the base acute, glands 0.4–0.6 mm in diameter, raised above the margin or borne on the petiole; pedicels 5.5–10.5 mm long.

14. Bracteoles borne at or just below the apex of the peduncle (i.e., just below the articulation); laminas elliptical or narrowly so, with an apical tuft of hairs (best seen in younger leaves); peduncles 0.5–1 times as long as pedicels; anterior styles longer than the posterior style; ovary glabrous; calyx eglandular; Tamaulipas and Veracruz, and adjacent regions of Hidalgo, Puebla, Querétaro, and San Luis Potosí. *G. gracilis* Bartling
14. Bracteoles borne near the middle of the peduncle, or one near the middle and the other near the base; laminas ovate or lanceolate, without an apical tuft of hair; peduncles 0.2–0.6 times as long as the pedicels; styles subequal; ovary glabrous or with hairs on the sutures; calyx glands present or absent; Guerrero, Jalisco, Michoacán, Nayarit, Sinaloa, and southwestern Durango and Zacatecas. *G. montana* (Rose) Nied.

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