EUPHORBIACEAE NOVAE NOVO-GALICIANAE[1]

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In 1949 I spent a few weeks in the State of Jalisco, Mexico, and became interested in the varied vascular flora of the Pacific Slope of Jalisco and the surrounding area. Field work preliminary to the preparation of a regional flora was initiated in 1951 and continued in 1952, 1957, 1958, 1959, and 1960, with generous aid from the Horace H. Rackham School of Graduate Studies, University of Michigan, and from the National Science Foundation. Approximately 500 days have been spent in field work in southwestern Mexico since 1949, and approximately 50,000 herbarium specimens have been obtained, from a variety of habitats and localities. Preliminary determinations have been made on most of the specimens, and tentative revisions, on a regional basis, have been prepared for a number of families of vascular plants. Early indications are that in the Jalisco region there are many undescribed and previously unrecognized species; the number of such species may run as high as 5–10 percent of the total known from the region. In the Euphorbiaceae, for example, out of a total of approximately 180 species in the Jalisco region, 24 are apparently new to science. The present paper includes descriptions of these 24 species and one additional variety, and to this I have added abridged keys to the genera in which the new species occur, and some further notes on nomenclature, range-extensions and taxonomic relationships.

The "Jalisco region" corresponds, in a very general way, to the area formerly occupied by the Spanish Vice-Royalty of Nueva Galicia—a great wedge with its base on the Pacific Ocean and its point pushing northeastward, halfway across the Republic.[2] Specifically, I have attempted to include in the present work all records from Jalisco, Colima and Aguascalientes; from Nayarit as far north as San Blas and the edge of the highlands that fall off north of Tepic to the broad coastal plain; from eastern Nayarit, southern Durango and southern Zacatecas as far west as the Río San Pedro and north to latitude 23°; from the small part of the basin of Lake Chapala that extends into Michoacán; eastward to an ill-defined physiographic boundary that is marked approximately by the western and northern fronts of the mountains along a line in Guanajuato and Michoacán, from the Cerro del Toro about 50 kilometers east of Lagos de Moreno, southward to the Sierra de Pénjamo, Cerro Patamban, Cerro Tancítaro and Sierra de Coalcomán. (Fig. 1).

The area as defined above is in some measure a natural one, of relatively low relief, lying in an intermediate position between the Sierra Madre Occidental to the Northwest and the Sierra Madre del Sur to the Southeast, and bisected by the valley of the Río Lerma (below Lake Chapala mostly called

[1] This paper is published with the aid of a subvention from the National Science Foundation, which also supported the field work in the Jalisco region in 1957, 1958, 1959 and 1960. Most of the drawings were made by Mr. Charles Feddema, for whose continued interest and careful attention to detail I am most grateful. The paper was in galley proof before my return from Mexico in 1960 but notes on a few of the more significant findings from this last trip have been added for the sake of completeness.

[2] Descripción de la Nueva Galicia. Domingo Lázaro de Arregui, edited by François Chevalier. Univ. Sevilla Esc. Estud. Hisp.-Am. Publ. 24 (III, no. 3). pp. lxxi, 161. 1946.

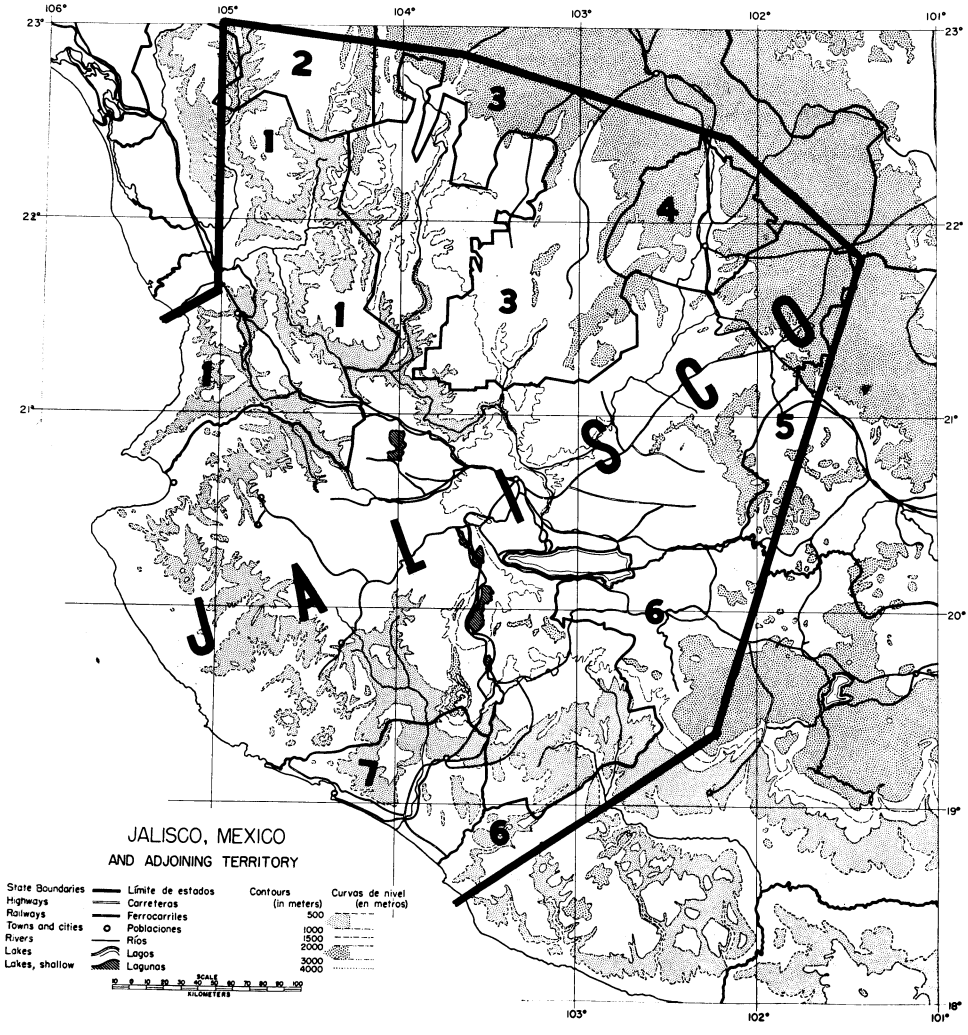


FIG. 1. Area of the *Flora novo-galiciana*. Map by Bonnie Hall. States, except Jalisco, indicated by numbers: 1. Nayarit. 2. Durango. 3. Zacatecas. 4. Aguascalientes. 5. Guanajuato. 6. Michoacán. 7. Colima.

the Río Grande de Santiago). The flora includes a considerable endemic element, and a very much larger element (perhaps one-half of all the species) that is endemic or essentially so in western Mexico, in the region with a long winter dry season.

The northeastern part of the area includes a corner of the high central plateau of Mexico, and a number of grassland species are not found elsewhere in the Jalisco region except in these uplands, at elevations of 2000 meters or more.

The northern part of the region seems to be little influenced, floristically speaking, by species of the Sierra Madre Occidental. As Maysilles[3] has pointed

[3] Floral relationships of the pine forests of western Durango, Mexico. Unpubl. Ph.D. thesis, University of Michigan. pp. xii, 165. illus. 1959.

out, the great pine forests of the Sierra Madre come to an abrupt termination in southern Durango. The broad, dry valley of the Río Mezquital lies between the Durango highlands and the relatively drier and more nearly level grasslands of western and southern Zacatecas and northern Jalisco. Such well known temperate genera as *Pseudotsuga, Populus, Potentilla, Saxifraga, Eriogonum, Sidalcea, Pterospora, Primula* and *Monarda,* in western Mexico, range southward to the Durango highlands, but scarcely beyond them.

The southwestern part of the Jalisco area, from near Mazamitla to the massif of the Nevado de Colima and thence northwesterly to the valley of the Río de Ameca, is characterized by rugged mountainous topography and the presence of numerous more or less isolated ranges 1500–3000 meters in elevation (4300 meters on the Nevado de Colima). These mountains are topographically and floristically similar to, and geographically adjacent to, the high mountains of southern Michoacán and to the Sierra Madre del Sur in Guerrero and Oaxaca; it is perhaps not surprising that the flora of southwestern Jalisco shows a strong relationship to the floras of Oaxaca, Chiapas and Central America.

As pointed out above, a large proportion of the species making up the *Flora novo-galiciana* range more or less widely along the Pacific Slope of Mexico, in the region of high summer rainfall and long winter drought. Many of the species range northward to central Sinaloa (a few to Sonora or southwestern Chihuahua), and southeastward to Guerrero or Oaxaca. There is almost no relationship between the *Flora novo-galiciana* and that of Baja California (except to a very limited extent with the mountains of the Cape Region); almost no relationship with the arid-land floras from central Sinaloa northward; and a tenuous relationship with the tropical floras of the Atlantic Coast of Mexico. The recent discoveries in western Mexico of such euphorbiaceous genera as *Alchornea, Garcia, Gymnanthes* and *Mabea,* and of such species as *Croton glabellus, Euphorbia cotinifolia, Sebastiania corniculata* and *Tragia volubilis,* point up the need for further exploration particularly in Michoacán and Guerrero. The mountainous areas in these states are still very incompletely known to botanists. At present, for example, we know that the species and genera named above occupy isolated disjunct portions of their ranges in Jalisco and Nayarit, but we can but speculate as to whether they may occur also along the Pacific slope in Michoacán and Guerrero and thus perhaps range nearly continuously to Oaxaca, Veracruz and Central America.

Special note may be made of the almost unbroken belt of pine and fir forest that extends westward from Mexico City in the trans-Mexican Sierra de los Volcanes, beyond Morelia and Lake Patzcuaro to Uruapan and Cerro Tancítaro. Many of the species of the mountain forests range much further west, on some isolated highlands well into Jalisco. Somewhere west of Morelia, however, there appears to be a marked change in floristic composition of the forests. Western Michoacán is as yet insufficiently explored botanically, and I cannot explain why so many species that are known from the vicinity of Morelia and from further east are unknown from further west.

The Euphorbiaceae, treated in more detail below, are represented in the *Flora novo-galiciana,* as far as known, by about 180 species. Of these approximately 100 are confined, or nearly confined, to the Pacific slope of western Mexico; about 40 appear to have the principal portions of their ranges on the Mexican Plateau; fewer than 20 are wide-ranging plants of tropical lowlands; the rest are of unexplained disjunct distributions, or unclassified.

ACALYPHA

This genus was revised by F. Pax and K. Hoffmann (Pflanzenreich IV.147. XVI(Heft 85): 12 – 177. 1924). These authors saw little Mexican material. Their keys are difficult to interpret satisfactorily and, as pointed out by Standley & Steyermark (Fieldiana Bot. 24^6 : 33, 34, 42. 1949), Pax & Hoffmann relied heavily upon mechanical separation of species by key characters, thereby sometimes misrepresenting the taxonomic relationships of the species. The following key is therefore constructed on a somewhat different basis from that of Pax and Hoffmann.

♀ flowers, at least the lowermost, slender-pedicellate; ♀ bracts scarious, 1 mm long.
♂ spike 1–1.5 cm long, stiff, multibracteate; petioles 2–6 mm long. *A. coryloides* Rose.
♂ spike 6–10 cm long, flexuous with filiform axis; petioles 30–45 mm long. *A. filipes* (S. Wats.) McVaugh.

♀ flowers sessile, their bracts at least in fruit usually much larger, foliaceous.
Annual herbs.
Lobes of the ♀ bracts long-linear to setaceous or filiform, much longer than the undivided portion of the bracts [*A. polystachya* Jacq., *A. setosa* A. Rich., *A. ostryaefolia* Ridd., *A. trilaciniata* P. G. Wilson, *A. alopecuroides* Jacq., *A. arvensis* Poepp. & Endl.].
Lobes or teeth of the ♀ bracts rounded, ovate or triangular, not linear or much elongated, the bracts usually not divided beyond the middle.
Lowermost leaf-axils producing red filiform pedicels up to 15 cm long. *A. hypogaea* S. Wats.
Lowermost leaf-axils not producing filiform pedicels.
♀ bracts with 3 blunt, triangular or ovate lobes; ♂ spikes terminal. *A. pippenii* McVaugh.
♀ bracts with 5 or more, often sharp-pointed teeth; ♂ spikes axillary (except in *A. pseudoalopecuroides* with ♀ bracts 7- to 9-toothed). [*A. pseudoalopecuroides* Pax & Hoff., *A. salvadorensis* Standl., *A. neomexicana* Muell. Arg., *A. microphylla* Kl.]
Perennial herbs, or shrubs or trees.
Perennial herbs with tufted, clustered and nearly unbranched stems, often 30–60 cm long or less, from a woody root [*A. anemioides* HBK., *A. multispicata* S. Wats., *A. phleoides* Cav., *A. ocymoides* HBK. (including *A. triloba* Muell. Arg. and *A. erecta* P. G. Wilson)].
Shrubs or trees.
All spikes axillary, the branches indeterminate [*A. umbrosa* Brandg., *A. langiana* Muell. Arg. (including *A. palmeri* Pax & Hoffm.), and *A. vagans* Cav.].
Terminal spike present, all or nearly all ♀, usually much larger than, and maturing earlier than, the ♀ spikes (if any) in the upper leaf-axils.
♀ spikes several or many, usually paniculate in a definite inflorescence, sometimes with a terminal ♂ portion or sterile seta.
♀ bracts with (7–) 9–13 teeth, these densely and coarsely stipitate-glandular; plants white-pubescent, eglandular except the bracts; upper axillary spikes shorter than the leaves. *A. subviscida* var. *lovelandii* McVaugh.
♀ bracts with (11–) 15–19 (–25) teeth, often plicate; herbage often viscid and stipitate-glandular generally; upper axillary spikes often equalling or exceeding the subtending leaves. *A. subviscida* S. Wats. var. *subviscida*.
♀ spikes usually few, and solitary at the tips of short lateral branches, without a terminal ♂ portion or sterile seta.
Petiole 1 cm long or less; leaves small, at maturity 1–3 cm wide; teeth of the ♀ bracts about 21, heavily glandular-serrulate. *A. nubicola* McVaugh.
Petiole mostly 2.5 cm long or much more (sometimes shorter in immature leaves at flowering time); mature leaves mostly 5 cm wide or much more; teeth of ♀ bracts eglandular, or if glandular then only 7 in number [*A. cincta* Muell. Arg., *A. grisea* Pax & Hoffm., *A. schiedeana* Schlecht.].

1. Acalypha anemioides HBK. Nov. Gen. & Sp. **2**: 94. 1817.

This is rather doubtfully distinct from *A. monostachya* Cav. (Anal. Hist. Nat. Madrid 2: 138. *t. 21. fig. 3.* Sep 1800), which is rather generally pilose-

pubescent with soft hairs, and in which the leaves are long-petiolate, suborbicular, cordate, and dentate nearly to the base with 8–10 teeth on each side. The leaves in *A. anemioides* are glabrous nearly from the first, merely strigose on the veins, short-petiolate, obovate to irregularly suborbicular, broadly cuneate at base, coarsely dentate with 2–3 broad teeth on each side. Typical *monostachya* is widespread in high arid regions from Oaxaca and Puebla through eastern and northern Mexico to southeastern Chihuahua and southern and western Texas. It has not been found in the Jalisco region. The type was from "entre los pueblos de Cimapán et Tecozotla" [presumably Hidalgo]. Modern collections from near Zimapán, Hidalgo, have been confidently referred to *A. hederacea* Torr. in Emory, U.S. & Mex. Bound. Surv. 2[1]: 200. 1859.

Mueller Argoviensis, in the *Prodromus,* recognized *A. hederacea* as distinct from *A. monostachya,* partly on the basis of the supposedly smaller ♂ spikes, and partly because of unspecified differences in the ♀ bracts. Apparently no one since Mueller's time has suggested that the two species are synonymous, although Cavanilles' illustration and description of *A. monostachya* apply perfectly to the plant known widely as *A. hederacea* (except that Cavanilles pictured *A. monostachya* as having an annual root). Pax and Hoffmann followed Mueller in separating the two species on the basis of the ♂ spike ("2–3 cm longa" as against "ad 6 cm attingentes"). The actual length of the spike, in specimens usually accepted as *A. hederacea,* rarely exceeds 3 cm, and is often less than 2 cm. It seems that the widespread Texano-Mexican plant commonly known as *Acalypha hederacea* Torr. is correctly called *A. monostachya* Cav.

2. Acalypha filipes (S. Wats.) McVaugh, comb. nov.
Corythea filipes S. Wats. Proc. Am. Acad. **22**: 451. 1887.
C. multiflora Standl. Contr. U.S. Nat. Herb. **23**: 649. 1923.

This species certainly belongs with the Acalypheae and not with the Hippomaneae to which it was assigned by Watson. The 8 stamens are exactly those of *Acalypha* (not 3 stamens as reported by Watson). The valvate ♂ calyx is that of *Acalypha,* not of the Hippomaneae. Pax (Pflanzenreich IV.147. v (Heft **52**): 156. 1912), who also assigned the genus to the Hippomaneae, had seen no material of the type-species of *Corythea* (*C. filipes*) and had no first-hand knowledge of the aestivation, Watson having reported the perianth as "valvate(?)". The plant in habit resembles an *Acalypha,* and apparently is closely related to the other west-Mexican species with pedicellate ♀ flowers, *A. coryloides* Rose. The generic name *Corythea* should be relegated to the synonymy of *Acalypha.*

The status of *A. coryloides* Rose is by no means certain. The type is a winter-flowering specimen collected at Manzanillo in December (*Palmer 1368,* US). The specific epithet was derived from the unusual appearance of the ♂ spikes. As stressed by Rose, "It differs from all other species which I have seen in its staminal spikes being aments or catkins. They appear as scaly buds and *seem to have been formed at the close of the last growing season*" [Italics mine]. A modern collection (*McVaugh 11873*) from coastal Jalisco near Manzanillo, flowering in April, suggests that the racemes of both sexes are slender and elongate, arising from short spur-like branchlets tipped by small ament-like clusters of indurated and imbricated ovate bracts which are really bud-scales. I suspect that the original collections of *A. coryloides* were taken from plants in which neither ♀ nor ♂ spikes had attained their full development, that the ♂ spikes are normally considerably longer than the "3

to 6 lines" mentioned by Rose, and that the ♀ flowers are not "solitary or in pairs" but normally produced in slender racemes of 6–8 flowers each. More collections are needed to resolve this question.

3. Acalypha nubicola McVaugh, sp. nov. Fig. 2.

Frutex, puberulus, foliis ovato-lanceolatis ovatisve, brevipetiolatis, subglabris, supra glandulosis; spica ♀ terminalis interrupta, paucibracteata; spicae ♂ tenues, axillares; bracteae ♀ suborbiculares, ca. 21-dentatae, dentibus glabris glanduloso-serrulatis; styli vix connati, tota longitudine lacinulati; semina laevia.

A slender arching shrub 1–2 m high, finely puberulent, the leaves sparingly strigose; leaves ovate or ovate-lanceolate, short-petioled, 1.5–3 cm wide, 3–8 cm long, the petioles 0.5–1 cm long; blades slender-acuminate (the acumen sometimes subfalcate), the base rounded and subcordate, the margins crenate-serrate except on the rounded base, with mostly 15–20 teeth on each side; upper surface sparingly (or in some younger leaves densely) beset with sessile or nearly sessile resinous capitate glands; blades 3-nerved near the base with 1 pair of smaller veins below this; stipules filiform-subulate, 3–5 mm long, very early deciduous; ♀ spike terminal, 4–6 cm long, 6–7 mm thick, the peduncle 2 cm long; axis of spike slender, less than 1 mm thick, loosely flowered, with up to 12–14 bracts; ♀ flowers occasionally 1–2 at the base of a ♂ spike, or in the leaf-axils; ♀ bracts one-flowered, glabrous or nearly so, suborbicular, 3–4 mm long (less than 1 mm in flower), 7–8 mm wide, with about 21 deltoid teeth to 1 mm long (the central tooth sometimes slightly longer); teeth densely glandular-serrulate with stout short-stipitate glands that extend from the margins onto both surfaces of the bract; ♀ calyx-lobes lance-oblong or ovate, 1 mm long; ♂ spikes axillary, very slender, loosely flowered and scarcely pedunculate, 4–6 cm long, hardly more than 1 mm thick; capsule 3-lobed, 3 mm broad, strigose and verrucose; styles 4–5 mm long, red, multi-lacinulate nearly to the base; seed ovoid, brown, smooth, 2 mm long.

Mountains of southwestern Michoacán, in barrancas in pine forests, at elevations of about 2000 m, flowering in August and September.

Cloud-forest area among pines, in barranca 3 miles below the lumber camp at Dos Aguas, west of Aguililla, 15 Sep 1958, *McVaugh 17871* (MICH, type); 2 miles above Tancítaro, 10 Aug 1940, *W. C. Leavenworth 530* (GH).

From the description, and from a photograph of the type (Field Mus. Neg. 5276), of *Acalypha adenostachya* Muell. Arg., it seems that *A. nubicola* is very similar to that species. The leaves are broadly ovate and more coarsely toothed than in *A. nubicola,* however, and measure no more than 3.5 cm long; according to Mueller the pubescence is more generally distributed in *A. adenostachya,* and the branchlets (including the axes of the spikes of both sexes) are said to be densely stipitate-glandular. These differences in leaves, in indument and in glandularity are of doubtful constancy, and *A. nubicola* may ultimately prove to be conspecific with *A. adenostachya.*

4. Acalypha phleoides Cav. Anal. Hist. Nat. Madrid **2**: 139. Sep 1800.

A species of the arid highlands of eastern and central Mexico, ranging from Guatemala to central Jalisco, Nuevo León, Coahuila and Chihuahua. The type is from Guerrero (Tíxtala, collected by Née). Further north, in the northern states of Mexico and in the United States from Texas to Arizona, is the very closely related *Acalypha lindheimeri* Muell. Arg., which may be conspecific. Mueller distinguished *A. lindheimeri* from *A. phleoides* chiefly on the basis of the acuminate (rather than acute) leaves, the prolonged termi-

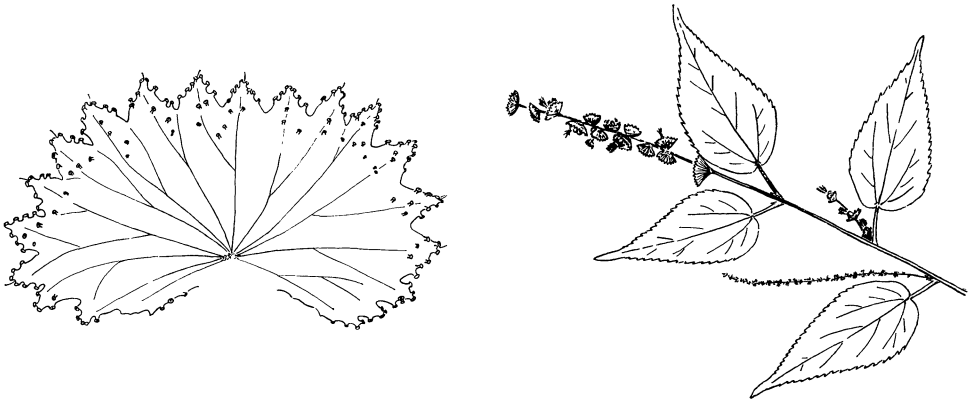


FIG. 2. *Acalypha nubicola.* Drawings from the type. ♀ bract, × ca. 7.5. Flowering branchlet, ca. ×½.

nal tooth of the ♀ bracts, and the more slender branches of the style.

In the Jalisco region many plants of *A. phleoides* are strongly hispid with numerous stiffly spreading long hairs; such plants are common elsewhere in the range of the species in southeastern Mexico. In the range of *A. lindheimeri,* however, most plants are merely puberulent, with few or no long spreading hairs. The precise distinction between the population of central Mexico (characterized by relatively dense and coarse pubescence and the relatively short terminal tooth of the ♀ bract), and the more northern population typified by *A. lindheimeri,* remains to be worked out.

Dioecious forms, not otherwise distinguishable from the ordinary monoecious plants, are found occasionally throughout the range of *Acalypha phleoides–lindheimeri;* the occurrence of hispid and non-hispid variants among the dioecious forms seems to parallel that in the monoecious. In the Jalisco area one of these dioecious forms has been designated as an independent species, *A. sessilifolia* S. Wats. All specimens corresponding to *A. sessilifolia* seem to agree precisely in every detail, except in their sexual expression, with specimens of *A. phleoides* from the same area. In view of the well-known variation in sex-expression in *Acalypha,* it seems preferable to regard *A. sessilifolia* merely as one of the variants of a morphologically distinct species:

4a. Acalypha phleoides Cav., forma **dioica** McVaugh, form. nov.

A. sessilifolia S. Wats. Proc. Am. Acad. 22: 450. 1887.

The type is from Río Blanco, Jalisco, *Palmer 38* in 1886. The plant is locally abundant in grasslands or grassy openings in pine forests, between Guadalajara and Tepic.

Sparingly setose dioecious (♂) plants from western Durango (*Maysilles 7317* and *8461,* both MICH) might well be referred to *A. phleoides* f. *dioica* except for the non-spreading pubescence, exactly like that of monoecious plants from the same area. One of the ♂ plants bears a single ♀ bract at the base of one ♂ spike, suggesting that dioecism is not complete.

It seems likely that *A. veronicoides* Pax & Hoffm., Pflanzenreich IV.147. XVI: 89. 1924, described from San Luis Potosí, is similarly a dioecious form of some one of the populations of *A. phleoides.*

5. Acalypha pippenii McVaugh, sp. nov. Fig. 3.

Annua, ramulosa, puberula, stipitato-glandulosaque, etiam praesertim ad basin longe pilosa; folia ovata, dentata, longe petiolata; spica ♂ terminalis; spicae ♀ axillares, paucibracteatae, bracteis 3-lobis, lobis obtusis; styli 3–4 mm attingentes, vix connati, simplices vel saepius lacinulati; semina laevia, reticulata.

Nomen in honorem discipuli adjutorisque Richard Wayne Pippen (1935–), collectoris diligentis, qui mecum anno 1958 plantas plurimas mexicanas siccavit, dicavi.

An annual, usually 30 cm high or less, with many spreading subordinate branches, the stems and petioles puberulent with short curved hairs, abundantly stipitate-glandular, and also (especially the lower stem) pilose with straight colorless divaricate hairs up to 4 mm long; leaves narrowly to broadly ovate, 1–3 cm broad, 2–5.5 cm long, the petioles about as long as the blades (1.5–5.5 cm); blades blunt or acute to gradually acuminate, rounded or very broadly obtuse at base, prolonged at the junction with the petiole into two short rounded auricles; margins crenate-dentate with (7–) 11–15 teeth on each side, the basal portions entire or nearly so; stipules flat, scarious, lanceolate, 0.3–0.7 mm long; blades papillose on both sides, sparingly hairy, somewhat strigose at least above, 3-veined from a point at or just above the base, with 1–2 pairs of smaller veins below this; ♂ spike linear, terminal (sometimes with 1 ♀ flower near the base of the peduncle), 1–1.5 mm thick, (1–) 2–3.5 cm long, the peduncle (0.6–) 1–2 cm long; ♀ inflorescence axillary, often compound, consisting of a short sessile spike and usually 2 longer peduncled spikes from the base of the central sessile one; central spike abortive, or up to 5- or 6-bracteate, and 6–7 mm long; lateral spikes pedunculate, up to 1–1.5 cm long, 10- to 12-bracteate, all the spikes rather loosely flowered; ♀ bracts 2–3.5 mm long, divided ¾ their length into 3 blunt triangular or ovate lobes up to 2 mm wide, 3 mm long, the lateral ones sometimes asymmetric and crenate;

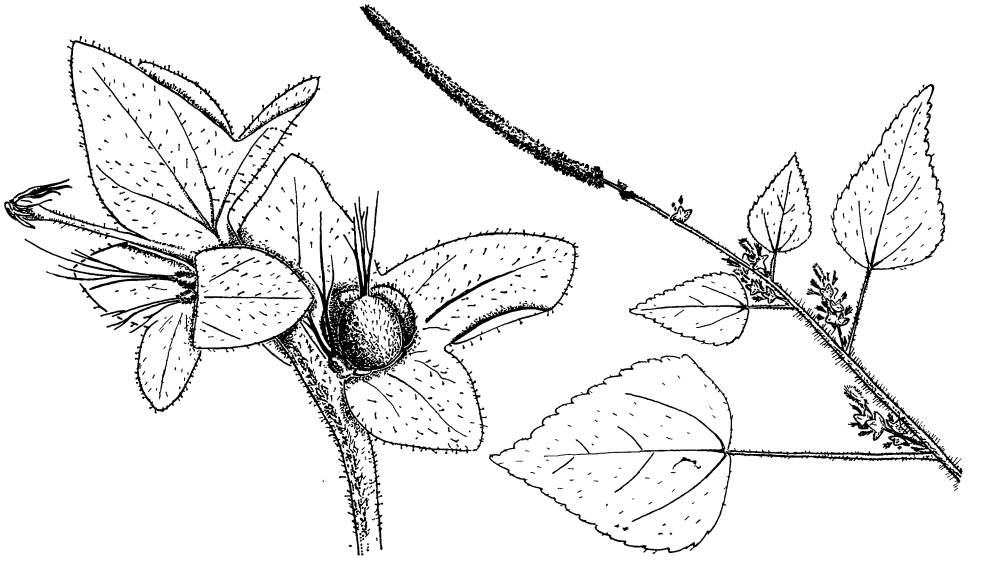


FIG. 3. *Acalypha pippenii*. Drawings from the type. ♀ spike, ×7.5. Flowering branchlet, ×1.5.

flowers 1–3 in each bract; calyx lobes elliptic, acute, ciliate; styles laciniate, 2.5 mm long (or in one form 3–4 mm long, simple); ♀ spike often terminating in a sterile seta bearing an incompletely developed ♀ flower; stamens 8, the anther-cells linear; capsule 3-lobed, 1.5–1.7 mm in diameter, hispid, glandular and near the apex tuberculate; seed ovoid, 1.1 mm long, light reddish brown, finely alveolate-reticulate.

Region of Apatzingán, Michoacán, in deciduous woodland, shady places among rocks, and open grasslands and about fields, at elevations of 300–400 m, flowering mid-August to October.

Old lava flows 4 miles n w of Apatzingán, 16 Sep 1958, *McVaugh 17894* (MICH, type); Apatzingán, 15 Aug 1938, *Hinton 12020* (US, fls. only); Buena Vista, *Hinton 12067* (MICH, US); barranca of Río Cancita 9 miles s e of Apatzingán, *McVaugh 17986* (MICH).

The specimen from Río Cancita suggests in appearance a shade form, with membranaceous and relatively luxuriant foliage, but is otherwise indistinguishable from the other specimens except by its styles, which are simple, showing not a trace of the characteristic branching so common in *Acalypha*. The importance of this character is not clear. Both Pax and Mueller separated certain groups of species with simple styles, but both authors agreed that some species, e.g. *A. alopecuroides,* may have the styles either simple or bifid.

6. Acalypha subviscida S. Wats. Proc. Am. Acad. **21**: 440. 1886, var. **subviscida.**
?*A. vagans β glandulosa* Muell. Arg. Linnaea **34**: 161. 1865.

A rather widespread plant especially at middle elevations (1000–1500 m) in western and central Mexico, the type from Chihuahua (*Palmer 39* in 1885). A sparingly branched shrub, or woody at base only, the ♀ spikes in the upper axils usually exceeding the leaves and forming, with the terminal ♀ spike, a definite inflorescence; the ♀ bracts are foliaceous, stipitate-glandular especially near the margins, the teeth usually 15–19 (in some plants 11–13 or as many as 25), the central tooth often somewhat prolonged. The herbage is rather uniformly puberulent or pale-hirsutulous; numerous pale slender gland-tipped hairs are usually intermingled with the other hairs, especially on the petioles and branchlets.

Watson reported the number of teeth of the ♀ bract in the type as about 13; he reported the number in a paratype as 7–9. The bracts in the paratype (*Palmer 17*) are very small and immature, but the number of teeth appears actually to be 11–13.

Occasional plants throughout the range of *A. subviscida* are eglandular or nearly so, but otherwise indistinguishable from the others. In our area such a plant is *Rose & Hay 6286* (US), from near Guadalajara. In herbaria such eglandular specimens have often been referred to *A. vagans* Cav., which as pointed out below is quite a different species.

What appears to be a second well-marked variety of this species occurs at a number of localities from western Michoacán to Colima and is described below. It differs from var. *subviscida* in having the young herbage hirsutulous or pale-tomentulose with soft white hairs; the stout stipitate glandular hairs confined to the margins of the ♀ bracts; the bracts with 7–13 teeth all about the same size; and the upper leaves usually exceeding the spikes.

6a. Acalypha subviscida S. Wats., var. **lovelandii** McVaugh, var. nov.

Frutex 1–4 m altus, albido-tomentulosus; folia ovata, serrata, longe petiolata, spicas superiores plerumque superantia; spicae ♀ terminales lateralesque, earum bracteis (7–) 9–13-dentatis, dentibus subaequalibus, valde glandulosis; valde similis var. *subviscidae* est, et verisimiliter vix specifice diversa.

Varietatem amico collegaque Hugh Frank Loveland (1918–), qui mecum anno 1958 plantas mexicanas collectavit, nominavi.

JALISCO: Upper valley of Río de Mascota, 4–7 miles s of El Rincón, with *Fraxinus, Alnus, Salix,* elevation 1600–1700 m, 28 Nov 1960, *McVaugh 21473* (MICH); precipitous wooded slopes above La Garita, Jiquilpan–Colima road near Km. 72, elevation 1300 m, 20 Sep 1958, *McVaugh 18041* (MICH), 2 Dec 1959, *McVaugh & Koelz 1343* (MICH, type). COLIMA: Above Hda. San Antonio, in barranca, 11 Aug 1957, *McVaugh 16090* (MICH). MICHOACAN: Uruapan, 27 Nov 1907, *Pringle 10405* (MICH, US); Tancítaro, in pine forest, 3 Oct 1940, *Hinton 15621* (US).

7. Acalypha vagans Cav. Anal. Hist. Nat. Madrid **2**: 139. Sep 1800; Ic. 6: 47. *t. 569. f.1.* 1801.

A. leptoclada Benth. Voy. Sulph. 164. 1846.

A. acapulcensis Fern. Proc. Am. Acad. ***33***: 87. 1897.

Cavanilles stated clearly in the protologue that in this species all the spikes are axillary and the teeth of the pistillate bracts are setose. These characteristics are sufficiently well shown in the illustration in the *Icones* (*t. 569.f.1.*). The type was from Acapulco, where collected by Née. In Jalisco and Colima the pistillate bract is often shaped precisely as shown in Cavanilles' plate; the bracts vary from glabrous to strigose, those of some plants having setose teeth as described and figured by Cavanilles (e.g. *Wilbur & Wilbur 1435,* from the region of Autlán).

Mueller Argoviensis (cf. DC. Prodr. **15**^{2}: 828–829. 1866), apparently without having seen the plants described by Cavanilles, referred to *A. vagans* a group of specimens with terminal pistillate spikes; all or nearly all of these were from Veracruz. Pax & Hoffmann, in *Das Pflanzenreich,* accepted Mueller's view and treated *A. vagans* as a species primarily of eastern Mexico, distinguished by its terminal spikes. Most herbarium specimens that (following Mueller and Pax & Hoffmann) have been referred to *A. vagans,* appear to be eglandular or nearly eglandular forms of *A. subviscida* S. Wats.

ALCHORNEA

The one species known to occur in Mexico [cf. Pax & Hoffmann, Pflanzenreich IV. 147. VII (Heft **63**): 220–253. 1914; and Standley, Contr. U. S. Nat. Herb. **23**: 633. 1923] seems not to have been reported from western Mexico.

1. Alchornea latifolia Sw. Prodr. Veg. Ind. Occ. 98. 1788.

Plants referred to this species are abundant in the humid forests of the *barrancas* at the locality cited below, associated with species of *Quercus, Carpinus, Fraxinus, Saurauia, Distylium,* and *Podocarpus;* the trees reach a height of 25 m and a trunk diameter of 50 cm. At the time of our visit the trees were mostly sterile; a few were in flower. I am much indebted to Professor Jerzy Rzedowski, who first tentatively identified the genus from the abundant fallen leaves.

JALISCO: Near the headwaters of the Río de Talpa, s of Talpa de Allende, elevation ca. 1200 m, 24–25 Nov 1960, *McVaugh 21389, 21402* (MICH).

BERNARDIA

This genus was revised by Pax (Pflanzenreich IV.147. VII: 21–45. 1914). Little Mexican material was available to him for his revision of the genus. Additional collections are still much needed. Most species are dioecious, most have inconspicuous flowers, most flower in the dry spring months when plant-collectors are least likely to be active in their range, and most of them occur in areas where high summer temperatures, heavy summer rains, rugged topog-

raphy and tangled thorny vegetation combine to discourage the casual collector. Our species of *Bernardia* may be recognized at once, even in the sterile condition, by the combination of stellate pubescence and the presence of annular glands on the margins at the base of the leaves.

Leaves thickly pilose-hispid above with simple hairs; leaf-margins evenly dentate with 3–8 teeth per cm, the discrete quadrate or rounded teeth 1 mm high; main veins not passing directly into the marginal teeth; seeds ca. 7 mm long. *B. heteropilosa* McVaugh.

Leaves finely stellate-pubescent above, sometimes with a few simple hairs.

Leaves mostly elliptic, acute, finely toothed (about twice as long as wide, with 8–12 teeth per cm of leaf-margin); lower leaf-surfaces (except in old leaves) whitened and nearly covered by the hairs. *B. mexicana* (Hook. & Arn.) Muell. Arg.

Leaves ovate to lanceolate, often acuminate, more coarsely toothed to sinuate and subentire (about 1.5 times as long as wide or often broader, the marginal teeth 5–6 per cm or fewer); pubescence various.

Carpels and styles usually 2; leaves green on both sides, thinly and minutely stellate, glabrescent; fruit globose, 2 cm in diameter, indehiscent, soft and spongy; seeds 10–11 mm long, hemispheric. *B. spongiosa* McVaugh.

Styles and carpels 3; leaves various; fruit oblate, strongly 3-lobed, 1–1.5 cm wide, woody and elastically dehiscent; seeds 4–8 mm long, cordiform.

Pubescence short and thin, the leaves thinly stellate and green both sides; hairs of the capsule 0.2–0.3 mm long; leaves narrowly acute or acuminate; seeds 4–6 mm long. *B. gentryana* Croizat.

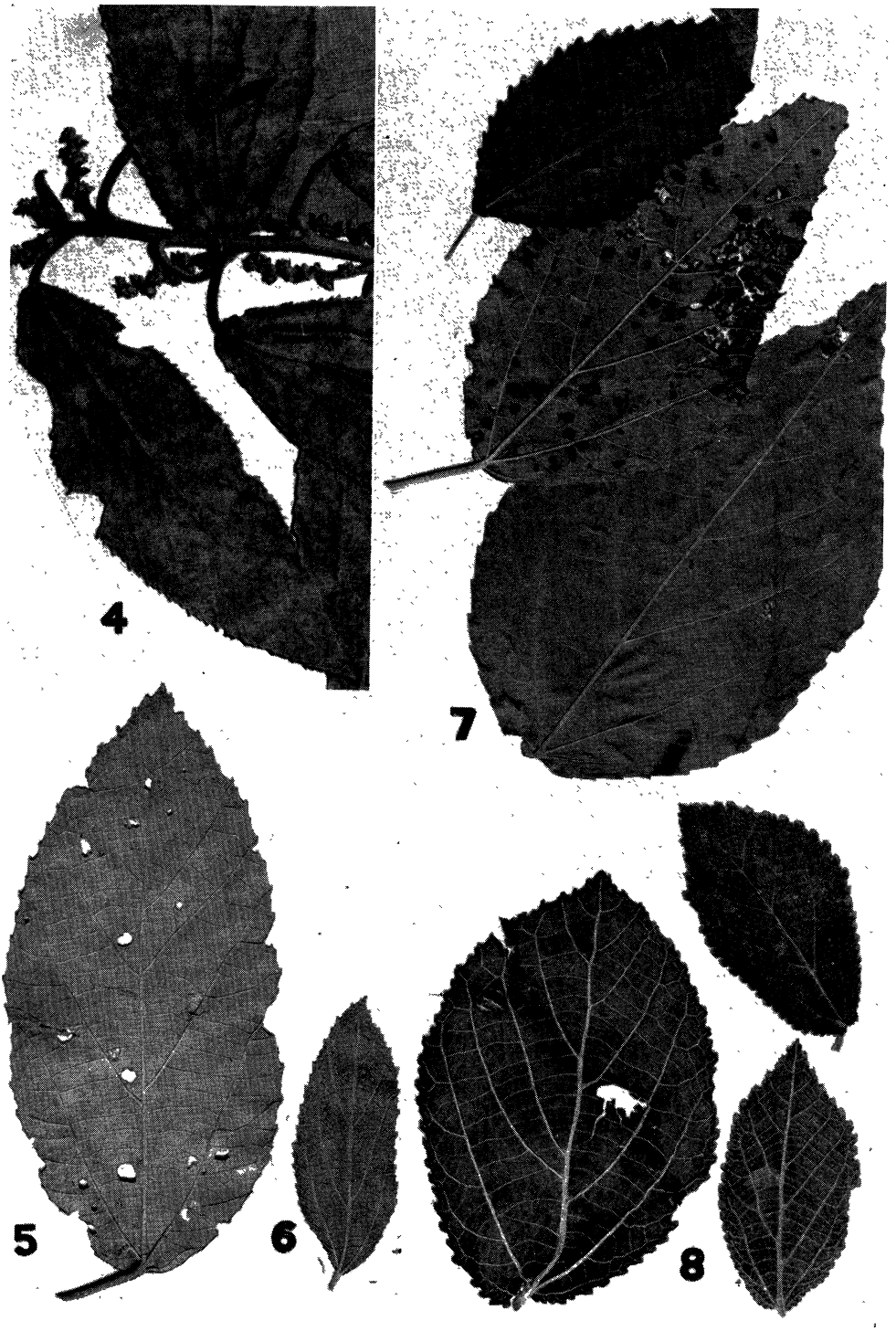
Pale tomentum conspicuous, the leaves covered and whitened beneath; hairs of the capsule 1 mm long or more; leaves broadly or obtusely pointed or broadly acuminate; seeds 7–8 mm long. *B. wilburi* McVaugh.

1. Bernardia heteropilosa McVaugh, sp. nov. Fig. 8.

Arbor 5 m alta, 7.5 cm diametiens, stellato-pubescens vel -tomentosa; folia utraque pagina viridia, supra non solum pilis minutis stellatis sed etiam pilis plurimis rigidiusculis simplicibus ca. 1 mm longis obsita; lamina ovata, late elliptica vel obovata, 2–4.5 cm lata, 3–7 cm longa, apice obtusa, acuta vel breviacuminata, basi rotundata, cordato-auriculata, ambitu conspicue serrata (dentibus quoque cm 3–8, distinctis, quadratis rotundatisve, ca. 1 mm altis vel denticulis immixtis); glandulae crateriformes prope basin marginaliter insertae, tum praeterea superficie inferiore duae aliae plerumque collocatae; petioli 0.6–1.5 cm longi; stipulae lanceolatae, scariosae, induratae, deciduae, 2–3 mm longae; folii nervi pinnatim dispositi, utroque latere ca. 5, subtus reticula scalariformia efficientes, partibus terminalibus anastomosantibus; planta ♂ ignota; spicae ♀ terminales, 3–6 cm longae, floribus 2–4 sessilibus; bracteae ♀ cordato-ovatae, acuminatae, mox reflexae, 4 mm longae, bracteolae 2, bracteis similes sed minores; sepala 4, inaequales, usque ad 2.5–4 mm lata, 4.5–5.5 mm longa; discus subinteger, angustus; styli flabelliformes, basi crassi, compressi, ca. 1 mm lati longique, laciniis ca. 12, 3–4 mm longis, capsulae velutinae, valde 3-lobatae, 9–12 mm latae, 7–9 mm longae; semina (vix matura) 6.5 mm longa, cordiformes, apice carinata, basi truncata vel concava.

Branchlets, petioles and inflorescences thinly pubescent or tomentose, the hairs mostly appressed but some of them longer, fascicled, erect or nearly so; leaves slightly harsh to the touch; lower surface copiously stellate-pubescent with a few simple hairs (up to 1.3 mm long) intermixed; axils of the basal veins copiously tufted with long hairs that are paler (white) and more slender than those of the leaf-surfaces; glands prominent on the basal margins, the pair on the lower surface beside the base of the lowest large vein.

NAYARIT: Ca. 14 miles n w of Tepic, on steep rocky forested slopes of the barranca at Mirador del Aguila, among deciduous trees, at an elevation of about 500 m; fruit nearly mature 10 Jul 1957, *McVaugh 15256* (MICH, type).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2. **Bernardia mexicana** (Hook. & Arn.) Muell. Arg. Linnaea 34: 171. 1865. Figs. 4–6.

Hermesia? mexicana Hook. & Arn. Bot. Beech. Voy. 309. 1838–39.
Bernardia aspera Pax & Hoffm. Pflanzenr. IV.147. VII (Heft 63): 24. 1914.

This is a well marked species of western Mexico. It has been poorly understood. The type of *B. aspera, Palmer 493* from Acapulco, is a representative specimen of *B. mexicana*. Pax and Hoffmann apparently did not see the type of *B. mexicana*, and assumed wrongly that it was conspecific with a group of specimens from eastern and southern Mexico and Central America; most if not all of these as cited in the Pflanzenreich belong to other species. As shown in Figs. 4–6, the leaves of *B. mexicana* are readily recognizable by their shape and by the characteristic small marginal teeth.

3. **Bernardia spongiosa** McVaugh, sp. nov. Fig. 11.

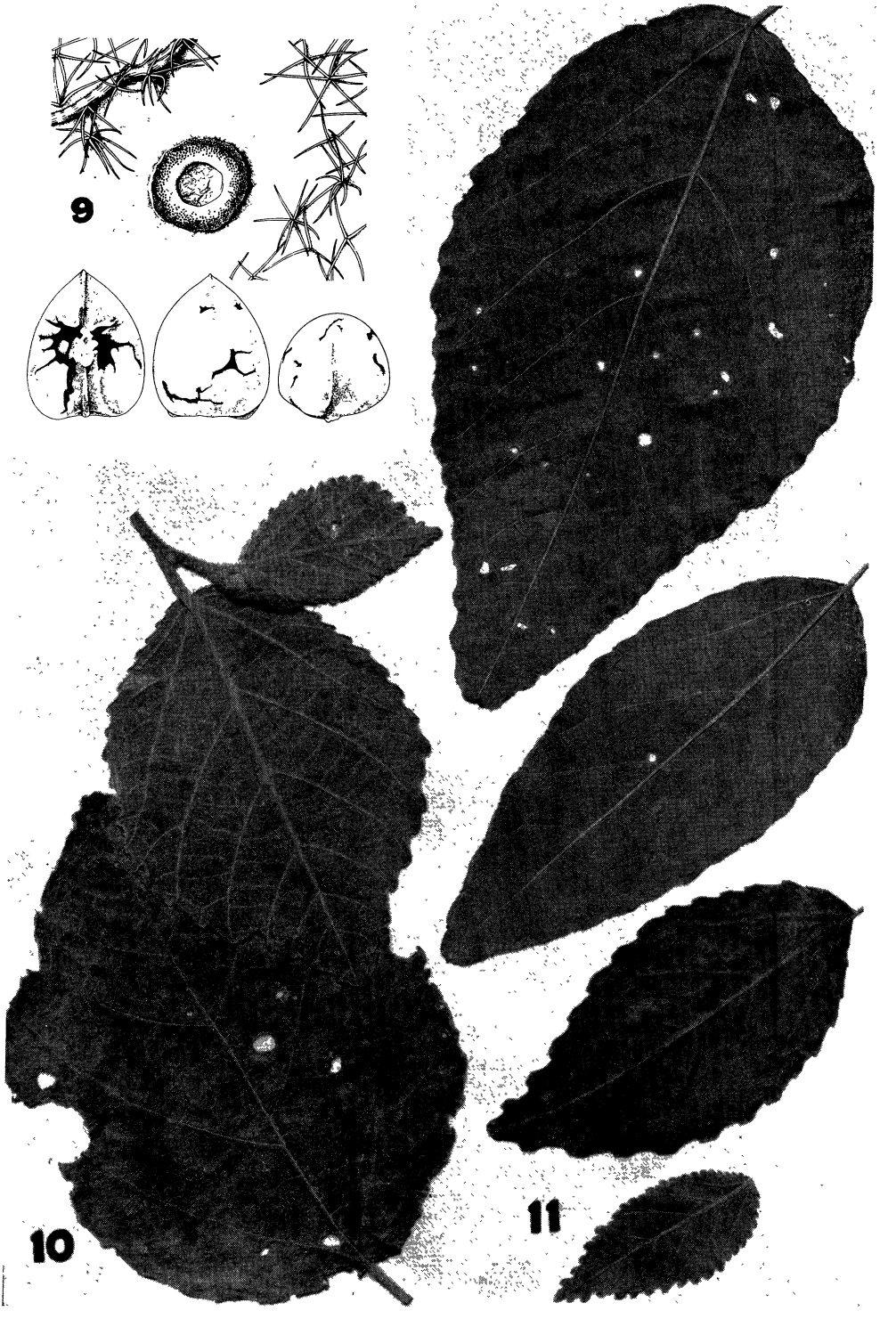
Arbor vel frutex arborescens 5–6 m altus, inflorescentia ramulis petiolisque pubescentibus vel sparsim tomentosis, pilis stellatis fasciculatisve; folia utraque pagina viridia (subtus pallidiora), rare minuteque stellata, glabrescentia, scabridula; lamina ovata vel ovato-lanceolata, 2–6 cm lata, 4–10 cm longa, a medio vel ultra ad apicem obtusum cuspidatum angustata, basi rotundata vel obtusa, plerumque abrupte in petiolum 0.5–1.5 cm longum angustata, ambitu crasse sinuatim dentata, vel foliorum juniorum crenato-serrata (dentibus quoque cm 3–4); folii nervi pinnatim dispositi, utroque latere 5–6, infimi majores, valde ascendentes, omnes prope costam crassi, sed ad apices valde diminuentes anastomosantesque; planta ♂ ignota; glandulae crateriformes prope basin marginaliter insertae; stipulae subulato-lanceolatae, scariosae, duriusculae, ante foliorum maturitatem deciduae, 1.5–2.5 mm longae; spica ♀ terminalis, 1 cm longa vel minus, floribus solitariis bracteatis 1–3, bracteis deltoideo-cordatis, 2.5 mm latis, 3 mm longis, mox reflexis, bracteolis sepalis similibus 2 mm longis; sepala (3–) 4–6, inaequales, ovata, acuminata, 1 (–2) mm lata, 2 (–2.5) mm longa; discus nullus; carpella plerumque 2; styli divergentes et ad ovarium appressi, basi hirsuti, crassi, 2 mm longi et fere 2 mm lati, laciniis multi-partitis, flabellatis, 2–2.5 mm longis; fructus globosus vel nonnunquam paulum 2–4-lobatus, velutinus, spongiosus, 2 cm diametiens, ut videtur indehiscens; semina fere hemisphaerica, 10–11 mm longa, 9–10 mm lata, 7 mm crassa, laevia, apice vix acutata, superficie ventrali plana, rapha 6–6.5 mm longa.

COLIMA: Low hills with occasional rock-outcrops, in deciduous woodlands with *Bursera, Ficus, Tabebuia,* at elevations of 50–135 meters: 14 miles w n w of Santiago, *McVaugh 15755* (MICH); 8 miles w n w of Santiago, 25–26 Jul 1957, *McVaugh 15777* (MICH, type).

4. **Bernardia wilburi** McVaugh, sp. nov. Figs. 9–10.

Arbor 5-metralis, cortice grisea, ligno duro; foliorum superficies inferiores, inflorescentia, ramuli petiolique dense pilis stellatis grandibus confertis dealbatis (folii superficies inferioris pilorum rami 0.5–0.8 mm longi); folia asperula, supra obscura et rare stellato-pubescentia; lamina late ovata vel obovata, (2–) 3.5–7 cm lata, 4–8.5 cm longa, plerumque 1.25–1.5-plo longiora quam latiora, apice obtusa vel breviacuminata, basi rotundata, cordato-auriculata, ambitu

FIGS. 4–8. *Bernardia.* All leaves approximately ×1. FIG. 4. Winter branchlet of *B. mexicana,* the type (Univ. of Mich. Neg. 527). FIG. 5. Winter leaf of *B. mexicana, Palmer 2011* in 1891. FIG. 6. Immature leaf of *B. mexicana, McVaugh 15139.* FIG. 7. Three leaves of *B. gentryana,* the largest from *McVaugh 15786,* the others from an isotype, *Gentry 5372* (MICH). FIG. 8. *B. heteropilosa.* One nearly mature leaf and 2 immature leaves from the type.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crasse crenato-serrata vel subintegro-undulata (foliorum juniorum marginis dentes quoque cm 3–4); petioli 6–12 mm longi; stipulae lanceolatae, scariosae, duriusculae, mox deciduae, 2.5–3.2 mm longae; glandulae crateriformes subtus prominentes, earum par majus prope venarum lateralium infimarum basin usque ad 0.8 mm diametro; folium basi 3-nervatum, nervis lateralibus utroque latere 5–6, pinnatim dispositis, omnibus ad apices diminuentibus, sed in dentes majores marginales excurrentibus; planta ♂ ignota; spica ♀ terminalis, usque ad 6 cm longa, floribus sessilibus 2–4, bracteis cordato-ovatis acuminatis mox reflexis 3 mm longis; bracteolis sepalis similibus sed minoribus, ca. 2 mm latis, 2.5 mm longis; sepala 4, inaequalia, usque ad 2 mm lata, 4 mm longa; discus angustus, pilosus, continuus, integer; styli ca. 3 mm longi, ad ovarium appressi, flabelliformes, multi-laciniati; carpella 3; capsula plusminusve 3-lobata, 1 cm alta, 1.5 cm lata, velutino-tomentosa dense pilis pallidis rigidis 1 mm longis vel ultra obtectis; columella ca. 5 mm longa; semina 7–8 mm longa, cordiformia, cicatrix fere centralis; apex carinatus; superficies ventralis plana convexa dua angulum obtusum efficientia, etiam in lobulas basilares prolongata.

Axils of the basal veins of the lower leaf-surface copiously tufted with paler (white) and more slender hairs than those of the leaf-surface in general; glands on the basal margins, and surface glands in addition to the large ones near the basal veins, usually present; spikes markedly zigzag.

JALISCO: Deciduous woodland 2 miles w of Autlán, elevation ca. 1000 m, in fruit 12 Jul 1949, *R. L. & C. R. Wilbur 1677* (MICH, type).

CROTON

There has been no general revision of this genus of some 700 species since that by Mueller Argoviensis (DC. Prodr. **15**^{2}: 512–700. 1866). About 50 species were included by Standley in the *Trees and Shrubs of Mexico* (Contr. U.S. Nat. Herb. **23**: 610–620. 1923). Since the publication of that work more than 60 additional species of *Croton* have been described from Mexico and adjacent United States and Central America. A thorough revision of the genus as it is represented in the Mexican region is much to be desired.

Almost all the species are stellate-pubescent, but the indument varies notably from species to species and from one part to another on the same plant. Each hair consists of a stipe from which arises a number of radiating branches. Sometimes, as in *C. hirtus,* the central axis of the hair becomes elongated and thickened and the short radiating branches at its base are relatively inconspicuous. The so-called "simple hairs" in *C. lobatus* are presumably the result of suppression of the basal ring of branches of each hair. At the other extreme the principal axis of the hair terminates at the summit of the stipe, and the ring of radiating branches (like the spokes of a wheel) becomes the characteristic feature of the hair. The branches may radiate in one plane, or in all directions from the enlarged terminal part of the stipe. If the spokes of the wheel are coherent into a peltate scale, the relationship of this structure to a stellate hair may not be immediately apparent, but there is in fact no way of distinguishing, at least in *Croton,* between a scale and a hair. The rays of individual scales may be elongated far beyond the hub where the spokes of the wheel are coherent; as the hub becomes smaller and the spokes longer, it may

. FIGS. 9–11. *Bernardia.* FIG. 9. *B. wilburi.* Foliar glands and hairs, both ca. ×27, from the lower leaf-surface near the base of the blade; seed, ca. ×3.3. Drawings by Bonnie Hall, from the type. FIG. 10. Leaves of *B. wilburi,* ×1, from the type. FIG. 11. Four leaves of *B. spongiosa,* ×1, from the type.

be impossible to say whether a given structure is a long-rayed scale or a stellate hair with the rays somewhat coherent at base. In practice, however, the distinction between scales and hairs may be a useful one.

The following key may be found useful for the determination of species anywhere in western Mexico except in Baja California and the lowlands about the head of the Gulf of California.

Herbs, or woody at base only and then mostly 30 cm high or less; if shrubs 1 m high, the leaves coarsely toothed.
- Leaves deeply 3 (–5) -lobed; annuals, the younger parts strigose with stiff simple hairs. *C. lobatus* L.
- Leaves entire or toothed, not lobed; pubescence evidently of stellate or branched hairs.
  - Leaves entire, linear-oblong or lanceolate, 2–3.7 cm long; petiolar glands none; suffruticose, but flowering the first year and the root then appearing annual. *C. pedicellatus* HBK.
  - Leaves coarsely toothed, of an ovate type; petioles with cupuliform glands.
    - Coarse erect annuals with stiffly hirsute stems (the central branch of each cauline hair enlarged, erect); petiolar-glands long-stalked. *C. hirtus* L'Hér.
    - Perennials or low shrubs 1 m high or less; pubescence of short stellate hairs; petiolar glands sessile.
      - Leaves commonly acute, at least the lower on slender petioles 2–8 cm long; petiolar glands 0.2 mm wide, on the upper side of the petiole, erect; stipules filiform-subulate. *C. cupulifera McVaugh.*
      - Leaves commonly obtuse, the petioles 1–1.5 cm long; petiolar glands 0.5–1 mm across, at the sides of the petiole beneath the blade; stipules flat, linear. *C. repens* Schlecht.

Shrubs or trees. usually 1 m high or more; leaves entire or scarcely denticulate, not lobed (sometimes coarsely dentate in *C. ynesae*, a nearly glabrous species).
- Leaves linear to elliptic or oblong, mostly 1 cm wide or less; small shrubs or woody herbs mostly 50 cm high or less; indument of scales or scale-like hairs or fine stellate hairs, the plants never loosely tomentose.
  - Plant dioecious; ♀ flowers, and fruits, erect or ascending; whole plant silvery-lepidote with long-rayed scales. *C. dioicus* Cav.
  - Plant monoecious; ♀ flowers soon abruptly decurved; pubescence of stellate hairs. *C. pedicellatus* HBK.
- Leaves elliptic, or lanceolate to ovate, usually much more than 1 cm wide; much-branched shrubs, or trees.
  - At least the young growth densely and primarily lepidote (some multiradiate hairs also present in some species); petals well developed in both ♂ and ♀ flowers; styles several times dichotomous.
    - Ovary tomentose or conspicuously stellate-pubescent with long-rayed hairs; leaves 5- or 7-veined at base, the mature blades with a few scales, and numerous slender multiradiate hairs, on the lower surface; seed probably about 5 mm long. *C. septemnervius* McVaugh.
    - Ovary lepidote, the scales toothed, lacerate or entire; leaves pinnately veined, or 3-veined at base (often with a pair of additional smaller veins), lepidote beneath, without additional stellate hairs.
      - Leaves penninerved, of an oblong or elliptic type, notably short-petiolate (5–10 mm); fruiting pedicels elongate, 1.5–2.5 cm long; seed 7–8 mm long. *C. glabellus* L.
      - Leaves palmatinerved with 3 prominent veins at base, of an ovate or deltoid-ovate type, the petioles (1.5–) 2 cm long or more; pedicels and seeds various.
        - Scales of ovary stiff, convex, resembling opaque glass, short-toothed (not lacerate), up to 1 mm across, with radiating brown lines; inflorescences axillary, clustered, up to 3 cm long; leaves deltoid-ovate, green on both surfaces at maturity; seeds 5.5 mm long. *C. pseudoniveus* Lundell.
        - Scales of ovary toothed or lacerate, more delicate; inflorescences usually elongate, terminal or axillary; leaves rounded-ovate, permanently silvery green beneath with overlapping scales; seeds various.
          - Seeds 11 mm long or more; capsule with many elongate fleshy tubercles; scales of ovary raggedly laciniate, the free hairlike tips longer than

the width of the central portion, the whole up to more than 1 mm across. *C. wilburi* McVaugh.

Seeds 6 mm long; capsule smooth except for the scales; scales of ovary toothed, 0.7 mm wide; Acapulco. *C. reflexifolius* HBK.

Indument of branched or stellate hairs, not of scales; petals well developed in the ♂ flowers, undeveloped in the ♀; styles divided nearly to the base, the divisions sometimes again parted.

Leaf-blades with a pair of conspicuous flat or convolute glands up to 1–1.5 mm long and broad, on the lower surface at base, or at the summit of the petiole; inflorescence many-flowered, often 15–30 cm long, the ♀ flowers often numerous and scattered along the axis; small to large trees.

Petiolar glands on the upper (adaxial) side; stipules up to 1 cm long, often unilateral, foliaceous with base 3–4 mm wide; lower bracts often subtending both ♂ and ♀ flowers; tomentum partly of stipitate tufted (pompon-like) hairs, giving the branchlets a scurfy appearance. *C. draco* Schlecht.

Petiolar glands lateral or dorsal (abaxial), seen from the lower side of the blade only; stipules 2.5–3 mm long, subulate; lowest bracts subtending ♀ flowers only; branchlets uniformly and smoothly appressed-tomentose. *C. xalapensis* HBK.

Leaves without a pair of conspicuous glands at base (glands sometimes present at the summit of the petiole, but if so, smaller, often in groups, sometimes stipitate); inflorescence shorter, the ♀ flowers usually few (often 10 or fewer) and grouped at base.

Stipules and leaf-margins bearing numerous long-stalked glands. *C. ciliatoglandulifera* Ort.

Stipules and leaf-margins eglandular, or the stipules with inconspicuous stalked glands.

Branchlets whitened with a felty tomentum of erect elongated dendritic hairs (up to 2 mm long); leaves tomentose beneath, conspicuously bicolorous; stipules persistent, linear-subulate, 1–2 cm long; petioles 2–3.5 cm long, or on vigorous flowering shoots 6–9 cm. *C. suberosus* HBK.

Branchlets glabrous to tomentose, if the latter then with appressed or short, tufted hairs; leaves various; stipules (except in *C. alamosanus* with petioles 1 cm long or less) inconspicuous, 3.5 mm long or less, often early deciduous.

Upper stems hirsute, roughened by the lenticel-like swellings left by the persistent bases of the coarse erect hairs up to 2–2.5 mm long; leaves 6–9 cm long, long-petiolate, broadly ovate, deeply cordate with narrow sinus and often overlapping lobes. *C. tremulifolius* Croizat.

Upper stems closely stellate-pubescent, tomentose or nearly glabrous; leaves mostly rounded to subcordate at base.

Plants nearly glabrous, the leaves with minute scattered pale stellae beneath; leaves ovate, 4–10 cm wide, shallowly crenate-serrate to coarsely toothed. *C. ynesae* Croizat.

Plants markedly pubescent, at least the inflorescence often tomentose; leaves entire to minutely serrulate, often with marginal hairs simulating tiny teeth.

♀ calyx-lobes 5–8 mm long, ovate, or elliptic with narrow base; leaves pinnately veined, of a lanceolate type, the short petioles 4–10 mm long; stipules often foliaceous, asymmetrical, the basal green part 3–8 mm long. *C. alamosanus* Rose.

♀ calyx-lobes 2.5 mm long or less, linear or narrowly triangular; leaves various; stipules inconspicuous.

Leaves 2–4 cm long, often cuspidate, broadest near the middle, penninerved; petioles 3–5 mm long; plants silky-tomentose, the upper leaf-surface green but permanently and densely soft-pubescent with ascending-branched hairs; leaves and branchlets not subverticillate below the inflorescence. *C. incanus* HBK.

Leaves 5–15 cm long, narrowly lanceolate to broadly ovate, palmatinerved (obscurely so in some narrow-leaved forms of *C. fragilis*); petioles mostly 5–20 mm long; indument various;

leaves and branchlets often subverticillate at the base of the inflorescence.

♂ flowers glabrous or essentially so without, some of them on slender pedicels 2 mm long or more; ovary globose, golden-tomentose and in addition setose, the setae up to 1.5 mm long, rising well above the tomentum; styles 4–8 mm long; petiolar glands 2–6, usually apparent. *C. adspersus* Benth.

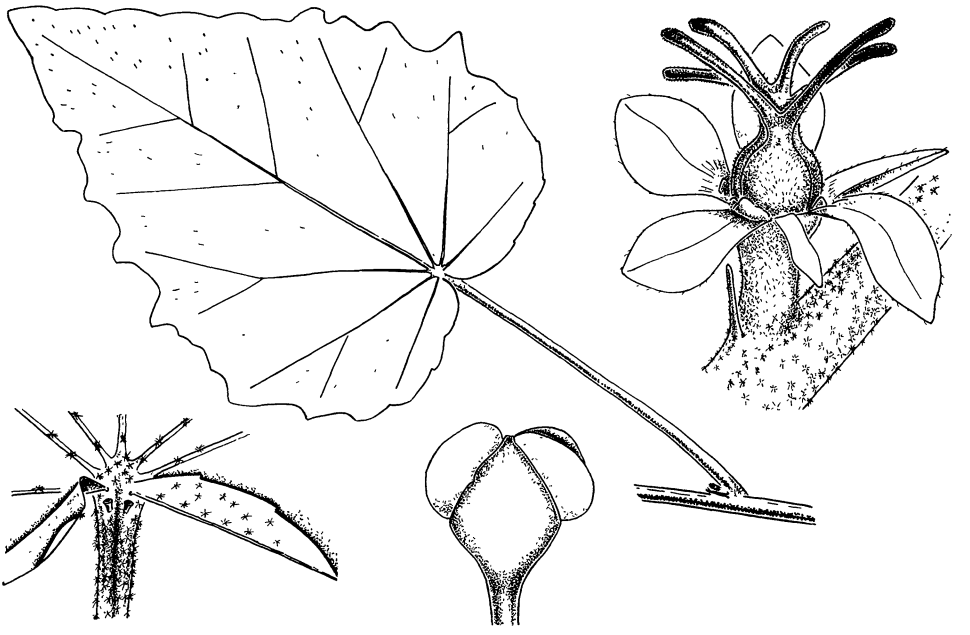
♂ flowers uniformly pubescent (sometimes sparingly so); ovary tomentose, not setose; styles 2.5–4.5 mm long; petiolar glands often obsolete; stamens 16.

Mature leaves tomentose beneath with stout stalked pompon-like hairs 0.5–0.7 mm across the tips of the extended 12–20 rays; tips of leaves often glabrate, cucullate, callose, not cuspidate; ♂ flowers mostly sessile, subtomentose; ovary heavily tomentose (usually with golden hairs), globose even when young; styles 3.5–4.5 mm long; seed 5 mm long; petiolar glands often apparent. *C. morifolius* Willd.

Mature leaves silky-silvery beneath with appressed nearly sessile 9- to 12-rayed hairs up to 1–1.2 mm across, the rays mostly in the plane of the leaf; ♂ flowers thinly stellate to nearly glabrous, some of them pedicellate 2–3 mm; ovary short-tomentose (the stellate nature of the yellowish white hairs usually evident), often lobed; styles 2.5–3.5 (–4.2) mm long; petiolar glands obsolete.

Young leaves stellate above with stiff erectly branched hairs; blades often with a slender hornlike cusp up to 2 mm long; ovary markedly 3-lobed even when very young; styles 2.5–3 mm long; ♀ sepals scarious, 1.5 mm long; capsule prominently 3-lobed at summit; seed 6–6.5 mm long. *C. flavescens* Greenm.

Young leaves smooth and glabrous above (sometimes with a few hairs) nearly from the first; blades scarcely apiculate; ovary scarcely lobed; styles 2.5–4.2 mm long; ♀ sepals persistently green, mostly 2–2.5 mm long; capsule subglobose; seeds 4–4.5 mm long. *C. fragilis* HBK.



1. **Croton cupulifera** McVaugh, sp. nov. Fig. 12.

Frutex 0.3–1 m altus, rare furfuraceo-puberulus, pilis stellatis tenuibus obsitus (folia ramulique juvenilia albido-furfuracea, vetustiora glabrescentia); rami bis terque subumbellatim 2–3-furcatis; folia ovata, cordata, acuta vel inferiora obtusa, crasse irregulariterque dentata, dentibus plerumque latis obtusisque, folia principalia alterna vel subopposita, 4–7 cm lata, 6–10 cm longa, longipetiolata, petiolis tenuibus 5–10 cm longis, eorum glandulis ventralibus 2–4, campaniformi-stipitatis, flavis, ut videtur cerosis, usque ad 0.3 mm longis, apice concavis; folia superiora minora et saepe angustiora, sessilia vel subsessilia, opposita vel sub dichotomiis inflorescentiae ternata; stipulae virides, filiformi-subulatae, 1–2 mm longae, basi minute calloso-glandulosae; spica usque ad 6–10 cm longa, floribus ♀ 1–2 (–6) basilaribus subsessilibus, pedicellis usque ad 1.3 mm longis, sepalis inaequalibus 5–6, ad florendi tempus plerumque 0.7–1.3 mm latis, 1.7–2.5 mm longis, oblanceolatis, acutis, superne glabrescentibus, ovario albido-tomentoso duplo longioribus; flores ♂ receptaculum inclusum molliter pilosi; stamina 10–12, antheris 0.5 mm latis suborbicularibus; styli 2–2.5 mm longi, papillosi, vix connati, bipartiti, basi compressi dilatatique; capsula subrotunda, 4–4.5 mm longa lataque, 3-sulcata, apice acutiuscule 3-lobata; columella 3.5 mm longa; calycis lobi 4–4.5 mm longi; semina biconvexa, illustria, carunculata, 3.5–4 mm longa, 2.6–2.8 mm lata.

The ♀ calyx often develops 1 or more extra lobes, smaller than the rest, often on the abaxial side of the flower. Plants of this species suggest superficially a sparsely pubescent, long-petioled shade-form of *Croton repens* Schlecht. or a dentate-leaved form of *C. soliman* Schlecht. & Cham. From *C. repens* it seems that *C. cupulifera* differs in the acutely pointed leaves with longer petioles, the small ventral rather than large lateral or essentially dorsal petiolar glands, and the filiform rather than linear or triangular stipules. From *C. repens* the new species differs also in the repeatedly dichotomous or trichotomous branching and the tendency for all or nearly all the upper leaves to be opposite. From *C. soliman* it differs in the perennial habit, in the coarsely toothed leaves and in the stipules and calyx-lobes, which in *C. soliman* are more or less beset with very slenderly stalked stipitate glands. The ♀ flowers of *C. soliman are* long pedicelled, not subsessile as in *C. cupulifera.*

In appearance *C. cupulifera* is also somewhat like *C. lotorius* Croizat, a Guatemalan species known only from the type (Huehuetenango, *Steyermark 51332*). An isotype of *C. lotorius* (US) differs in having softer and more copius tomentum, narrower and less foliaceous ♀ calyx-lobes, and the petiolar glands lateral rather than ventral.

COLIMA: Low hills with occasional rock-outcrops, deciduous woodland 14 miles w n w of Santiago, along the road to Cihuatlán, Jalisco, elevation 50 m, 7 Nov 1960, *McVaugh 20771* (MICH, type).

As far as I am aware *C. cupulifera* is unique among the Mexican species in the diversity of its foliage: On any given plant at the same time are often found the miniature hoary canescent petiolate juvenile leaves, the large and long-petiolate alternate middle leaves, and the narrower, sessile or subsessile and opposite leaves of the inflorescence.

A few immature flowering individuals of this species were found on the roadside at the type-locality in July 1957 *(McVaugh 15743).* The plants

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FIG. 12. *Croton capulifera.* From *McVaugh 15743.* Leaf, ×1. ♀ flower, ca. ×10. Summit of petiole, adaxial side, showing glands, ×5. Anther, ×15.

appeared to be annuals or short-lived perennials, 30 cm high or less; none was found in fruit. In December 1959 I searched at the same locality but could find no additional plants, the hurricane of early November having destroyed or drastically modified the ground-cover, broken down most of the arborescent vegetation and washed away most of the soil. In 1960 a thriving colony of *C. cupulifera* was located in what seems to be its usual habitat, a wooded rocky ravine with *Bursera, Apeiba, Trichilia, Cnidoscolus* and *Lysiloma.* Almost all the plants of the *Croton* were in flower and fruit, including seedlings one year old or less. It is apparent that the supposed "annual" or perhaps perennial species found in 1957 consisted of a few stray plants, probably washed into a roadside habitat by a freshet from the hills above, of a normally shrubby species. In the shrubby species of *Croton* the use of habit as a key-character for identification is to be used with caution.

1a. Croton glabellus L. Sp. Pl. ed. 2. 1425. 1763.

C. nitens Sw. Prodr. Veg. Ind. Occ. 100. 1788.

This widely distributed species of tropical America was treated by Croizat in his revision of Sect. *Eluteria* (Journ. Arnold Arb. **26**: 187. 1945), under the name of *C. nitens.* According to this author it occurs in Mexico in Veracruz and Chiapas only. According to Standley (Contr. U.S. Nat. Herb. **23**: 613. 1923) it is known from Veracruz and Tabasco. What is presumably the same species, i.e. a lepidote shrub or tree up to 10–12 m high with penninerved leaves and fruiting pedicels 1.5–2.5 cm long, can now be reported from two localities in western Mexico. At the locality where we found it in 1960, it was abundant in dense semi-deciduous tropical forest with *Brosimum, Orbignya, Bursera* and *Calophyllum.*

NAYARIT: El Llano, elevation 60 m, *J. González Ortega 104* in 1923 (US); south of Las Varas, in the coastal mountains 1–1.5 miles west (?) of La Cucaracha, elevation 300 400 m, 20 Sep 1960, *McVaugh 19200* (MICH).

2. Croton pedicellatus HBK. Nov. Gen. & Sp. **2**: 75. *t. 104.* 1817.

C. tenuilobus S. Wats. Proc. Am. Acad. **21**: 439. 1886.

Specimens examined: CHIHUAHUA: *Palmer 29* in 1885, type of *C. tenuilobus* (GH). NAYARIT: *Rose 1919.* JALISCO: *Rose & Painter 7680.* MICHOACAN: *Hinton 12690.*

The collections cited above seem to be conspecific, but there is some doubt that they are to be referred to *C. pedicellatus,* which as far as I can learn has not previously been reported from North America. The type came from northern Peru, and the species was subsequently reported by Mueller from 2 different localities in Colombia, and from northeastern Brazil. The Hinton collection cited above was named *C. pedicellatus* by Croizat. Modern South American collections so named by Croizat are very similar. The ♀ pedicels in these are mostly 8–15 mm long and little recurved; a good match for these is *Rose 1919.* The pedicels in North American material are mostly 3–5 mm long and abruptly decurved.

3. Croton pseudoniveus Lundell, Phytologia **1**: 449. 1940.

This species is a member of Sect. *Eluteria* Griseb., sensu Croizat in Jour. Arnold Arb. **26**: 186–187. 1945. These are more or less densely lepidote and silvery trees and shrubs, the ♀ flowers petaliferous, the styles usually several times dichotomous. Croizat stated that in general the species cannot be separated except by the use of characters of fruit and seed. The species are certainly very similar in general appearance but, at least in western Mexico, they seem to be readily distinguishable by characters of the inflorescence, by those of the leaves, and by the distribution and nature of the scale-like hairs, especially those of the ovary.

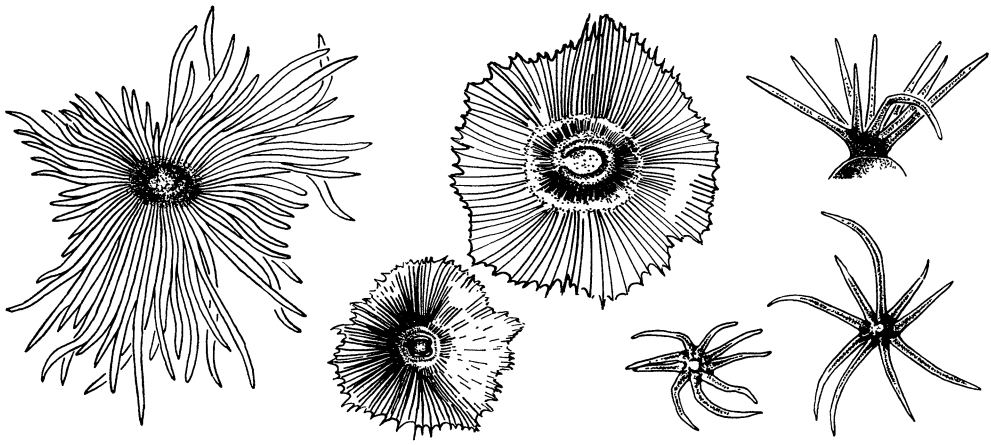


FIG. 13. Characteristic ovarian hairs and scales in *Croton*, ×50. Left to right, *C. wilburi* (type); *C. reflexifolius* (*Palmer 156*); ***C. pseudoniveus*** (***McVaugh 18056***); *C. septemnervius* (type); *C. septemnervius*, top and side views (***Gentry 5723***).

It seems to me that *Croton pseudoniveus* is a well marked entity, endemic in the deciduous woodland region of western Mexico. Croizat in his key to Sect. *Eluteria* implies that in western Mexico all plants of this section are to be referred to *C. reflexifolius* HBK., but this remains to be demonstrated. The leaves in *C. reflexifolius* seem to be more rounded than the deltoid-ovate ones of *C. pseudoniveus,* and more densely lepidote. A presumed topotype of *C. reflexifolius,* determined as that species by Croizat [Acapulco, *Palmer 156* (GH)], has the ovary delicately lepidote with toothed scales 0.7 mm wide, the scales much smaller and more delicate than those of *C. pseudoniveus* (Fig. 13).

The two species described below seem sufficiently distinct, as indicated by the characteristics set forth in the key above, from one another and from *C. pseudoniveus* and *C. reflexifolius.*

4. Croton septemnervius McVaugh, sp. nov. Fig. 13.

Arbor parva 5–7 m alta, cortice albo, ramulis inflorescentiaque dense lepidotis; folii pagina inferiori, capsula, ovario, et nonnumquam petiolis ramulisque stellato-pubescentibus vel tomentosis; folia ovata, 2.5–5 cm lata, 4–9 cm longa, basi 5–7-nervata, rotundata vel emarginata, apice acuminata vel apiculata, ambitu sinuata; lamina supra viridis glabraque, subtus pubescens vel subtomentosa, squamis paucis et pilis multis multiradiatis hyalinis tenuibus obsita; petioli 1–2 cm longi, glandulis minimis; stipulae subulatae, duriusculae, 2–3 mm longae; inflorescentiae axillares terminalesque, 2 cm longae vel minus, basi floribus ♀ paucis, pedicellis 1–2 mm longis, sepalis anguste deltoideis 1.7–2.3 mm longis, petalis laciniatis 1 mm latis, 2.3–3 mm longis; flores ♂ ca. 20, pedicellis 1 mm longis, staminibus ca. 16; ovarium tomentosum pilis multiradiatis opertum (pilorum radiis basi vix conjunctis); styli 3 mm longi, saepius bifurcati; capsula 7–8 mm longa, crassistellata, pilorum ramis suberectis; columella 5 mm longa; semina ignota.

The young branchlets and leaves, and the inflorescence in this species are densely lepidote, without any trace of the long-rayed hairs that are abundant on the ovary and the older foliage. The 5 prominent veins at the base of the

leaf are distinctive in a group of species in which the principal basal veins are usually 3 in number. Additional collections with flowers and fruit are much to be desired; the flowering season is probably in Winter and early Spring.

JALISCO: Wooded summits between Barra de Navidad and Tenacatita, with *Aralia, Bursera, Ficus, Trichilia,* elevation 150–200 m, 12 Nov 1960, *McVaugh 20994* (MICH). COLIMA: Low hills 14 miles w n w of Santiago, road to Cihuatlán, Jal., with *Bursera, Apeiba, Trichilia, Cnidoscolus,* elevation 50 m, 7 Nov 1960, *McVaugh 20765; Manzanillo,* 1–31 Dec 1890, *Palmer 1058* (MICH, type.) SINALOA: Cerro Tecomate, w of Pericos, *Gentry 5723* (MICH).

5. Croton wilburi McVaugh, sp. nov. Fig. 13.

Arbor parva ad 7 m alta, 10 cm diametiens, ramulis inflorescentiaque dense lepidotis; folia late rotundato-ovata (vel ramulorum lateralium brevium angustiora), 4–11 cm lata, 6–13 cm longa, base 3–5-nervata, rotundata vel truncata vel late obtusa (vel in petiolum cuneatim angustata); apice obtuse breviacuminata, ambitu sinuata; lamina supra rare lepidota sed viridis, subtus semper argenteo-viridis, superficie squamis imbricatis tecta; petioli 2.5–4 (–7) cm longi, glandulis nullis vel convexis, inconspicuis; stipulae subulatae, nigrescentes et ut videtur induratae, 2.5–3.5 mm longae; racemi terminales, usque ad 22 cm longi, cernui, basi floribus ♀ 1–2, pedicellis 1.5 mm crassis, 6–12 mm longis (fructescentibus vix incrassatis), sepalis deltoideo-ovatis, permanescentibus sed vix accrescentibus, cum petalis ca. aequilongis, 3.5 mm latis, 4.5 mm longis; flores ♂ 50–60, distantes, racemi pars ♂ ante fructus maturitatem plerumque marcescens; pedicelli ad 6 mm longi; stamina ca. 16, antheris 1.2 mm longis, connectivo dense glandulis maculato; capsulae ovariique squamae pallidae, tenues, irregulariter laciniatae, plus quam 1 mm latae, pars centralis quam apicibus liberis filiformibus angustior; styli 5–6 mm longi, rotati, basi compressi et ibidem ca. 1 mm lati, tota fere longitudine partiti, ramis quibusque fere ad basin bipartitis, deinde quater bifurcatis; capsula longior quam latior, 1.3–1.5 cm longa, tuberculis multis carnosis conicis 2 mm longis obsita; semina (vix matura) 11 mm longa.

Species in honorem collegae aliquando discipuli Robert Lynch Wilbur (1925–), cui debentur plantae jaliscenses plurimae, 1949 aestate praeclare collectae, nominavi.

JALISCO: Moist forested crest of the ridge facing the Pacific, in region of deciduous woodland 10 miles s of Autlán, elevation 1700 m, 19 Aug 1949, *R. L. & C. R. Wilbur 2431* (MICH, with immature fruit, type), 29 Jun 1949, *Wilbur & Wilbur 1421* (MICH, in bud).

The taxonomy of the large-seeded species of this group remains to be worked out on the basis of new material. Following Croizat's key in the paper cited above under *Croton pseudoniveus,* the present species would seem to be closely related to or identical with *C. eluterioides* Lotsy, a plant of Guatemala and (according to Croizat) of extreme southeastern Mexico. In the *Flora of Guatemala,* however, Standley and Steyermark express the opinion that *C. eluterioides* is a synonym of *C. guatemalensis* Lotsy, a species stated by Croizat to have seeds about 7 mm long. The two species described by Lotsy (Bot. Gaz. **20:** 352, 353. 1895) were based upon specimens without mature fruit and seeds.

DRYPETES

At the time of the completion of Standley's *Trees and Shrubs of Mexico* this genus was scarcely known from continental North America, with but a single species reported from Mexico (Contr. U.S. Nat. Herb. **23:** 1671. 1926). One additional species was described from British Honduras in 1929, and a third, *D. gentryi* Monachino, from Sinaloa in 1948. The plants cited below

from Colima seem to agree well with material from Yucatán and from the West Indies, except that in all other specimens the leaves are entire or essentially so; in our specimens the leaves are obscurely denticulate, the teeth represented by dilated gland-like spots at very low step-like notches in the margins.

1. Drypetes lateriflora (Sw.) Krug & Urb. Bot. Jahrb. **15**: 357. 1892.

Schaefferia lateriflora Sw. Prodr. Veg. Ind. Occ. 38. 1788.

COLIMA: In the barranca forest near Río Cihuatlán (Maravasco), 13 miles n of Santiago, with *Brosimum, Bursera simaruba, Acacia hindsii,* at an elevation of 200–300 m, in young flower 10 Dec 1959, *McVaugh & Koelz 1647* (MICH).

At this locality the trees were 20–25 m high and 50–70 cm DBH. I am much indebted to Dr. Faustino Miranda, who accompanied Dr. Koelz and me to the locality where we found *Drypetes lateriflora,* and to whom we owe the original determination of what was to us then an unknown plant.

EUPHORBIA

The large genus *Euphorbia* is represented in Mexico by well over 100 species. Standley listed 27 woody species in the *Trees and Shrubs of Mexico* (Contr. U.S. Nat. Herb. **23**: 597–604. 1923). There is no general treatment of the genus more recent than that of Boissier (in DC. Prodr. **15**^{2}: 7–187. 1862). In the following pages are presented keys to subgeneric taxa that are represented in western Mexico by several or numerous species, or that are insufficiently covered by existing monographs; subgeneric concepts accepted are in general those of Wheeler (Rhodora **43**: 109. 1941).

POINSETTIA

The subgenus *Poinsettia* is represented in the Jalisco region by 7 species, to which a key follows. One other species, *E. eriantha* Benth., occurs in northwestern Mexico.

Herbs, or the stem thickened and woody at base.
- Leaves all opposite, or the lowermost alternate, the blades often coarsely toothed; stems mostly strigose, and retrorsely hispidulous above. *E. dentata* Michx.
- Leaves alternate, or the uppermost and lowermost opposite, or the uppermost crowded and subverticillate; plants annual or perennial.
  - Leaves subtending the inflorescence petaloid, narrow, 1–3 cm long, white or pale pink; plants flowering in spring (March–May), 10–20 cm high from a tuberous root; leaves below the inflorescence reduced or wanting, the foliage leaves borne chiefly on separate sterile shoots. *E. radians* Benth.
  - Leaves subtending the inflorescence, at least the outer ones, much larger, often bright red or pink or, if pale, this at base only (white and sometimes small in *E. restiacea,* a tall fall-flowering species); fertile shoots bearing normal leaves below the inflorescence; plants annual or perennial.
    - Plants annual, strigose at least on the lower leaf-surface, rarely completely glabrous; leaves of the inflorescence green, or their bases red or pink, white, or yellowish white; leaves variable on the same plant, oblong-lanceolate to ovate or panduriform, sometimes all linear; lobes of the involucre not red, but with white or nearly white finger-like divisions. *E. heterophylla* L.
    - Plants perennial from woody or tuberous roots; leaves of the inflorescence red or scarlet, or in one species white, the color often extending to most of the upper surface, and at least to the distal part of the involucre, including its lobes.
      - Plants glabrous or the strongly revolute leaf-margins minutely scabrid; leaves linear or narrowly lanceolate.
        - Inflorescence intense red; glands of the involucre 1–2; leaf-margins scabrid; styles mostly 2 mm long. *E. colorata* Engelm.
        - Inflorescence white; glands of the involucre 5–4; leaf-margins scarcely scabrid, minutely spinulose-serrate; styles mostly 1.5 mm long or less. *E. restiacea* Benth.
      - Plant pubescent and more or less heavily spinulose-strigose; inflorescence

scarlet; leaves variable, on the same plant some often linear, others oblong to broadly ovate. *E. strigosa* Hook. & Arn.

Nearly glabrous shrub or small tree with large alternate leaves mostly 12–20 cm long, the leaves of the inflorescence almost as large, and brilliant red, or sometimes pale red or yellowish. *E. pulcherrima* Willd. ex Kl.

1. **Euphorbia colorata** Engelm. in Emory, Bot. U.S. & Mex. Bound. Surv. 2[1]: 190. 1859.

E. tuberosa Rose, Contr. U.S. Nat. Herb. 1: 111. 1891, not L. 1753.

Often confused in herbaria with narrow-leaved forms of *E. heterophylla*, from which it is readily distinguished by the characters given in the key. The range of *E. colorata* is from southern Zacatecas to Sonora (*Smith, Thurber*, syntypes; *Palmer 356*, type of *E. tuberosa* Rose).

2. **Euphorbia restiacea** Benth. Bot. Voy. Sulph. 162. 1846.

This species has been hardly known except for the type, a fragmentary specimen collected by Sinclair "between San Blas and Tepic" (herb. K). So far as known it is endemic in the Jalisco region. It is abundant on the mountains around Tepic, in oak and pine forests at elevations from 1100 to 2000 m. It is also known from isolated collections from northern Nayarit and extreme southern Durango (*Rose 3362, 3475*).

CYTTAROSPERMUM

A second large group of species in the Jalisco region corresponds approximately to the Sect. *Cyttarospermum* as defined by Boissier (DC. Prodr. 15[2]: 53. 1862), that is, annual or perennial herbs or vinelike shrubs; the glands of the involucre with petaloid appendages; the leaves usually alternate at least below, the upper sometimes opposite, or verticillate at one or two nodes below the inflorescence. No revision of this group has appeared since the time of Boissier. The following tentative key may be useful in most of western Mexico.

A few species not technically members of *Cyttarospermum* are included in the key for the sake of convenience, as these may well be confused by the uninitiated with other superficially similar species. Boissier referred *E.*

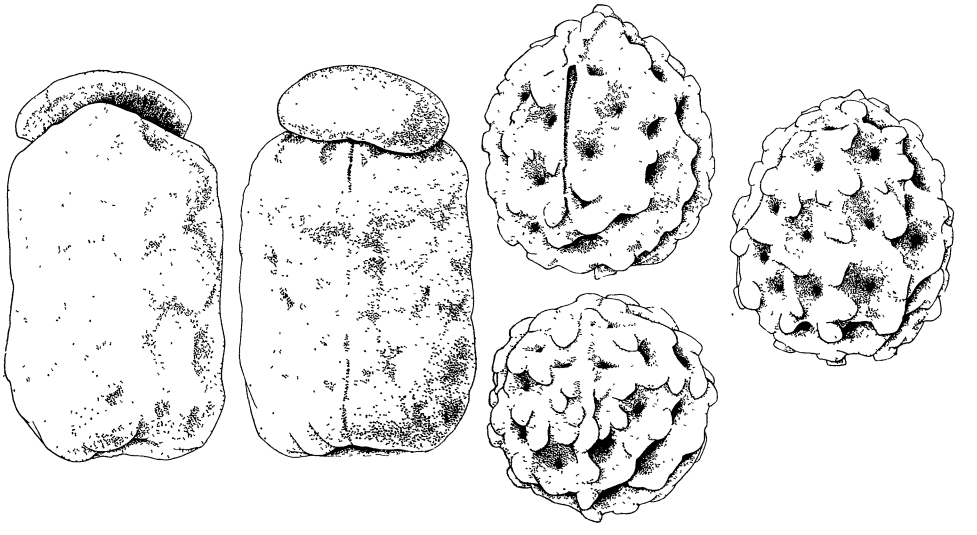


FIG. 14. Seeds of *Euphorbia*, ca. ×38. Drawings by Bonnie Hall. Left, carunculate seeds of *E. delicatula* (*McVaugh & Koelz 736*). Right, pitted-tuberculate seeds of *E. humayensis* (*McVaugh & Koelz 1510*).

biformis (under the name of *E. macropus*) to *Anisophyllum* (*Chamaesyce*), noting that it was in some ways transitional between this group and *Zygophyllidium*; unknown to Boissier was ***E. jaliscensis*** which is surely to be referred to *Zygophyllidium*. Both *E. biformis* and ***E. sphaerorhiza*** (the latter referred by Boissier to Sect. *Tithymalopsis*) differ markedly from the species of *Cyttarospermum* in their tuberous roots and their smooth or wrinkled but scarcely pitted seeds.

A. Appendages of the glands undivided, or at most broadly and shallowly lobed, not deeply bipartite nor fimbriately parted.
Leaves opposite or the lowermost alternate, usually panduriform and dentate or serrate, sometimes varying to linear but then serrate; styles undivided; appendages consisting of a narrow greenish entire or lobulate border beneath the gland. *E. jaliscensis* Rob. & Greenm.
Leaves variously arranged, entire (in age coarsely dentate in rare forms of *E. xalapensis*); styles bipartite; appendages usually much wider than the gland, mostly petaloid and pink or white, occasionally green or yellow.
Vinelike, with green stems often 2–4 m long, or weak upright shrubs to 5–6 m high, often with long vinelike branches.
Slender and vinelike; young growth glandular-pilose; leaves subpeltate. *E. oaxacana* Rob. & Greenm.
Usually an erect shrub, glabrous or essentially so; leaves not peltate. *E. tresmariae* (Millsp.) Standl.
Annual or perennial herbs.
B. Plants with underground parts.
Annuals; leaves alternate (except that the cotyledons and the leaves at the lowest 1–3 nodes are usually opposite).
C. Principal cauline leaves (i.e. in general the alternate ones) linear or oblong, 4–10 times as long as wide, or longer.
D. Middle leaves mostly 4–6 times as long as wide; petioles 10–35 mm long; floral leaves green; capsule 3.5 mm high. *E. succedanea* L. C. Wheeler.
D. Middle leaves mostly 10 or more times as long as wide; petioles 4–8 mm long; floral leaves petaloid, white or pink; capsule 2 mm high. *E. galiciana* McVaugh.
C. Principal cauline leaves of an ovate type, 1–2 times as long as broad.
Branchlets glandular-pilose; seeds ovoid, coarsely pitted. *E. humayensis* Brandg.
Branchlets glabrous, or pubescent with non-glandular hairs.
Seeds oblong, carunculate, smooth or lightly dimpled; leaves narrowly peltate; glands of the cyathium 5 (–4); floral leaves green. *E. delicatula* Boiss.
Seeds ovoid, coarsely pitted; leaves not peltate; glands 2 (–4); floral leaves white, occasionally green (the tiny inner white ones sometimes very inconspicuous). *E. graminea* Jacq.
Perennials, often showing persistent bases of the stems of previous years, the flowering branches arising from tuberous or hard woody roots, or sometimes apparently rhizomatous; cauline leaves opposite or alternate.
Ovary moderately pubescent with blunt flaccid cylindrical several-celled (vermiform) hairs; appendages elongate, white or pink; leaves long-linear, 5 mm wide or less, opposite or whorled at the base of the inflorescence; plants nearly glabrous, scabrous, often nearly leafless at flowering time except the bracts, the stems arising from a rounded tuberous root. *E. sphaerorhiza* Benth.
Ovary glabrous, or rarely pilose with attenuate hairs; plants various, mostly leafy at flowering time, the leaves often broad.
E. Leaves mostly alternate, only those at the base of the inflorescence opposite; roots not tuberous.
Principal cauline leaves (i.e. in general the alternate ones) linear or narrowly oblong, 7–10 or more times as long as wide; inflorescence glabrous or essentially so; petaloid white or pink bracts usually conspicuous in the symmetrically forked cymes. *E. galiciana* McVaugh.

Principal cauline leaves ovate, 1.5–2.2 times as long as wide; inflorescence crisp-pubescent; bracts sometimes petaloid, usually abortive and the cymes falsely racemose by suppression of one fork at a node. *E. xalapensis* HBK.

E. Leaves mostly opposite, those at the base of the inflorescence usually ternate or quaternate.

Floral leaves petaloid, white, 6–10 mm long; inflorescence glabrous or essentially so; appendages of the glands petaloid, white, 2–2.5 mm long; flowering stems from an upright woody base; upper leaves often whorled at more than 1 node. *E. aricnsis* HBK.

Floral leaves like the vegetative ones but much smaller; upper branchlets hispidulous with small erect hairs markedly disparate in size; appendages sometimes distally white, usually green or purple-streaked, 1.5 mm long or less; stems from a rounded tuberous root; leaves whorled at the base of the inflorescence. *E. biformis* S. Wats.

B. Specimens without underground parts.

Leaves mostly alternate, the floral leaves (and sometimes those at the lowest 1–3 nodes) opposite.

Principal cauline leaves linear or oblong.

Ovary pubescent with vermiform hairs; leaves at the base of the inflorescence more conspicuous than the cauline ones. *E. sphaerorhiza* Benth.

Ovary glabrous or rarely pilose with attenuate hairs; floral leaves small and inconspicuous (except sometimes the lowermost), or petaloid. [Go to first D in key, above].

Principal cauline leaves broadly ovate.

Plants, including the inflorescence, crisp-pubescent; ovary and capsule pilose; lower leaves usually not opposite; glands 4–5; floral leaves sometimes petaloid; cymes often falsely racemose by suppression of one branch at each node. *E. xalapensis* HBK.

Plants glabrous or variously pubescent, the inflorescence mostly glabrous; ovary and capsule glabrous; leaves usually opposite at the lowest 1–3 nodes; floral leaves green or petaloid, the cymes usually symmetrically forked. [Go to second C in key above].

Leaves mostly opposite, those at the base of the inflorencence often whorled.

Ovary pubescent with vermiform hairs; plants nearly glabrous, scabrous; leaves linear, those below the floral whorls often reduced or wanting; appendages white or pink, elongate; petaloid floral leaves none. *E. sphaerorhiza* Benth.

Ovary glabrous, or rarely pilose with attenuate hairs; plants mostly leafy at flowering time, the leaves mostly broad. [Go to second E in key, above].

A. Appendages of the glands bi- or tripartite, or palmately or fimbriately parted, nearly to the base. (See also *E. oaxacana*, a green vinelike shrub, with petaloid appendages usually entire).

Leaves linear or very narrowly elliptic, rounded and peltate at base, 2–5 mm wide; inflorescence pilose with very slender flexuous hairs 1.5–3 mm long; appendages with 6–7 filiform divisions; styles undivided. *E. guadalajarana* S. Wats.

Cauline leaves ovate to reniform, the principal ones mostly 1 cm wide or more; inflorescence glabrous, appressed-pilose or glandular-pilose, the hairs inconspicuous.

Appendages of the glands bi- or tripartite nearly to the base, the divisions narrowly ovate, 0.6–0.8 mm long; styles divided more than half their length; involucre appressed-pilose with flaccid several-celled hairs.

Appendages mostly 2-lobed, purple, the lobes blunt; upper cauline leaves, and floral leaves, narrow with hairlike tips; plants annual. *E. francoana* Boiss.

Appendages mostly 3-lobed, green, the lobes acuminate or caudate; upper leaves, including the floral ones, mostly elliptic, blunt, apiculate; plants perennial. *E. soobyi* McVaugh.

Appendages palmately 3- to 7-lobed nearly to the base, the divisions mostly linear to filiform.

Bracts of the inflorescence leafy, resembling the foliage leaves but much smaller and often narrower, with terminal seta up to 1–2 mm long; styles undivided; appendages with 5–7 filiform segments; stipules persistent, subulate, 1–2.5 mm long.

Annual, much-branched; cyathia few in loosely cymose clusters at the tips of the branches. *E. sonorae* Rose.

Erect or arching and sprawling perennial with a terminal panicle-like inflorescence. *E. multiseta* Benth.

Bracts of the inflorescence, if broad and leafy, obtuse or merely apiculate; styles divided at least a part of their length; stipules inconspicuous, 0.5 mm long or less.

Bracts filiform, opposite, 6–10 mm long; branchlets glandular-pilose; appendages white or pinkish, palmately 3-parted, the divisions 3–3.5 mm long, 0.2–0.4 mm wide. *E. dioscoreoides* Boiss.

Bracts foliaceous, much smaller than the leaves, 2–7 mm wide; young branchlets sparingly pilose, not glandular; appendages 3- to 5-lobed, the lobes 2 mm long or less.

Small annual herbs; leaves reniform to suborbicular, up to 10–12 mm wide; divisions of the appendages 1 mm long or less.

Seeds smooth, biconvex; plants 3–5 (1–10) cm high, the lowest branches 2–5 cm long, much longer than the upper ones; divisions of the appendages finger-like, 0.2 mm long. *E. biuncialis* McVaugh.

Seeds ovoid, plump, deeply pitted and coarsely tuberculate; plants often 30–50 cm high, if dwarfed the branches all about the same length and relatively short; divisions of the appendages filiform-subulate, 0.4–0.8 mm long. *E. subreniformis* S. Wats.

Perennial herb or scandent subshrub 1 (–4) m long; leaves ovate, 1.5–3.5 cm wide; appendages 2 mm long, the segments linear-filiform with capitate tips. *E. mexiae* Standl.

3. Euphorbia biformis S. Wats. Proc. Am. Acad. **18**: 151. 15 Aug 1883.

?Anisophyllum macropus Kl. & Garcke, Abh. Akad. Berlin [Phys.] **1859**: 33. 1860.

?A. crassipes Kl. & Garcke, Abh. Akad. Berlin [Phys.] **1859**: 38. 1860.

?E. macropus (Kl. & Garcke) Boiss. in DC. Prodr. **15**^{2}: 52. 1862.

E. retroscabra S. Wats. Proc. Am. Acad. **22**: 449. 25 Jun 1887.

Plants that I should refer to this species-complex are abundant in many localities in forested mountains in Mexico, at elevations from 1500 to 2500 m, from Oaxaca and Puebla to Coahuila and Nuevo León, Michoacán, western Jalisco and northern Nayarit. The plants vary from nearly glabrous to heavily pilose and the leaves vary a great deal from one locality to another, e.g. from nearly linear to ovate. The species is at once recognized by the globose or elongate tuberous root, the prevailingly opposite leaves, the usually green or purplish-green appendages, and the characteristically hispidulous branchlets on which the ordinary hairs are intermingled with tiny erect hairlets. Possibly more than one species is represented in this complex, but at present it seems doubtful.

It is probable that *E. biformis* is a synonym of *E. macropus;* the latter, as illustrated by Boissier (Ic. Euph. *pl. 26.* 1866) is very like some of the xeromorphic forms of *E. biformis* from the Jalisco region (e.g. *McVaugh 17112* from Cerro de los Gallos, Jalisco). The plants are described by Boissier as 2 inches high, divaricately branched from the base, the whole plant spreading-setulose, the glands always 5, the leaves ovate. Modern specimens from near the type-locality (Real del Monte and Cerro Vento[so], Hidalgo) are not distinguishable from specimens of *biformis* from other localities.

It is probable that *Anisophyllum crassipes* and *A. macropus* are synonymous as supposed by Boissier. A collection from the Sierra Madre west of Bolaños, Jalisco, *Rose 2981,* has been determined by Millspaugh as a species of *Zygophyllidium* based on *A. crassipes;* the specimen is a dwarfed and thickly pilose plant with broadly ovate-cordate leaves, as far as I can tell not otherwise different from small plants of *E. biformis.*

The plant described as *Euphorbia retroscabra* (Río Blanco, *Palmer 157,*

the type) is not distinguished from other plants of *E. biformis* by the indument; the "retrorsely scabrous-hispid" stem noted by Watson is usual in this whole group. The distinctive features of *E. retroscabra* are the elongated upper branchlets and peduncles (4–11 mm long), the smallness of the bracts in contrast with the foliage leaves, and the oblong appendages which in some plants are 1.5 mm long and apparently yellowish. Because of the small bracts and the elongated peduncles, the cyathia stand out above the foliage and the small cymose clusters are conspicuous at the tips of the branches. In all other respects *E. retroscabra* seems to be identical with the inclusive *E. biformis;* the characteristics and distribution of the pubescence in the two are very similar, as are the habit and the leaf morphology and the various features of the cyathia and flowers. The glands in *E. retroscabra* (*Pringle 4421,* from Guadalajara) are 5 in number; in *biformis* they are usually 4, but sometimes 5. The case for the specific segregation of *E. retroscabra* is not a convincing one.

3a. **Euphorbia biuncialis** McVaugh, sp. nov. Fig. 36.

Annua nana ramosa 3–5 (–10) cm alta, leviter strigosa, foliis ramulisque juvenilibus et involucris sparse pilis pallidis articulatis obsitis; folia ad nodos infimos 2 et nodos approximatos 1–3, ramulos florescentes terminantes, opposita; altera alterna; rami divaricati, saepe ad nodum secundum oppositi longi (2–5 cm); foliorum laminae suborbiculatae, 4–9 mm longae lataeque, nunc apiculatae nunc emarginatae, integrae; petioli 3–6 mm longi; stipulae minutae glandiformes; cymulae pauciflorae terminales binis foliis mediocribus oppositis subtentae, utraque deinde circa 2-bifurcata, foliis oppositis redactis subbracteiformibus; involucra campanulata 0.8 mm longa, 1 mm lata, e pedunculo breviusculo 0.6 mm crasso oriunda; lobis hyalinis, quadrato-oblongis, glandulas superantibus, apice dentibus 5–7 brevibus digitiformibus instructis; glandulae 5 apice concavae, transversaliter elongatae 0.3 mm longae, appendiculatae, appendicibus ut videtur e glandulae basi oriundis, patentibus vel adscendentibus, in lobulas 2–3 digitiformes 0.2 mm longas partitis; gynophorium 1.5–2.5 mm longum plerumque recurvatum; capsula exserta glabrata subrotunda trisulcata, infra medium latior, 1.7–1.9 mm longa lataque; columella 1.3–1.5 mm longa; styli 0.3 mm longi subcapitati bipartiti; semina biconvexa ovoidea, ecarunculata, laevia, 1.2–1.4 mm longa, 1–1.2 mm lata, 0.7–0.8 mm crassa, pallida, caesia vel adusta, marmorata.

JALISCO: About 2 miles e of Tapalpa, in pine forest zone, locally abundant in shallow soils in seepage areas around rocks, elevation 2100–2200 m, 1 Nov 1960, *McVaugh 20558* (MICH, type).

The seeds of this species are quite unlike those of the herbaceous annuals of Sect. *Cyttarospermum,* although in other respects *E. biuncialis* appears to have its affinities in that section. Most of the species of *Cyttarospermum* have tuberculate and pitted seeds (Fig. 14).

The type-locality of *E. biuncialis* is in a habitat that is springy and muddy during the summer rains and for a few weeks thereafter, and entirely without water for the rest of the year. Similar habitats elsewhere in the Jalisco region support a specialized group of small herbaceous species, in such genera as *Isoetes, Bulbostylis, Sisyrinchium, Habenaria, Polygala, Pinguicula,* and *Utricularia.* So far *E. biuncialis* has not been found except in this habitat; it is possible that under more favorable conditions of soil and humidity the plants may become larger.

4. Euphorbia delicatula Boiss. Cent. Euph. 19. 1860. Fig. 14, left.

E. edulis Sessé & Mociño, Pl. Nov. Hisp. 81. 1888, not Lour.

?E. subcaerulea Rob. & Greenm. Proc. Am. Acad. **32**: 37. 1896.

The type-locality of this species was unknown to Boissier, who reported it on the basis of a specimen from "Nova Hispaniâ (herb. Pavon)". The plant in the Boissier Herbarium (Field Mus. Neg. 34102) is plainly marked "Nueva España", and, in ink, "E. edulis". It is a fair assumption that this is the *Euphorbia edulis* of Sessé & Mociño, as their description can apply well enough to the specimen cited by Boissier, and many of their specimens are known to have found their way into Pavon's herbarium. The type of *E. edulis,* and so presumably that of *E. delicatula,* was from Chilapa, Guerrero.

The species was described by Boissier as glabrous; modern specimens thought to be conspecific with the type are often sparsely puberulent on the young growth, finely and sparingly ciliate on the leaf-margins near base, and scaberlous on the angles of the stems.

Moist shaded places in deciduous woodlands and barrancas, at elevations of 400 to 1300 meters, Guerrero to southern Nayarit.

NAYARIT: 10 miles s e of Ahuacatlán, *McVaugh & Koelz 736.* JALISCO: Barranca of Tequila, *Pringle 4550.* COLIMA: 11 miles s s w of Colima, *McVaugh & Koelz 1070.*

Plants of this species are superficially very similar to those of *E. humayensis* Brandg., but may readily be distinguished by the nearly glabrous (not glandular-pilose) branchlets, and the oblong and conspicuously carunculate (not ovoid and coarsely pitted) seeds. The seeds of the two species are contrasted in Figure 14. Seeds of *E. delicatula* were unknown to Boissier, as the type was a flowering specimen. On the basis of general similarity I do not hesitate to identify the type with the specimens cited above.

The type of *E. subcaerulea* is glabrous; the seeds (stated by Robinson and Greenman to be "light blue") are like those of our collections of *E. delicatula;* the floral leaves are said to be white or "bluish" and the appendages are said to be at first "light blue", then changing to white. The colors in the type appear actually to be violaceous, as in other specimens of *E. delicatula,* rather than blue.

5. Euphorbia galiciana McVaugh, sp. nov. Figs. 19–21.

Verisimiliter perennis sed anno primo saepe florens, caulibus tenuibus subglabris ascendentibus 20–50 cm altis, paucis vel multis e radice lignescenti; folia caulinia alterna (inflorescentiae basi dua opposita; bracteae nonnunquam foliaceae oppositaeque; basi plantae ramuli foliaque subopposition); folia inferiora latiora, elliptica vel raro suborbicularia; mediana superioraque plerumque elongata, oblonga vel linearia, apice obtusa vel ad apicem basinque attenuata, 2–5 mm lata, (2.5–) 4–10 cm longa; petioli 4–8 mm longi; stipulae glanduliformes, subulatae vel latiores, 0.1–0.3 mm longi; inflorescentiae rami tenuissimi, subnudi, in modum cymae semel- vel bifurcati, foliorum caulinium pari summa subtentes; cymarum bracteae valde reductae, vix foliaceae, plerumque petaloideae, earum ultimae albae vel dilute rubescentes, oblanceolatae, ca. 1 mm latae, 4–5 mm longae, cyathia conferta pauca, folia superantia, 1.2–1.5 mm longa; pedunculis 1–3 mm longis; lobis laciniatis, latis, albis, cum appendicibus 0.5–1 mm longis subaequilongis; glandulis 4, ut videtur in basibus concavis appendicum albarum vel dilute rubescentium, ovatarum curvato-patentium depressis; styli 0.7–1 mm longi, bipartiti; capsula 3-lobata, 2 mm alta, 3 mm lata; columella 1.5–1.7 mm longa; gynophorium 1.5–4 mm longum recurvatum; semina ovoidea, nigrescentia, basi rotundata, apice pyramidata, superficie foveolata nonnumquam tuberculataque, foveolis grandis, concavis.

Most of the collections appear to be annuals or delicate perennials with small roots and solitary or few stems. In *Mexia 1667* there are 20 or more stems arising from a woody root about 2 cm thick; the bases of old stems may be persistent; the very youngest growth may be pubescent, and the leaves scabrous on the involute margins and strigose beneath; the seeds are of a common type, with about 10 longitudinal rows of pits, 3–4 pits in each row, the surface smooth or obscurely tuberculate.

Grassy slopes, openings in pine and oak forests, at elevations of 1500–2000 meters, southern Nayarit to Guerrero, flowering October–January.

NAYARIT: Below C. San Juan, ca. 5 miles s w of Jalisco, *McVaugh & Koelz 664*. JALISCO: San Sebastián, *Mexia 1538, 1667;* 6 miles s w of Cuautla, *McVaugh 13658;* Sierra de Manantlán, between Aserradero San Miguel Uno and Durazno, 7 Nov 1952, *McVaugh 13985* (MICH, type); Sierra del Halo, *McVaugh 16217, McVaugh & Koelz 1172*.

6. **Euphorbia graminea** Jacq. Sel. Stirp. Am. 151. 1763.

E. scabrella Boiss. in DC Prodr. 15^2: 55. 1862; Boiss. Ic. Euph. *pl. 32*. 1866.
E. colimae Rose, Contr. U.S. Nat. Herb. 1: 356. 1895.
E. longepetiolata M. E. Jones, Extr. from Contr. W. Bot. 18: 55. 1933.

The taxonomy of the annual species related to *E. graminea* is in need of revision. The synonyms given above seem all to apply to the one species, a common herbaceous plant in moist shady places in western Mexico, where it does not seem to be particularly weedy, nor especially variable except in the amount of pubescence on the stems and leaves. In other words it appears to be a well established native species, not merely a weed of tropical lowlands. The type of *E. graminea,* which I have not seen, came from Cartagena, Colombia, and conceivably represents another species.

Plants identified as *E. graminea* in eastern Mexico usually have the small bractlets green, and the glands are often 4 or 5 in number. In western Mexico the bracts subtending the terminal cymules are usually white, but green in an occasional plant; the glands are almost always 2. The significance of these regional differences is unknown.

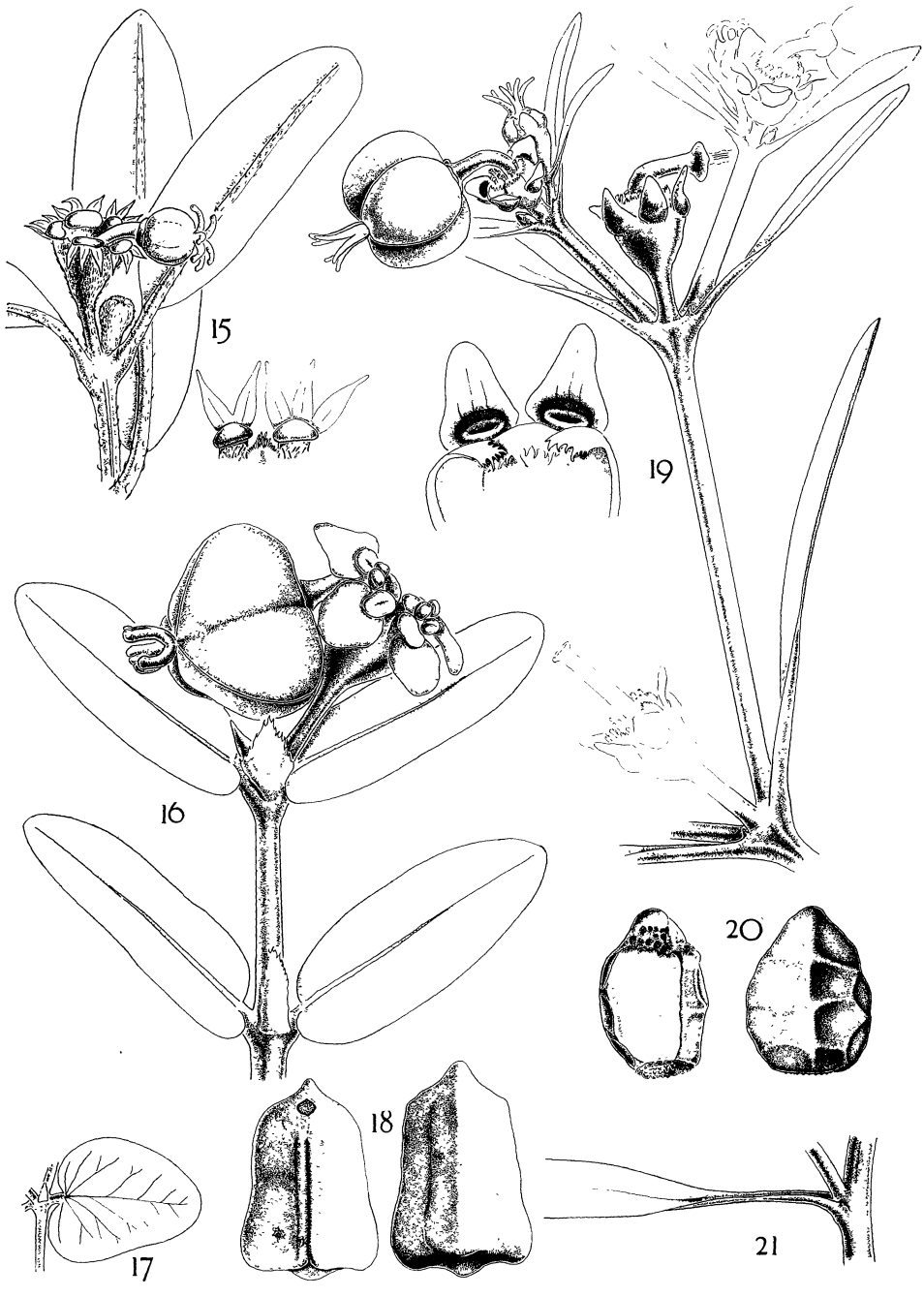
Standley & Steyermark, in the *Flora of Guatemala,* interpreted *E. scabrella* as a perennial species, but Boissier's plate in the *Icones* clearly shows the plant to be a delicate annual. The type-collection of *E. longepetiolata, Jones 27514* (GH), is a plant with purplish pigmentation in the appendages and the floral leaves, and the cymes somewhat elongate and naked. Wheeler (Contr. U.S. Nat. Herb. 29: 107. 1945) remarked on the narrow appendages, but these are not unusually narrow when compared with other plants from the same region. The plant can hardly have any relation to *E. succedanea,* as suggested by Wheeler.

7. **Euphorbia humayensis** Brandg. Zoe 5: 208. 1905. Fig. 14, right.

?E. sinaloensis Brandg. Zoe 5: 208. 1905.

This species is superficially similar to *E. delicatula* Boiss., as pointed out above, but that species is nearly glabrous, whereas in *E. humayensis* the branchlets are glandular-pilose with erect multicellular capitate hairs up to 0.3 mm long. The seeds of *E. humayensis* are similar to those of a number of other species of *Cyttarospermum,* i.e. with large pits and additional tubercles especially on the ridges between the pits (Fig. 14).

The type of *E. sinaloensis,* a fruiting plant collected by T. S. Brandegee at Cerro Colorado near Culiacán, Sinaloa, 1 Nov 1904, lacks the characteristic gland-tipped hairs; the herbage is glabrous except for a few hairs on the cyathium; the bracteal leaves are elliptic to oblanceolate rather than ovate as in other specimens; the seeds are more coarsely and less deeply pitted than those of the type.



FIGS. 15–21. *Euphorbia*. FIG. 15. *E. soobyi*, from *McVaugh 14387*. Tip of flowering branchlet, ×7; lobes and glands of the involucre, ×8.5. FIGS. 16–18. *E. linguiformis*, drawn from the type. FIG. 16. Tip of flowering branchlet, ×7. FIG. 17. Cauline leaf, ×1.7. FIG. 18. Ventral and dorsal views of seed, ca. ×14. FIGS. 19–21. *E. galiciana*, drawn from the type. FIG. 19. Tip of flowering branchlet, ×7; lobes and glands of the involucre, ca. ×17. FIG. 20. Ventral and dorsal views of the seed, ca. ×14. FIG. 21. Base of cauline leaf, ×1.7.

I am much indebted to the Herbarium of the University of California, at Berkeley, for the loan of the types of Brandegee's species, and to Miss Annetta Carter for additional observations on these specimens.

8. Euphorbia soobyi McVaugh, sp. nov. Fig. 15.

Perennis vel fortasse annua 40 cm alta, caulibus tenuibus erectis basi lignescentibus, inferne et ad angulos glabris, superne sparse pubescentibus; folia (eis inflorescentiae ramos subtendentibus exceptis) alterna, ovata vel oblongo-elliptica, 1–1.4 cm lata, 2.5–3.2 cm longa, rare pilosa, apice obtusa vel subacuta, basi rotundata vel obtusa, marginibus revolutis integris, basilaribus supra petiolum continuis, folia itaque subpeltata; petioli 7–12 mm longi; stipulae glandiformes; cymae 10 cm longae, 3–5-dichotomae, cyathiis fere solitariis brevipedunculatis; involucrum turbinatum appendicibus inclusis 1–2 mm longum, cum pedunculum pilis appressis flaccidis obtusis 0.3 mm longis obsitum, lobis brevibus rotundatis ciliatis, quam glandularum stipitibus brevioribus; glandulae 5 stipitatae, ellipticae vel reniformes, 0.5–0.7 mm longae, appendicibus plerumque 3-lobatis, lobis (nonnumquam 2 vel 4) viridibus ovatis, subulato- vel caudato-acuminatis, basi ad 0.4 mm latis, 0.6–1 mm longis; flores ♂ ca. 12 stipitati; bracteae lineares plumosae; styli 0.6–0.8 mm longi, tota longitudine bipartiti, subcapitati; capsula valde 3-lobata, laevis, 3.5 mm lata, 2.7–3 mm longa; gynophorium 2.5 mm longum, glabrum, vix recurvatum; semina ovoidea, adusta, 2 mm longa vel paulum longiora, punctato-favosa et tuberculata.

Species comite adjutoreque Joseph Sooby juniore (1924–), qui mecum anno 1952 per terram mexicanum lustravit, nominavi.

JALISCO: Sierra de Cuale, s w of Talpa de Allende, in pine forests, elevation 1800–2250 m, 19–21 Nov 1952, *McVaugh 14387* (MICH); headwaters of Río de Talpa, 10–12 miles s of Talpa, pine forests and pine-oak transition, elevation 1500–1800 m, 23–24 Nov 1960, *McVaugh 21317, 21353* (MICH, type); headwaters of Río de Mascota, 11–13 road-miles s of El Rincón, fir forests in *barrancas*, elevation 2000–2150 m, 29 Nov 1960, *McVaugh 21547* (MICH).

The description and illustrations of this species are based chiefly upon the single plant found in 1952. It transpires that *Euphorbia soobyi* is a common plant of steep mountain forests in the region from Talpa to San Miguel de la Sierra.

No other herbaceous species in western Mexico seems likely to be confused with *E. soobyi*. Some shrubby or subshrubby species, thus far not known from our area, may be contrasted with it; cf. L. C. Wheeler, "Two Ornamental

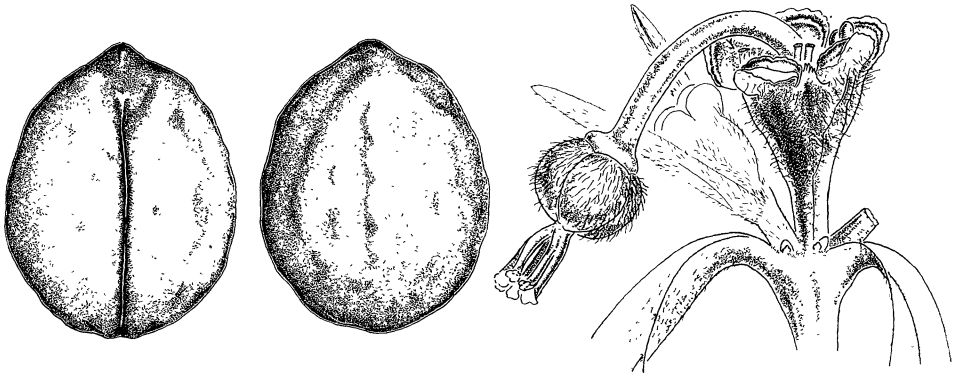


FIG. 22. *Euphorbia maysillesii*. Ventral and dorsal views of the seed, ×16⅔, drawn from the type. Tip of flowering branchlet, ×6, from *Maysilles 8163*.

Mexican Euphorbias'' (Cact. & Succ. Jour. 11: 44–47. 1939). The seeds of *E. sloanei,* as illustrated by Wheeler (l.c. 46, *fig.* 3), much resemble those of *E. soobyi,* but are said to be smaller, 1.1–3 mm long.

9. Euphorbia sphaerorhiza Benth. Pl. Hartw. 8. Mai 1839.

This species, referred by Boissier to Sect. *Tithymalopsis,* is keyed out here with the members of *Cyttarospermum* because of its superficial resemblance to some of the species of that section. Like some apparently related species (e.g. *E. biformis*), *E. sphaerorhiza* has the seeds plump and nearly smooth or somewhat wrinkled or tuberculate, not deeply and uniformly pitted as in many species of *Cyttarospermum.* Because of the unusual cylindric many-celled (''vermiform'') hairs that adorn the ovary in *E. sphaerorhiza,* it may be recognized at once. An extra-limital species, evidently closely related to *E. sphaerorhiza,* is described below:

9a. Euphorbia maysillesii McVaugh, sp. nov. Fig. 22; fig. 23, below.

Herba perennis ad 50 cm alta, erecta, ramosa, e radice tuberosa subglobosa ad 2 cm crassa oriunda, pilis albis obtusis vel attenuatis 0.5–0.8 mm longis obsita; rami adscendentes, medianis verticillatis, superioribus (foliisque) oppositis, inferioribus nonnunquam alternis; caules saltem infra glabri, minute scabriduli; folia mediana superioraque 3–5-verticillata, lanceolata vel elliptica, 2.5–9 mm lata, 1.5–6 cm longa, (3–) 4–10-plo longiora quam latiora, obtusa vel apiculata, basi attenuata vix petiolata, vel petiolo ad 5 mm longo instructa; stipulae glanduloso-scariosae vel rubidae, laciniatae, ad 1 mm longae, saepe nullae; inflorescentiae rami 2–4-furcati; cymae ultimae cyathiis 1–3 pilosis, late campanulatis, basi saepe rotundatis, 1.5–2 mm longis (appendicibús inclusis) instructae; glandulae 5, ellipticae; appendices reniformes rotundataeve, virides vel purpurascentes, crassistipitatae, integrae vel lobulato-crenatae, corpore 1.2–1.3 mm lato, 0.8 mm longo, in margine angusto ultra glandulam producto; ovarium pilis albis hirsutum; styli 1.5–1.7 mm longi, basi breve connati, fere ad medium bipartiti; capsula pilosa, 3-lobata, 4 mm longa, 5–5.5 mm lata; gynophorium 5 mm longum, valde recurvatum; semina rotundato-ovoidea, laevia, obscura, nigrescentia, 2.5 mm longa.

DURANGO: Open meadows (''llanos'') in pine forests, elevation 2400–2500 m, Coyotes Hacienda, 63 road-miles w s w of Durango, 16 Jul 1955, *James H. Maysilles 7881* (MICH); 5 miles n of the railroad at Coyotes, 1 Aug 1955, *Maysilles 8149* (MICH, type), *8163* (MICH).

A relationship to *E. sphaerorhiza* is suggested by the close resemblances in the seeds, the scabrous and often leafless stems, the tuberous base of the plant, the verticillate branching and the pilosity of the capsule and ovary. In *E. sphaerorhiza,* however, the leaves and bracts are narrower, the pubescence of the herbage is scanty or none, the branches are inconspicuously if at all whorled, the ovary is sparingly pilose with collapsing ''vermiform'' hairs, and the seed is larger. There are scattered records of *E. sphaerorhiza* as far north as the southern tip of Durango (*Rose s.n., Rose 3518*), and from Otinapa, Durango (*Palmer 416*), but the principal range of this species is from Jalisco and San Luis Potosí southward.

10. Euphorbia subreniformis S. Wats. Proc. Am. Acad. 21: 439. 1886.

Euphorbia subreniformis appears to be the principal representative, in western Mexico, of a tropical American species-complex typified by *Euphorbia ocymoidea* L. (Sp. Pl. 453. 1753), the type from Campeche, *Houstoun.* I am accepting *E. ocymoidea* in the sense of Standley & Steyermark (Fieldiana Bot. 24[6]: 108. 1949), that is a nearly glabrous, nonglandular plant, with the leaves

FIG. 23. Flowering branches of ***Euphorbia***, about natural size. Above, *E. perlignea*, the type collection. Below, *E. maysillesii* (*Maysilles 8163*).

"orbicular or rounded ovate . . . the smaller leaves often broader than long". Plants apparently of this species occur in Guatemala, Puebla, Morelos, E. de México and perhaps farther west; the following specimens from our area have ovate leaves instead of the reniform ones of *E. subreniformis*: La Barranca, Guadalajara, *Jones 27510*: S. Juan Capistrano, *Rose 3552*. The type of *E. cofradiana* Brandg. (Zoe **5**: 207. 1905), from Cofradia, Sinaloa, *Brandegee s.n.*, 20 Oct 1904 (UC) is of the *"ocymoidea"* alliance, with leaves broadly ovate and floral leaves obovate or suborbicular; the leaves do not suggest *subreniformis,* but in pubescence and other features the plants are very like that species.

Except for the shape of the leaves I do not find any character that separates *E. subreniformis* from *E. ocymoidea.* The leaf-character, moreover, does not seem to be a very good one. In *Pringle 2302,* for example, from Guadalajara, some of the plants have suborbicular leaves suggesting an ovate type; others have the usual reniform leaves.

A revision of *E. ocymoidea* and related species is much to be desired. Probably a synonym of *E. ocymoidea* is *Adenopetalum barnesii* Millsp. (Field Mus. Publ. Bot. **2**: 377. 1913), based on *Barnes & Land 306* (F 247472), collected 6 Oct 1908 along the road to San Domingo mine near Etzatlán, Jalisco. The plants on the type-sheet are short and bushy, apparently open-grown specimens much branched from the base, with numerous ovate or elliptic, acutely pointed floral leaves that give them an unusual aspect. The few alternate cauline leaves near the bases of the plants are like those of other specimens of *E. subreniformis,* i.e. orbicular or reniform, the largest 7 mm long and 9 mm wide. Barnes and Land were accompanied on their trip from Etzatlán by C. G. Pringle; Pringle's no. 10822, labelled "hills of Etzatlán, among oaks, 6000 ft. alt.", is presumably a topotype.

CHAMAESYCE

About 20 species in the Jalisco region are to be referred to the Subgenus *Chamaesyce* (Sect. *Anisophyllum* in the sense of Boissier). A good modern revision of *Chamaesyce* (for the United States and Canada only) is available (Wheeler, L. C., in Rhodora **43**: 97–154, 168–205, 223–286. *pl. 654–668.* 1941), and much helpful information has been obtained from it. Unfortunately only about half of the species in the Jalisco region are treated by Wheeler.

A. Leaves serrulate.
  B. Ovary and capsule glabrous.
    Robust erect or ascending annuals (sometimes perennials in the tropics) with the larger leaves mostly 15 mm long or more, somewhat elongated and toothed most of their length.
      Plants glabrous; capsule 1.3–1.4 mm long, widest about the middle; styles 0.4 mm long; seeds 1 mm long or less, light reddish brown, the facets with concave depressions. *E. glomerifera* (Millsp.) Wheeler.
      Plants usually somewhat pilose or pubescent; capsule mostly more than 1.5 mm long.
        Seeds 1.4–1.75 mm long, dark gray to blackish, coarsely honeycomb-pitted; capsule 2–2.3 mm long. *E. potosina* Fern.
        Seeds smooth to wrinkled, or somewhat transversely ridged or with shallow concave depressions, 0.8–1.3 (–1.6) mm long; capsules mostly less than 2 mm long.
          Stems uniformly crisp-pubescent even in the branches of the inflorescence; leaves pilose or strigose, sometimes glabrate in age; perennials or shrubs.
            Shrub to 2 m high, the stems to 1 cm in diameter; styles 0.7–0.9 (–1.2) mm long; capsule always glabrous; seeds pinkish white to reddish, scrobiculate to strongly transverse-ridged; lowlands, Colima and coastal Jalisco. *E. perlignea* McVaugh.

Perennial or apparently annual herb to 30 cm high; styles 0.4–0.6 mm long; capsule usually pilose; seeds gray to brown or dark reddish brown, coarsely cellular, plump and smooth or sometimes lightly transversely wrinkled. *E. anychioides* Boiss.

Stems nearly glabrous, or thickly pubescent in lines along one side; leaves often with a few long persistent hairs especially near base; annuals, or perhaps overwintering.

Seeds black or nearly so, the facets nearly smooth or with fine irregular transverse wrinkles; young branchlets usually markedly pubescent in lines along one side.

Ovary and capsule usually pilose; capsule 1.5–1.7 mm long and wide; seeds sharply angled, irregularly and weakly rugulose. *E. feddemae* McVaugh.

Ovary and capsule glabrous; capsule 1.9–2.3 mm long, wider below the middle; seeds weakly angled, the convex facets finely rippled. *E. maculata* L.

Facets of the seeds with few shallow concave depressions separated by low broad ridges; stems mostly glabrous, sometimes sparsely pilose, usually not in lines.

Seeds light reddish brown, bluntly angled; cyathia in close bracteate clusters at the tips of branchlets. *E. apatzingana* McVaugh.

Seeds grayish white to black or chocolate brown, the prominent angles often white-edged; cyathia not in conspicuous clusters. *E. hyssopifolia* L.

Prostrate, weakly ascending or capillary-branched annuals; stem leaves sometimes partly or mostly entire; leaves mostly 1 cm long or less.

Erect capillary-branched annual, hispid on the stem with hairs 1.5–2 mm long; capsule 1–1.2 mm long, usually pilose on the angles. *E. radioloides* Boiss.

Plants prostrate or weakly ascending; capsule 1.8–2.6 mm long.

Plants prostrate, the leaves strongly flattened in 1 plane, short-ovate, usually entire, their margins often whitened and involute; cyathia in terminal umbel-like clusters. *E. umbellulata* Engelm.

Plants prostrate or ascending, the leaves not strongly flattened, usually oblong and at least the larger sharply serrate or serrulate; cyathia solitary, sometimes crowded at the nodes.

Plants glabrous; seeds linear-oblong or somewhat pointed, probably always less than 1.5 mm long, brownish.

Stipules united, broad and conspicuous; leaves pointed, obscurely but definitely serrulate; vicinity of Guadalajara. *E. floribunda* Engelm.

Stipules distinct, linear, entire or few-parted; leaves obtuse, evidently denticulate above the middle; high grasslands of northeastern Jalisco. *E. serpyllifolia* Pers.

Pilose; leaves mostly obtuse, at least the larger sharply serrate; stipules distinct; seeds 1.5–2 mm long, quadrangular, smooth, chalk-white to sordid. *E. serrula* Engelm.

B. Ovary and capsule strigose, pubescent or pilose, at least with a few hairs.

Cyathia numerous, mostly in dense head-like pedunculate *leafless* cymes in the leaf-axils; stems at least above commonly pilose with long yellow flaccid multicellular hairs.

Cymes capitate, usually both lateral and terminal (i.e. in one or more of the upper axils in addition to the terminal ones); annuals, usually in dry or weedy places; leaves conspicuously toothed; plants usually abundantly pilose; styles 0.2–0.4 m long; seeds 0.7–0.9 mm long, sharply quadrangular, light pinkish- or reddish-brown. *E. hirta L.*

Cymes capitate, usually terminal only; slender marsh-dwelling perennials from slender rhizomes; leaves obscurely toothed, often appearing entire; stems glabrous below, sparingly ascending-pilose above; styles 0.5–0.7 mm long; seed 1.1–1.3 mm long, ovoid, obscurely angled, lead color or faintly reddish gray. *E. paludicola* McVaugh.

Cyathia solitary or on short *leafy* lateral branches, sometimes in umbel-like clusters near the tips; stems glabrous or variously vestite, not with long yellow hairs.

Proximal appendages asymmetric, prolonged toward the sinus, much longer than the symmetric rounded or flabellate distal pair; seeds with distinct trans-

verse ridges.
Appendages hairy on the backs and usually on the margins, the larger pair commonly 1.5–2.5 mm long; capsule hirsute. *E. densiflora* (Kl. & Garcke) Kl.
Appendages glabrous or at most with a few hairs on the back at base; capsule strigose.
Larger appendages 0.5–0.7 mm long, the distal pair often very narrow or obsolete; styles 0.4–0.5 mm long; seeds with low broad ridges separated by shallow depressions. *E. thymifolia* L.
Larger appendages 1–2 mm long, the distal pair up to 0.5 mm long; styles 0.7–1.5 mm long; seed with rounded ridges separated by deep sharp grooves. *E. indivisa* (Engelm.) Tidestr.
Proximal and distal appendages without marked disparity in size, sometimes very narrow or wanting; seeds various.
Appendages obsolete or very narrow, often asymmetric; seeds 0.7–0.9 mm long; small hairy annuals with serrulate leaves.[4]
Stems commonly pilose with yellow hairs; capsule well exserted from the cyathium; cyathia in headlike axillary clusters. [starved forms of] *E. hirta* L.
Stems commonly strigose-tomentulose; capsule partially included, distending the cyathium; cyathia solitary or few together. *E. thymifolia* L.
Appendages conspicuous (if rarely obsolete the capsule exserted and the seeds more than 1 mm long).[4]
Prostrate perennial with broadly ovate and usually entire leaves strongly flattened in one plane, the blades often white-margined and involute; cyathia in small terminal umbels; seed light reddish brown, 1.3 mm long, the facets with raised irregular ridges and tubercles. *E. umbellulata* Engelm.
Prostrate or ascending, at least the principal leaves markedly serrulate; cyathia solitary or in small clusters
Seeds nearly black, 1.2 mm long, the sides irregularly and weakly transversely rugose; branchlets pubescent in lines; capsule thinly but uniformly pilose. *E. feddemae* McVaugh.
Seeds grayish white to pinkish or reddish brown or dull brown.
Stems uniformly crisp-pubescent; perennial; seeds 0.8–1.2 mm long, quadrangular-ovoid, plump, usually smooth, gray to brown; capsule pilose or glabrate. *E. anychioides* Boiss.
Stems villous or hirsute (rarely glabrous); annuals; seeds various; capsule pilose especially on the angles near base.
Seeds light reddish brown, plump, ovoid, 0.7–0.8 mm long; stem hispid; cauline leaves toothed; branchlets capillary, glabrous, their leaves small and entire. *E. radioloides* Boiss.
Seeds grayish white to brown, rather narrow and tapering, 1.2–1.4 mm long, usually with small dark depressions or pits; stem and branches villous, without marked disparity in the leaves. *E. stictospora* Engelm.

A. Leaves entire.
Stem and main branches coarsely hispid; annual, with many capillary branches, the leaves of the branchlets linear or lance-oblong, entire, 1–4 mm long; cauline leaves 5–12 mm long, toothed. *E. radioloides* Boiss.
Plants glabrous or pubescent or shaggy-hirsute.
Capsule 3 mm long; appendages linguiform, (0.8–) 1.8–2 mm long; glabrous perennial with ovate leaves. *E. linguiformis* McVaugh.
Capsule 1.8 mm long or less; appendages up to 1 mm long or often much less.
Cyathia pubescent at least distally; prostrate perennials with approximate pairs of broadly ovate leaves 5–11 mm long.

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[4] Here should be sought also *Euphorbia puberula* Fernald, discovered in Jalisco too late for inclusion in the key. It is a robust, erect, much-branched weedy perennial (perhaps also annual) with inconspicuous or obsolete appendages, the branches and young leaves uniformly and rather densely pale-puberulent, the cyathia numerous in dense subcapitate clusters at the tips of short leafy branches, the capsules exserted, puberulent, the seeds grayish-pink, sharply quadrangular and irregularly transversely rugulose, about 1 mm long.

Cyathia in small terminal umbels. *E. umbellulata* Engelm.
Cyathia solitary or few together on short axillary branchlets. *E. chamaecaula* Weatherby.
Cyathia glabrous like the whole plant, axillary and solitary (or a few clustered toward the tips); prostrate annuals, the leaves 2–7 mm long.
Stipules forming a white glabrous scarious scale up to 1.2 mm long; appendages white, up to 0.5 mm wide. *E. serpens* HBK.
Stipules inconspicuous, distinct or united, triangular, ciliate; appendages none. *E. micromera* Boiss. ex Engelm.

11. Euphorbia anychioïdes Boiss. Cent. Euph. 12. Apr 1860

?E. pilosula Engelm. ex Boiss. in DC. Prodr. 15²: 39. Jan 1862.
E. rubida Greenm. Proc. Am. Acad. 39: 83. 1903.
E. chalicophila Weatherby, Proc. Am. Acad. 45: 426. 1910.

From field observation I judge that in western Mexico there is but one species of this description, namely an erect or ascending perennial with crisp-pubescent and often reddish stems, relatively large serrulate and pilose leaves, the capsule usually pilose, the seeds 0.8–1.2 mm long, quadrangular-ovoid, rather plump and coarsely cellular-coated, gray to pale or dark reddish brown. There is some variation in leaf-shape, in the amount of pubescence on the stems, and in the markings on the seeds.

Through the kindness of the authorities at the Gray Herbarium, I have compared a fragment of the type of *E. pilosula* [from Tiristiran, Michoacán (ca. 20 km w n w of Morelia), *Gregg 792*] and a fragment of the type of *E. anychioides* (from Villalpando, Guanajuato, *Méndez*) with the types of *E. rubida* and *E. chalicophila* (*Pringle 8673,* from Tultenango Canyon, E. de Mexico, and *Pringle 11846,* from Guadalajara, respectively). The seeds of *Pringle 8673* are a little more wrinkled than those of a modern collection from Jalisco (*McVaugh 17495,* from Cerro Gordo near Tepatitlán), but the two collections are otherwise nearly identical. In *Pringle 11846* the stems are a little more densely hairy, the leaves are narrower and the seeds are scarcely wrinkled. The identity of *E. pilosula* is questioned because the fragment at the Gray Herbarium lacks seeds.

12. Euphorbia apatzingana McVaugh, sp. nov. Fig. 24.

Annua, ramosa, adscendens vel erecta, ad 30 cm alta, caulibus ramisque exigue pilosis, ramulis florentibus glabris vel subglabris; folia opposita, oblonga ovata subrotundave, vel summa lanceolata, omnia apice obtusa vel rotundata, basi inaequilateralia, cordata vel rotundata, utroque latere fere usque ad basin serrata; caulum folia 1.1–1.8 cm. longa, 6–8 mm lata, ramulorum 7–10 mm longa, 3–6 mm lata; petioli 0.5–1.5 mm longi; stipulae plerumque coalitae, scariosae, anguste triangulares, ciliato-laciniatae et saepe anguste lobatae; cymae ad ramulorum furcatorum apicem corymbulosae, cyathiis brevipedunculatis paucis (usque ad 15) bracteatis; involucra 1 mm longa, lobis angustis triangularibus, glandulas rotundas stipitatas superantibus; appendicibus albis vel rubellis, lunatis vel late flabellatis, speciosis, quam glandulis 3–4-plo latioribus; flores ♂ ca. 10; capsula glabra, 3-lobata, late ovoidea, infra medium latior, 1.7 mm longa; styli 0.7–0.9 mm longi, basi paulum coaliti, ad medium bipartiti; semina ovoideo-tetragona, 1.1–1.3 mm longa, obtuse angulata, rubella, pallida, ad facies lacunis concavis brevibus et jugis humilibus latis obsita.

MICHOACAN: Old lava flows 4 miles n w of Apatzingán, elevation 300 m. 16 Sep 1958, *McVaugh 17911* (MICH, type).

A specimen from the mountains near Ahuacatlán, Nayarit *(McVaugh & Koelz 775)*, would key out here but perhaps represents an undescribed species. The plant is a shrub 1 m high, weak, glabrous, the cyathia in terminal clusters,

the stipules (unique in my experience) distinct but with very short body terminated by about 5 erect subulate lobes to 0.7 mm long, the whole forming a short fringe across the node; capsule less than 1.5 mm long; styles 1–1.3 mm long; seeds about as in *apatzingana*.

For an additional note on this species see below under *E. feddemae*.

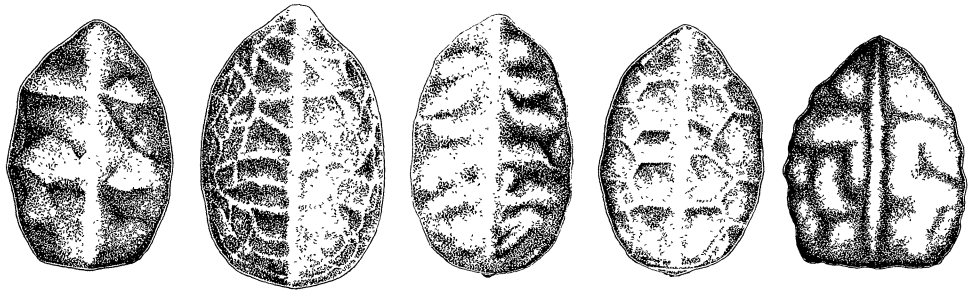


FIG. 24. Seeds of *Euphorbia*, subgenus *Chamaesyce*, dorsal views, ×30. Left to right: *E. hyssopifolia* (*Skutch 5359*); *E. maculata* (*Nash 2519*); *E. feddemae* (type); *E. apatzingana* (type); *E. perlignea* (type).

13. Euphorbia feddemae McVaugh, sp. nov. Fig. 24.

Annua, ad 40 cm alta, caulibus ramisque lineatim multifarie plerumque pubescentibus; folia opposita, oblonga oblongo-ovata oblongo-lanceolatave, 8–15 mm longa, glabra vel rarissime longipilosa, apice obtusa subacutave, basi cordata vel inaequilateralia (latere superiori rotundato, inferiori prolongato et auriculato), ambitu prope apicem latere superiori (brevi) serrulata, inferiori fere ad basin; petioli 0.5–1.5 mm longi; stipulae triangulares, coalitae, 1 mm longae (superiores nonnunquam distinctae); cyathia plerumque in dichotomiis superioribus solitaria; glandulae minutae, stipitatae, quam appendicibus 0.2 mm latis duplo angustiores; capsula sparse aequabiliterque pilis debilibus erectis hyalinis 0.5 mm longis obsita, 3-lobata, 1.5–1.7 mm longa lataque; styli 0.6–0.8 mm longi, ad medium vel ultra bifidi; semina prope nigra, oblongo-tetragona angulis acutis, 1.2 mm longa, ad facies irregulariter obscureque transverse rugulosa.

MICHOACAN: Cerro Santa María, in grassland with occasional shrubs, 5 km n e of Quitupan, Jalisco, elevation ca. 2000 m, 5–7 Aug 1959, *Charles Feddema 78* (MICH, type), *110*.

The type-collection consists of 12 plants, of which one has the capsules completely glabrous; the others are pilose.

This species and the preceding belong to a group of stout erect rather large-leaved weedy annuals that includes *E. maculata* L., *E. hypericifolia* L., *E. hyssopifolia* L., and *E. glomerifera* (Millsp.) L. C. Wheeler. It may seem premature to describe two additional species in a complex already in need of careful study and revision. I am inclined to agree with Wheeler, after study of Jalisco material, that the most useful distinguishing characteristics in the group are those of the capsules, seeds and vestiture. In our area *E. glomerifera* seems to be rare; the type-collection of *E. apatzingana* was originally referred to *E. glomerifera*, from which it differs in the considerably larger capsules, seeds and styles. A species not found further west than Michoacán, but well known in southern Mexico, is *E. hypericifolia* (*E. lasiocarpa*

Kl.), readily identified by the densely pubescent ovary and capsule. Not common in our area is *E. maculata* (sensu Wheeler in Rhodora 43: 143. 1941), which is primarily a plant of eastern North America, ranging westward in southern Mexico beyond the edge of the central plateau [e.g. to León, Guanajuato, *Hartweg 32* (GH); Coalcomán, Michoacán, *Hinton* (GH)]. Far more common in the Jalisco region is *E. hyssopifolia,* from which *E. maculata* is usually readily distinguishable by the young branchlets which are rather thickly pubescent along the inner (adaxial) side and by the finely rippled surface of the seeds. Occasional specimens of *E. hyssopifolia,* however, are somewhat pubescent on the young branchlets, and some otherwise typical plants (i.e. with glabrous branchlets and narrow leaves) have the rippled seeds of *E. maculata* (e.g. *Feddema 706* from Santa María del Oro). The two species ordinarily cannot be distinguished by the leaves alone; narrow-leaved plants (with blades 3–5 mm wide, 3–4 cm long) are not exceptional in *E. hyssopifolia,* but are less frequent than those with oblong leaves up to 1–1.5 cm wide.

From *E. maculata* the newly described *E. feddemae* is distinguished by the more abundant pilosity, the smaller capsules, more sharply angled and more coarsely marked seeds. From *E. hyssopifolia* it is distinguished by the characters of the seeds as indicated in the key above.

14. Euphorbia floribunda Engelm. ex Boiss. in DC. Prodr. 15^2: 39. 1862.

This plant apparently has not been found since the original collection near Guadalajara in May, 1849 (*Gregg 856*). A fragment of the type-material (No. 856c) is in the Gray Herbarium. In appearance it somewhat suggests a glabrous individual of *E. stictospora,* but with very short internodes. The leaves are pointed, obscurely but definitely serrulate, apparently somewhat coriaceous; the stipules are united and conspicuous; the appendages of the glands are large and broad; the immature capsule is widest below the middle.

According to Boissier the species is perennial, glabrous and glaucous, the styles are short, two-parted and clavate at the apex, the capsule ovate and its cocci acutely keeled; the seed linear-oblong, acutely quadrangular and rugulose-scrobiculate.

15. Euphorbia linguiformis McVaugh, sp. nov. Figs. 16–18.

Perennis, glabra, "procumbens" [ex Hinton], caulibus pluribus ad 20 cm longis, e radice erecta lignosa oriundis; folia ovata, integra, 8–13 mm longa, 4–9 mm lata, acuta vel inferiora obtusa, omnia basi inaequaliter cordata (uno latere rotundato tantum, breviore), marginibus involutis; petioli 1–1.5 mm longi; stipulae scariosae, coalitae vel distinctae, triangulares vel apice obtusae, laciniatae, ad 1.5 mm longae lataeque; cyathia terminalia solitaria, pedunculis 2–7 mm longis; involucrum 2 mm longum, intus ad marginem pilosum, lobis deltoideis, 0.5–0.6 mm longis, eorum margines scariosae laciniatae, et costa viridis; glandulae transverse ellipticae obovataeve, 0.5–0.7 mm latae, appendicibus linguiformibus, infra glandulam angustatis, 0.6–1 mm latis, (0.8–) 1.8–2 mm longis; flores ♂ ca. 50, fasciculis distinctis coaliti; apices bracteolarum pilosi, in partes filiformes divisi; capsula 3 mm longa, acute 3-lobata, latior quam longior, parte latiore infra medium; styli 0.8–1 mm longi, ad medium bipartiti; semina 2 mm longa, laevia, cineracea, trigona (facie ventrali plana), basi truncata, 1.2 mm lata, lateribus ad apicem pyramidalem angustatis.

MICHOACAN: [Open deciduous] woodlands, Apatzingán, elevation 300 m, 14 Aug 1938, *Hinton 12014* (MICH, type; US).

15a. Euphorbia paludicola McVaugh, sp. nov. Fig. 37.

Herba perennis 50–70 cm alta rhizomata, caulibus erectis tenuibus mul-

toties ramosis vel dichotomis inferne glabris, superne sparse pilosis, pilis appressis vel adscendentibus, acutis, subflavis, usque ad 0.6 mm longis; folia opposita, valde asymmetrica, integra vel sinuosa vel vix denticulata, oblongo-lanceolata vel -elliptica, (10–) 15–32 mm longa, 5–12 mm lata, apice obtusa vel rotundata, basi unilateraliter rotundata, margine altero latere fere recto; petiolis 1–2 mm longis; stipulis distinctis subulatis, juventute fimbriato-ciliatis, 1–1.5 mm longis; cymulae 2 subcapitatae terminales brevipedunculatae, pedunculis 1–10 (–40) mm longis parvibracteatis, cyathiis numerosis congestis; involucra anguste infundibuliformia, base attenuata vel paululum in pedicellum contracta, 1–1.5 mm longa, 0.6–0.9 mm lata, glandulis stipitatis (3–) 4 instructa; glandulae transverse ellipticae, apice concavae, ut videtur infra medium appendicum albarum lateraliter insertae; appendices albae spatulatae subpatentes, basi angustatae, cum stipite 1–1.2 mm longae, lamina 0.3–0.5 mm lata; involucri lobi oblongi, fimbriati, glandulas plus minusve aequantes; flores ♂ 7–10; gynophorium glabrum, breviexsertum, recurvatum; capsula 3-lobata, 1.5–1.8 mm longa, 2–2.2 mm lata, infra medium latior, sulcis exceptis pilosa. pilis flaccidis subflavis; styli 0.5–0.7 mm longi subcapitati bifidi; semina ovoideo-quadrangulata, 1.1–1.3 mm longa, fusco- vel rufo-livida, ventraliter obtuse angulata, dorsaliter carinata, faciebus dorsalibus convexis, rugulis anastomosantibus obscure reticulatis.

Flowering stems few or several from the sparingly branched slender black rhizomes 1–2 mm thick, 20–30 cm long; leafy stems up to 1–1.5 mm thick, with few nodes and very long (5–10 cm) internodes; inflorescence moderately pilose; leaves glaucous and sparingly pilose beneath, glabrous above, almost all on each plant with a few small teeth at east near the tip; inflorescence usually sessile or nearly so at the terminal node, sometimes on a leafy peduncle, rarely at the penultimate node also.

In permanently inundated marshes, in shallow water with *Scirpus, Eleocharis, Juncus, Escobedia, Canna, Leersia,* erect among other herbs, at elevations of 1000–1400 meters.

NAYARIT: Near La Labor, ca. 15 miles s e of Tepic, 25 Sep 1960, *McVaugh 19407* (MICH). JALISCO: 7 miles n of Unión de Tula, 5 Nov 1960, *McVaugh 20739* (MICH, type).

This species somewhat suggests a sparingly pubescent form of *Euphorbia hirta,* with which it is associated in the key. It differs sufficiently from this and other species in its rhizomatous habit, its habitat so unlike that of most species of Subg. *Chamaesyce,* and in the features noted in the key. The seeds themselves serve readily to distinguish this species from *E. hirta;* in the latter they are uniformly and narrowly oblong-quadrangular, less than 1 mm long, and in color light reddish- or pinkish-brown. In *E. paludicola* they are ovoid, acute, more than 1 mm long; as seen in mass they are dark gray, but as seen individually under higher magnification they may be faintly reddish-gray.

16. **Euphorbia perlignea** McVaugh, sp. nov. Fig. 23, above; fig. 24.

Frutex invalidus ad 1–2 mm longus, caulibus diametro ad 1 cm; caules aequabiliter crispo-pubescentes; folia aequabiliter sed saepe sparse strigosa, glabrata; laminae oblongae, ellipticae, ovatae obovataeve, 1.5–2.5 cm longae, 8–13 mm latae, ramulorum juvenilium saepe minores, aut angustiores aut breviores et subrotundae; folia apice acuta vel rotundata, basi rotundata vel semicordata (inaequilateralia), ambitu utroque latere fere ad basin serrulata, dentibus lateris longioris (cordati) manifestioribus; petioli 1–2 mm longi; stipulae (plerumque) distinctae, nonnunquam coalitae, pallide brunneae, anguste triangulares, 0.5–0.8 mm longae, basi saepe induratae et multilobatae; cyathia

solitaria vel in cymis parvis bracteatis; involucrum 1.5 mm longum, urceolatum, basi rotundatum, extus ad marginem pilosum, pedunculo 2–3 mm longo instructum; bracteolis tenuilobatis apice piloso-cristatis; lobis late deltoideis, cum glandulis ellipticis sessilibus viridibus ca. aequilongis, appendicibus integris, albis vel dilute rubidis (puniceis), ad 0.4 mm latis, quam glandulis duplo vel ultra latioribus; floribus ♂ ca. 20; capsula glabra, 1.5 mm longa, ca. 2 mm lata, valde 3-lobata lobis acutis, infra medium latior; styli 0.7–1.2 mm longi, basi vix coaliti, ultra medium bipartiti; semina 0.8–1 mm longa, ovoideo-tetragona, basi truncata, puniceo-albida vel rubella, obscure scrobiculata vel valde transverse jugata.

Deciduous forest with *Astronium, Brosimum, Jacaratia, Bursera simaruba, Tabebuia,* on shaded hills, at elevations up to 200 meters.

JALISCO: Playa de Cuastecomate, 8 km n w of Navidad, 11 Dec 1959, *McVaugh & Koelz 1701* (MICH). COLIMA: 7 miles n of Santiago, road to Durazno, Jalisco, 30 Jul 1957, *McVaugh 15905* (MICH), 10 Dec 1959, *McVaugh & Koelz 1670* (MICH, type); Manzanillo, *Palmer 924* in 1890 (GH, US).

The principal leaves in this species resemble those of the group of erect annual species that are discussed above (*E. maculata, hyssopifolia,* etc.). The present species, however, seems to be a member of the deciduous woodland community rather than a weed of clearings or of cultivation. The plants are real shrubs, a feature that marks them as unusual in Mexico where most of the species of *Chamaesyce* are strictly herbaceous. The so-called annuals like *E. hyssopifolia* may on occasion persist in the tropics for two or more years and develop some woody tissues in the stems, but ordinarily the plants remain primarily herbaceous. Detached specimens of *E. perlignea* may be recognized at once by the combination of pubescent stems, pilose or strigose leaves, glabrous capsule and reddish scrobiculate or ridged seeds.

17. **Euphorbia stictospora** Engelm. in Emory, U.S. & Mex. Bound. Surv. 2[1]: 187. 1859.

?E. mendezii Boiss. Cent. Euph. 15. Apr 1860.

?E. interaxillaris Fern. Proc. Am. Acad. **36**: 495. 1901.

Plants of this alliance appear to be in need of taxonomic study in southern and southwestern Mexico. Specimens from near the southern end of the Mexican Plateau are sometimes more conspicuously villous than those from northern Mexico and the United States, and the seeds may be only indistinctly pitted and scarcely ridged, but the plants look otherwise like typical *E. stictospora.* Typical *stictospora,* with short undivided styles and markedly villous herbage and capsules, is known from our area (*McVaugh 16638*). The plant described as *E. mendezii* Boiss. is vegetatively similar and has the pale narrow and characteristically punctate-pitted seeds of *E. stictospora,* but the styles are twice as long (0.4 mm) as in *stictospora* and are bifid nearly one-half their length. I have seen a fragment of an isotype (León, *Méndez,* GH). A relatively non-pubescent and sparsely flowered plant with similar seeds, but styles like those of *E. mendezii,* is *E. interaxillaris,* based on *Deam 25,* collected 3 July 1900 at Puente de Ixtla, Morelos (GH). A collection from near Guadalajara, *McVaugh & Koelz 306,* is moderately hairy, has the styles of *E. mendezii* and seeds that seem exactly like those of authentic specimens of *E. stictospora* from further north. This last collection is a little more hairy and more floriferous than the type of *E. interaxillaris.*

Perhaps related is *E. chamaecaula* Weatherby (Proc. Am. Acad. **45**: 427. 1910), based on *Pringle 11848* from plains near Guadalajara (GH). The plant is apparently a prostrate perennial that combines some features of *E.*

umbellulata Engelm. with others that suggest *E. stictospora.* The habit and the approximate pairs of ovate, nearly entire and involute leaves suggest *E. umbellulata.* The pilose leaves, the nearly glabrous herbage, the few hairs on the basal angles of the ovary, and the axillary rather than terminal inflorescence suggest *E. stictospora.* Apparently this plant has not been recollected.

18. Euphorbia serpyllifolia Pers. Syn. Pl. **2**: 14. 1806.

JALISCO: In grassland 14 miles s w of Lagos de Moreno, elevation ca. 1900 m, 19 Aug 1959, *U. T. Waterfall 15657* (MICH).

This species seems to be little known in Mexico, except from the arid northern states. Wheeler (Rhodora **43**: 233. 1941) cited specimens from near the city of Durango and from San Juan del Río, Querétaro. Waterfall's specimens are glabrous, with oblong or broadly elliptic obtuse leaves which are rather prominently toothed near the tips, with attenuate few-parted distinct stipules, and with narrow quadrangular brown seeds suggesting in shape those of *E. stictospora.* Additional localities for this species are to be sought in the high grasslands of the Plateau.

GARCIA

A genus of one or two species, known from eastern Mexico, Central America, the West Indies and northern South America. Standley (Contr. U. S. Nat. Herb. **23**: 620. 1923) reported *G. nutans* as occurring in Mexico in "Sinaloa and Tepic and probably elsewhere." This was based on specimens in the U. S. National Herbarium; the report from "Tepic" [i.e. Territory of Tepic, now Nayarit] was based on specimens from the Tres Marías. According to the most recent revision of *Garcia,* that by C. L. Lundell (Wrightia **1**: 1–12. 1945), *G. nutans* is found as a native plant in eastern Mexico only (San Luis Potosí and probably Veracruz). It is therefore of interest to note a locality in western Mexico where the plant appears to be indigenous, and where it occurs in abundance.

1. Garcia nutans Rohr, Skrivt. Naturh. Selsk. (Kjoebnhavn) **2**: 217. *pl. 9.* 1792.

JALISCO: Bahía de Tenacatita, near La Manzanilla, at and near sea-level, an under-story tree in the *Orbignya* forest and weedy in clearings, 11 Nov 1960, *McVaugh 20975* (MICH).

GYMNANTHES

This small and mostly West Indian genus was reviewed by Pax [Pflanzenreich IV.147.v (Heft **52**): 81–88. 1912], who reported one species from Yucatán and three additional species from the mainland of Mexico (Veracruz–San Luis Potosí region). Standley (Contr. U.S. Nat. Herb. **23**: 647. 1923) followed Pax but suggested that the three mainland species "are closely related and it is doubtful whether they are distinct". If they are to be combined, the oldest name is *G. riparia* (Schlecht.) Klotzsch. For the present, I retain the name *G. actinostemoides* for the plant reported below, as my specimens have the coriaceous and inconspicuously veined leaves suggested by Pax as a criterion. As far as I can learn this genus has not been reported from western Mexico. The tree is an occasional but apparently not excessively rare constituent of the *barranca* forests in the pine-covered mountains of southern Jalisco.

1. Gymnanthes actinostemoides Muell. Arg. Linnaea **32**: 103. 1863.

A large tree up to 12–15 m high, flowering August–September and fruiting November–December.

JALISCO: Sierra del Halo s w of Tecalitlán, at elevations of 1750–2000 m, *McVaugh 16202, McVaugh & Koelz 1259;* 12–15 miles s s e of Autlán, above Ahuacapán, *McVaugh & Koelz 935.*

MABEA

A genus of about 30 species, chiefly South American, reviewed by Pax and Hoffmann [Pflanzenreich IV. 147. v (Heft **52**): 26–42. 1912] with the note that the species are much alike and difficult of determination. The following is the only species known from western Mexico; apparently it has not previously been reported from west of the Isthmus of Tehuantepec.

1. Mabea occidentalis Benth. in Hook. Journ. Bot. **6**: 364. 1854.

In our area known from but a single collection; said by the collector to be a shrub up to 3 m tall, with the vernacular name *zarcillo*.

NAYARIT: Singaita, n e of San Blas, [near sea-level], 5 Jan 1944, in fruit, *E. Hernández X. 135* (MICH).

MANIHOT

This genus was reviewed by Pax [Pflanzenreich IV.147.II (Heft **44**): 21–99. 1910]. Most of the species in western Mexico were poorly known to Pax, or have been discovered since his revision of the genus. A paper by Leon Croizat (Jour. Arnold Arb. **23**: 216–225. 1942) is entitled "A study of *Manihot* in North America", but is not a general revision.

In the Jalisco region *Manihot* is the least known taxonomically and the least well understood of any of the large genera of the Euphorbiaceae. The plants are fleshy and difficult to dry, hence are unattractive to collectors and make poor specimens unless special care is taken. The ♀ flowers are evanescent and are seldom collected. The ♂ flowers differ relatively little from one species to another. Flowers and fruit are seldom found together on the same plant. Almost all the species are superficially similar in vegetative characters. Collectors should be urged to take specimens of any *Manihot* that is encountered, but especially of fruiting plants.

Branchlets tomentulose.
- Leaves 3-lobed; ♂ calyx more than 1 cm long.
  - Calyx 2 cm long, glabrous without; Colima. *M. crassisepala* Pax & Hoffm.
  - Calyx 1.3 cm long, whitish-tomentose without; Guerrero. *M. foetida* (HBK.) Pohl.
- Principal leaves 5-lobed; ♂ calyx 8–9 mm long; Colima-Jalisco border. *M. michaelis* McVaugh.

Branchlets glabrous, the whole plant glabrous except a tuft at the junction of the foliar veins.
- Lobes of the leaves 3–5 (–7), abruptly caudate-acuminate with hairlike tips 0.5–2 cm long; a tree 4–5 m high; seeds 12–15 mm long *M. caudata* Greenm.
- Lobes at most with bristle-tips 2 mm long or less, these mostly inconspicuous.
  - ♂ calyx 17–18 mm long, the lobes broadly cordate, 7–10 mm wide at base, the basal margins forming flaring projecting auricles; tree to 6 m high; leaves with 3 principal entire mostly elliptic lobes 2–5.5 cm wide and often 2 smaller backwardly directed asymmetrical lobes. *M. auriculata* McVaugh.
  - Lobes of the ♂ calyx mostly ovate-triangular, 3–5.5 mm wide, the bases not auriculate; habit various; principal lobes of the leaves, if 3 only, not broad and entire.
    - Inflorescence a leafless panicle with up to 15–25 ascending racemes; lobes of the leaf mostly 7–9, entire, acute to attenuate or acuminate, 2.5–3.5 cm wide; a tree to 8 m high. *M. olfersiana* Pax.
    - Inflorescence a single raceme (the lower flower-bearing branches sometimes with 2–3 flowers); lobes of the leaf, if entire (i.e. not lobulate) then 2 cm wide or less.
      - Lobes usually 7, linear or nearly so, often 10–17 cm long, attenuate, entire or with a pair of small acute falcate lobes; blades narrowly peltate; seeds 6 mm long; trailing or reclining shrubs 1–2 m long. *M. microcarpa* Muell. Arg.
      - Lobes broader or, if linear, the principal ones 5 only and the blades not peltate; seeds 8 mm long or more.
        - Leaves peltate up to 1 cm or more; lobes obovate or pandurate-lobulate,

their tips relatively broad and rounded, sometimes short-acuminate; small or large trees; seeds 14–20 mm long. *M. tomatophylla* Standl.

Leaves not peltate or, if narrowly so, the lobes markedly narrowed to the apex.

Lobes usually 7, entire and narrowly elliptic or oblanceolate, to pandurate-lobulate; stipules 2–3 mm long; erect shrub, or treelike, 1–4 m high; seeds 9 mm long; petioles 6–12 cm long, often about as long as the blades. *M. intermedia* Weatherby.

Lobes usually 5, entire or lobulate; shrubs or half-shrubs with weak trailing or reclining stems; petioles 3–6 (–9) cm long, often much shorter than the blades.

Lobes usually broadest at or below the middle and tapering to the apex; seeds 8–10 mm long.

Lobes mostly rhombic or ovate, entire or with coarse rounded lobules, acute or acuminate. *M. rhomboidea* Muell. Arg.

Lobes mostly lanceolate, with 1 pair of mostly falcate ascending lobes below the middle, thence long-attenuate to the tip. *M. angustiloba* (Torr.) Muell. Arg.

Lobes oblong-pandurate, if lobed usually abruptly dilated near the tips and often with 1–2 additional pairs of lobules at or below the middle; stipules minute; seeds 12–14 mm long. *M. chlorosticta* Standl. & Goldm.

1. Manihot angustiloba (Torr.) Muell. Arg. in DC. Prodr. **15**^{2}: 1073. 1866.

Janipha manihot var. *angustiloba* Torr. in Emory, U.S. & Mex. Bound. Surv. 2^1: 199. 1859.

M. mexicana I. M. Johnst. Contr. Gray Herb. **68**: 90. 1923.

This species, widely distributed at middle and low elevations about the Mexican Plateau and north into Arizona, is a weak shrub 1–2 m high with 5-lobed leaves, the central foliar lobes lanceolate, attenuate, broadest below the middle, with a strong tendency toward the development of falcate ascending lobules. Width of lobes and leaf-size in general are extremely variable even on the same plant. Johnston stated that *M. mexicana* was to be distinguished by its "southerly range, smaller bicolored leaves, more slender commonly purplish stems, and smaller less roughened fruit"; the type was from Zapotlán, Jalisco, *Goldsmith 120*. The characters described by Johnston are individually

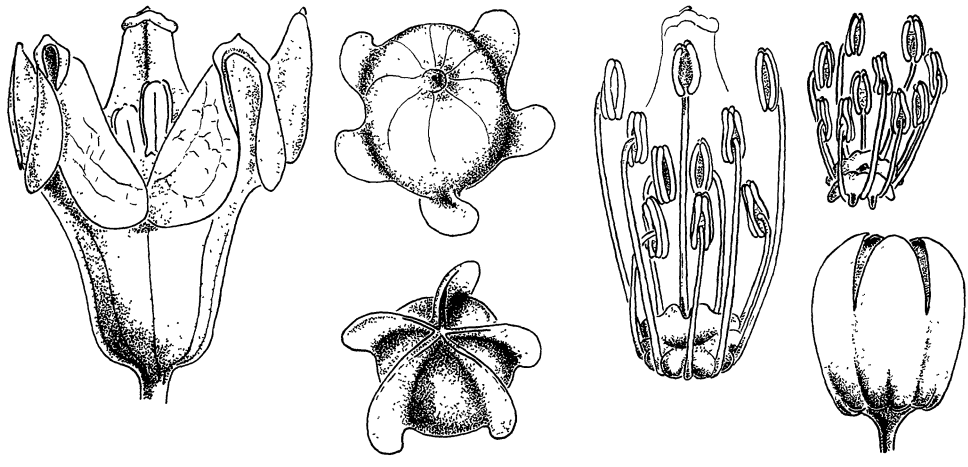


FIG. 25. Flowers of *Manihot*, ×2.5, from the types. Left, *M. auriculata* (♂ flower, bottom and top views of a ♂ bud, androecium). Right, *M. michaelis*, androecium and ♂ flower.

weak, and it is doubtful that any one of them is consistent.

From *M. microcarpa,* linear-lobed forms of *M. angustiloba* may usually be distinguished, even in the sterile condition, by the 5 (rather than 7)-lobed leaves which are not at all peltate.

2. Manihot auriculata McVaugh, sp. nov. Fig. 25, left; fig. 26.

Arbor glabra 6 m alta, 6 cm diametro, ramis longis debiliter porrectis; folia fere ad basin 5-lobata, angustissime peltata (etiam foliis maximis vix 1 mm); laminae 8–16 cm longae, 8–22 (–27) cm latae, lobis centralibus 3 integris sinuatis ellipticis, oblongis obovatisve, 2–5.5 cm latis, 5–14 cm longis, basi 8–20 mm latis sinibus angustis, apice anguste acuminatis, in setam 1–2 mm longam desinentibus; lobae infimae plusminusve reflexae, 2–8 cm longae, saepe falcatae inaequalesque, lobis centralibus duplo breviores; petioli ad 17 cm longi, saepe laminis longiores; stipulae ad 2.5 mm longae, lobulis angustis adscendentibus; racemus (4–) 6–16 cm longus, prope basin floribus ♀ 1–3 (tempore anthesis non vidi), pedicellis 3–6 (–10) mm longis; flores ♂ ad 40, flavi ["clear pale yellow"], campanulati, 17–18 mm longi, calycis lobis patentibus late cordatis, late obtuseque acutatis breviacuminatisque, 7–8 mm longis, 7–10 mm latis, loborum vicinorum marginibus basilaribus paulum coalitis et ad calycis medium auriculas eminentes efficientibus; alabastra valde longitudinaliter 5-jugata et lateribus auriculatis; filamenta majora calycis lobis opposita, 13 mm longa; filamenta filiformia 8–9 mm longa; antherae 3–3.5 mm longae; glandula annularis, 10-dentata, 3–3.5 mm lata; fructus et semina ignoti.

NAYARIT: Mirador del Aguila, 14 miles n w of Tepic, on lower slopes of a steep rocky barranca with *Ficus, Ceiba, Inga, Euphorbia pulcherrima,* at an elevation of 450–500 m, 10 Jul 1957, *McVaugh 15283* (MICH, type).

3. Manihot michaelis McVaugh, sp. nov. Fig. 25, right; fig. 27.

Arbor tenuis 5 m alta, inflorescentia ramulisque arachnoideo-tomentosis, dealbatis vel fulvescentibus; folia 5-lobata vel parviora 3-lobata, anguste peltata (foliis majoribus 3–4 mm), glabra vel praecipue juvenilia arachnoideo-villosa, subtus glauca; laminae 7–9 (–12.5) cm longae, 9–12 (–19) cm latae, lobis oblongis ellipticis obovatisve, integris, rotundatis vel late acutis, plerumque mucronatis vel breviacuminatis, se ad folii basin distantiae dodrans extendentibus; lobus centralis 2.5–5 cm latus, 4–10 cm longus, basi 8–16 mm latus, sinibus angustis; lobi infimi patentes vel paulum reflexi; petioli 6–17 cm longi, superne arachnoideo-villosi, laminis saepe satis longiores; stipulae triangulares, 4 mm longae, basi 1.5 mm latae, chartaceae, mox deciduae; panicula angusta 10–12 cm longa, saepe ramo axillari superata et primo aspectu ut videtur supra-axillaris, ramis praecipuis 2–5 cm longis, paucifloris, bracteis parvis scariosis instructis; flores ♂ campanulati, extus sparse puberulentes, flavi, 8–9 mm longi, lobis rotundato-deltoideis 4–5 mm longis, pedicellis 2–4 mm longis; calyx intus utroque latere loborum costae lacuna concava instructus; filamenta majora calycis lobis opposita, 8 mm longa; filamenta filiformia 5 mm longa, antherae 2 mm longae; glandula flava, disciformis, 3.5–4 mm diametro, lobulis 5 praecipuis ad medium bipartitis, cum calycis lobis alternantibus; flores ♀, fructus et semina ignoti.

Species filio carissimo Michael Rogers McVaugh (1938–), qui mecum aetate anni 1957 plantas jaliscenses collectavit, dicavi.

In barranca-forests, with *Astronium* and *Brosimum,* at an elevation of about 300 m, flowering in July.

COLIMA: Colima, 2 Jul 1892, *M. E. Jones 127* (US); near the bridge of Río Tuxpan ca. 18 road-miles e of Colima, 17 Jul 1957, *McVaugh 15502* (MICH, type).

4. Manihot microcarpa Muell. Arg. Flora **55**: 42. 1872.

M. parvicocca Croizat, Jour. Arnold Arb. **23**: 219. 1942.

A trailing or weak-stemmed shrub with branches 1–2 m long, widely distributed at middle and lower elevations in western Mexico from southern Nayarit to Guerrero, Chiapas and Central America. It is readily recognized by the 7–9 nearly linear and nearly entire attenuate lobes of the narrowly peltate leaf-blades.

Croizat did not compare his *M. parvicocca* with *M. microcarpa,* but suggested that the latter might be related to *M. rubricaulis* Johnst. A photograph of the type of *M. microcarpa,* however (Field Mus. Neg. 19508), evidently rep-

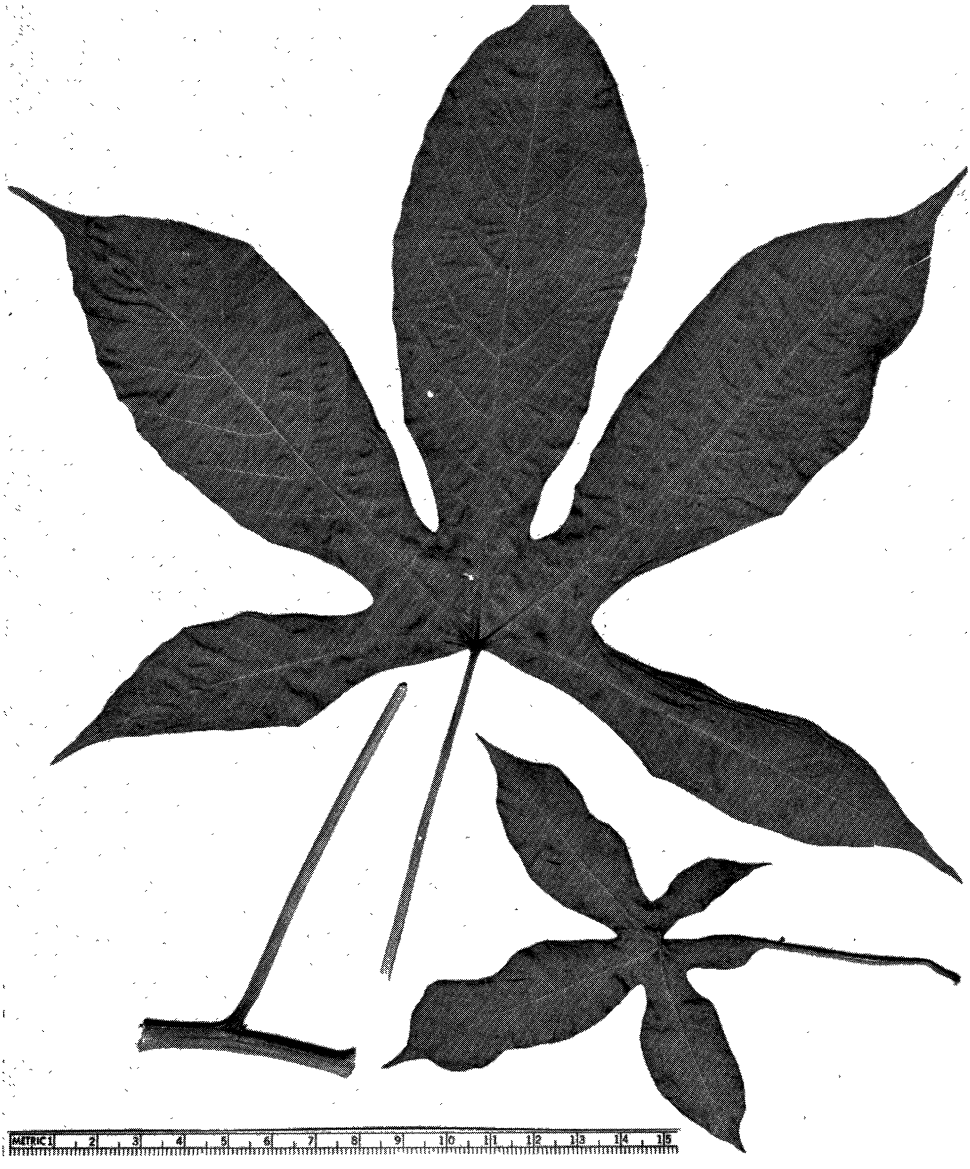


FIG. 26. *Manihot auriculata.* Leaves, from the type.

resents the same species as the type of *M. parvicocca* (*Matuda 1665*, isotype at MICH).

FIG. 27. *Manihot michaelis*. Leaves, from the type.

5. Manihot olfersiana Pax, Pflanzenreich IV.147.II (Heft **44**): 55. 1910.

A glabrous tree up to 8 m high, the trunk 10 cm thick, the leaves divided nearly to the base into 7–9 entire elliptic or oblanceolate bristle-pointed lobes up to 12–14 cm long; inflorescence a leafless panicle 15–25 cm long with 15–25 or more ascending racemes; bracts subulate-lanceolate, 1–3 mm long; flowers numerous, pendulous, the ♂ ones open-campanulate, 10–12 mm long.

This seems to be a native plant in western Mexico, from Sinaloa to western Michoacán, in the lowlands. Near Las Varas, Nayarit, at an elevation of 60–90 m, it is a plant of dry arroyos, associated with species of *Acacia, Coccoloba, Randia,* and *Cnidoscolus,* flowering 12 Jul 1957 (*McVaugh 15355*).

A specimen from Coalcomán, Michoacán, *Hinton 13972,* has been identified at Kew, and also by Croizat, as *M. aesculifolia* (HBK.) Pohl. If the latter species is characterized by glanduliform bracts and by a ♂ calyx 18 mm long, as stated by Pax, it seems unlikely that the plant of western Mexico is correctly referred to *M. aesculifolia.* It is, however, only doubtfully referred to *M. olfersiana,* although it may be traced immediately to that species in Pax's key. Pax makes no mention of the many-flowered panicle, describing the inflorescence as a raceme; he states also that the leaves are 5- to 7-parted, whereas in my material they are mostly 7- or 9-parted.

PHYLLANTHUS

In continental North America there are relatively few species of this very large pantropical genus. There has been no revision of the North American species since the treatment by Mueller Argoviensis in the *Prodromus* in 1866. Many helpful data pertaining to the Mexican species, however, are to be found in the recent papers on West Indian species by Grady L. Webster (Jour. Arnold Arb. **37–39,** 1956–58). I am also greatly indebted to Dr. Webster for a number of pertinent suggestions with respect to the species discussed below. In the following key *Margaritaria nobilis,* often regarded as a species of *Phyllanthus,* is included for comparison. The species inclosed in square brackets [thus] in the key are widely distributed tropical weedy annuals that may be expected to occur in western Mexico but are not well known there.

Plants annual or essentially so, the stems soft and herbaceous throughout; leaves less than 1.5 cm long, most of them less than 1 cm and of an oblong or narrowly ovate type; ♀ calyx 2.5 mm long or less.
- Calyx-lobes 5 in flowers of both sexes; stamens 3.
  - Leaves oblique at the base; filaments 0.6–0.9 mm long; styles ascending and arching. [*P. niruri* L.]
  - Leaves scarcely if at all oblique at base; filaments 0.2–0.4 mm long; styles various.
    - Seeds 1.1–1.3 mm long, with about 9–12 very delicate scarcely raised longitudinal striae; cymules unisexual. [*P. stipulatus* (Raf.) Webster]
    - Seeds 0.9–1 mm long, with 5–7 longitudinal ribs; cymules bisexual, each with 1 ♀ and 1 ♂ flower. *P. amarus* Schum. & Thonn.
- Calyx lobes 6 in the ♀ flowers, 4 or 6 in the ♂; stamens 2 or 3; styles various.
  - ♂ sepals 4; anthers 2, semi-circular or horseshoe-shaped; styles ascending, capitate; ♀ disk saucer-shaped, crenulate. *P. standleyi* McVaugh.
  - ♂ sepals 6; anthers 3, reniform; styles horizontal, appressed, with slender recurved tips; ♀ disk with 3 pairs of finger-like lobes. *P. hexadactylus* McVaugh.

Trees or shrubs or woody-based perennials, if low the stems hard and woody below; leaves often 2 cm long or more or, if shorter, often broadly ovate to suborbicular.
- Calyx-lobes 4; stamens 4, distinct; dioecious trees 7–15 m high or large shrubs.
  - Flowers mostly in fascicles in the axils of foliage leaves on ordinary leafy branches (sometimes on short spurlike leafless branches); styles and carpels usually 4; fruit at first fleshy, finally irregularly (not elastically) dehiscent by ruptures of the papery endocarp; seeds with dark blue fleshy outer coat; stamens 0.6–1 mm long, arising from the floral disk. *Margaritaria nobilis* L.f.

Flowers on slender naked branches from old leafless twigs, never on leafy branches of the current year; styles and carpels 3 (or 2); fruit indehiscent, dry and woody, the outer layer soft and pithy; seeds smooth, dry, with pale brown or stramineous brittle testa; stamens 0.1–0.25 mm long; disk none. *P. elsiae* Urb.

Calyx lobes 6; stamens 2 or 3, often united into a column; habit various; monoecious as far as known.

Inflorescence a many-flowered panicle, the panicles in the lower axils large and mostly or entirely ♂, those near the tips of the branches shorter with 1 or more ♀ flowers; foliage leaves often 5–10 (–20) cm long and stipules 5–7 (–16) mm long; fruit inflated and somewhat fleshy, tardily if at all dehiscent, 3–6 cm broad, suggesting a small apple.

♀ sepals 9–14 mm long and wide, broad and foliaceous; stamens 3, distinct, the filaments 2.5 mm long; leaves suborbicular or ovate, up to 20 cm long and wide, the apex rounded, obtuse or very broadly acuminate; tree or large shrub 1.5–3 m high. *P. coalcomanensis* Croizat.

♀ sepals 4 mm long or less, elliptic or obovate, scarcely foliaceous; stamens unknown, or in 1 species 2 only, the anthers nearly sessile; leaves mostly ovate to elliptic, much longer than wide, acute or acuminate, the upper ones often narrower.

Treelike shrub 1–3 m high; mature branchlets pale brown?, with narrow ridges connecting the stipules at adjacent nodes; leaves glaucous and densely vermiform-papillose beneath; stamens 2, the anthers nearly sessile. *P. tequilensis* Rob. & Greenm.

Sprawling shrub 40–60 cm high; mature branchlets bright reddish brown, terete; leaves smooth and yellow-green beneath; ♂ flowers unknown. *P. micromalus* McVaugh.

Flowers axillary, solitary or in small umbel-like cymules; foliage leaves often less than 5 cm long and stipules 1.5 mm long or less; fruit mostly a small oblate elastically dehiscent capsule 5 mm wide or less.

Petioles and/or lower surface of the midvein of the leaf pubescent, hirsutulous or scabridulous; shrubs or small trees with usually acuminate leaves; stamens 3.

Leaves scabridulous-roughened above; petioles adaxially scabridulous or hirsutulous; stamens united into a column. *P. acuminatus* Vahl.

Leaves smooth above, the midvein pubescent beneath near base with pale flaccid multicellular hairs; stamens distinct. *P. mickelii* McVaugh.

Plants smooth and glabrous throughout; leaves mostly rounded or obtusely pointed at apex, 0.5–5 cm long.

♀ sepals 2 mm long, elliptic or lanceolate; disk of the ♀ flower saucer-shaped, merely undulately lobed; anthers opening transversely. *P. mocinianus* Baill.

♀ sepals 3–5 mm long, obovate-subrotund; glands 6, erect, apparently inserted at the sinuses of the calyx; anthers opening vertically.

Styles bifid ⅓ their length; shrub or treelet 1–2 m high with slender brittle wiry branchlets. *P. gypsicola* McVaugh.

Styles not bifid, the subcapitate tips barely emarginate; half-shrub from a woody root, the virgate branches 60–75 cm high. *P. galeottianus* Baill.

1. Phyllanthus gypsicola McVaugh, sp. nov. Fig. 28.

Frutex vel arbuscula glaber 1–2 m altus, caule plus quam 1 cm diametro, ramulis fragilibus tenuissimis, ramificatione more sectionis *Phyllanthi*, ramulis novellis deciduis 3–10 (–20) cm longis; cataphylli triangulares, indurati, bractiformes 1 mm longi atrofusci; folia integra suborbicularia, late elliptica vel ovata, apice rotundata vel obtusa, basi obtusa vel rotundata, 5–10 (–15) mm lata, 5–15 (–22) mm longa; petioli basi saepe dilatati articulati, supra geniculum 1.3–2 mm longi; stipulae prope ramulorum bases ovatae, ad 0.4–0.7 mm longae, apices saepe triangulari-subulatae, pallidae vel apice fuscae, 0.7–0.8 mm longae; flores axillares fasciculati vel solitarii; flos ♀ solitarius, vel axilla flore ♀ 1, floribus ♂ 1–2 instructa; flores ♀ pedicellis tenuibus 5–7 mm longis, sepalis 6 foliaceis subaequalibus, obovatis rotundatis apiculatisve, 2.3–3.8 mm latis, 3.5–4.5 mm longis, saepe albo-marginatis; styli basi connati, ramis 0.7–1.2

mm longis fere ad medium bipartitis; glandulae 6, cum sepala alternantes, semilunatae et ovarii basin circumstantes, ad calycis sinus ut videtur insertae; flores ♂ pedicellis capillaribus 3–4 mm longis, calyce 2.1–2.6 mm longo, eius lobis subaequalibus oblongo-ellipticis vel obovatis obtusis vel rotundatis, fere ad basin distinctis, instructi; stamina 3, tota longitudine in columnam 1.5 mm longam coalita, antheris sessilibus 0.35–0.5 mm longis longitudinaliter dehiscentibus, in synandrio capituliformi radialiter dispositis; glandulae obovatae, compressae, ad calycis sinus insertae; fructus integer ignotus; semina pallido- vel atrobrunnea, tuberculata, 2–2.3 mm longa, lateribus planis duobus 1.5–1.8 mm latis.

COLIMA: Deciduous woodlands in ravines and on steep mountainsides, on slate and gypsum rocks, 11 miles s s w of Colima, elevation 400–450 m, *McVaugh 15542* (MICH), *McVaugh & Koelz 1573* (MICH, type). Flowering from July to November.

A very closely related species is *P. galeottianus* Baill., which is herbaceous or suffrutescent only. The sub-arborescent stature and wiry deciduous branchlets, the smaller size of most parts, and the bifid styles, serve to distinguish *P. gypsicola.*

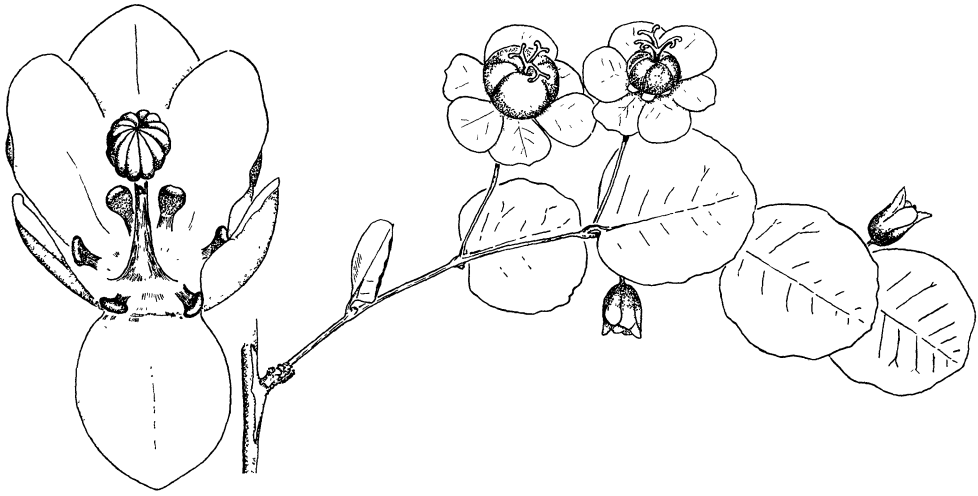


FIG. 28. *Phyllanthus gypsicola.* ♂ flower, from the type, ca. ×8.3; flowering branchlet with ♀ and ♂ flowers, from the type, × ca. 2.

2. Phyllanthus hexadactylus McVaugh, sp. nov. Fig. 29.

Annua, herbacea, ad 30 cm alta, glabra, caulibus teretibus, ramis parte superiori pluribus adscendentibus 5–10 cm longis, infra petiolorum bases anguste tenuiangulatis; ramificatio more sectionis *Phyllanthi*; cataphylli subulati 0.7 mm longi; folio integra, elliptica vel obovata, subtus pallida, 3–7 mm lata, 5–12 mm longa, apice rotundata, basi aequalia, rotundata vel obtusa; petioli 0.5–0.8 mm longi; stipulae tenues, scariosae, lanceolato-subulatae, ad 1 mm longae; ramulorum axillae inferiores steriles, mediae flores ♀ solitarios, superiores flores ♀ solitarios et ♂ 1–3 gerentes; flores ♀ ca. 1.2 mm longi, pedicellis clavatis maturitate fructus 1–1.5 mm longis, sepalis biseriatis 6, exterioribus 0.4 mm latis, 1 mm longis, interioribus ovatis vel obovatis ad 0.6 mm latis, 0.7 mm longis; calyx persistens, fructu paullum accrescens; discus angustis-

simus, loborum digitaliformium paribus 3 radiantibus instructus, lobis 0.5–0.6 mm longis, paris cuiusque parallelis, approximatis, calycis lobo angusto oppositis; styli ca. 0.25 mm longi, ad summum ovarium adpressi triradiales, ad medium bipartiti, apicibus recurvatis; flores ♂ ca. 1 mm lata, sepalis subaequalibus 6, obovatis, ad 0.5 mm latis, 0.6 mm longis; glandulae 6, ad calycis sinus insertae; stamina 3, 0.2–0.3 mm longa, basi in columnam ad medium coalita, filamentorum partibus liberis divaricatis, antheris reniformibus, horizontaliter dehiscentibus, loculis subdistinctis; capsula depressa, obtuse 6-angulata, 2 mm alta, 3 mm lata; semina brunnea, 1.5 mm longa, lateribus planis 1.3 mm latis, latere convexo longitudinaliter distincteque 7–8-striatulo.

MICHOACAN: Old lava flows 4 miles n w of Apatzingán, in sparse woodland of *Cordia, Juliania, Apoplanesia*, elevation ca. 300 m, flowering and fruiting 16 Sep 1958, *McVaugh 17945* (MICH, type).

3. **Phyllanthus mickelii** McVaugh, sp. nov. Fig. 30.

Frutex arborescens monoicus ad 3 m altus, subglaber, ramificatione more sectionis *Phyllanthi;* bracteae stipulaeque subglanduloso-ciliatae; folii costa subtus prope basin pilis pallidis flaccidis ad 0.3 mm longis obsita; ramuli novelli tenues, floriferi, teretes, cataphyllis scariosis stipuliformibus 1–1.5 mm longis subtenti; folia elliptico-ovata vel praecipue inferiora subrotunda, subtus glauca, inferiora apice saepe rotundata, 8–12 mm lata, 12–18 mm longa, superiora fere ovata, ad 1.5–3 cm lata, 3–5 cm longa, acuta vel breviacuminata, saepe brevissime apiculata; lamina basi plerumque rotundata, nonnunquam ad petiolum cuneatim angustata; petioli carnosi, teretes, 1.5–2 mm longi; foliorum stipulae scariosae, atro-apiculatae, triangulari-subulatae, 0.7–1.3 mm longae; flores minuti, glomerulis 1–2-floris axillaribus dispositi, ♀ saepe ad ramulorum apices solitarii, axillae nonnunquam bisexuales; pedicelli capillares, ad 8–12 mm longi, ♀ apice paullum dilatati; sepala ♀ 6 erecta, oblonga-elliptica, 1–1.6 mm longa obtusa; glandula annularis tenuis, brevis, undulans; styli stellatim patentes,

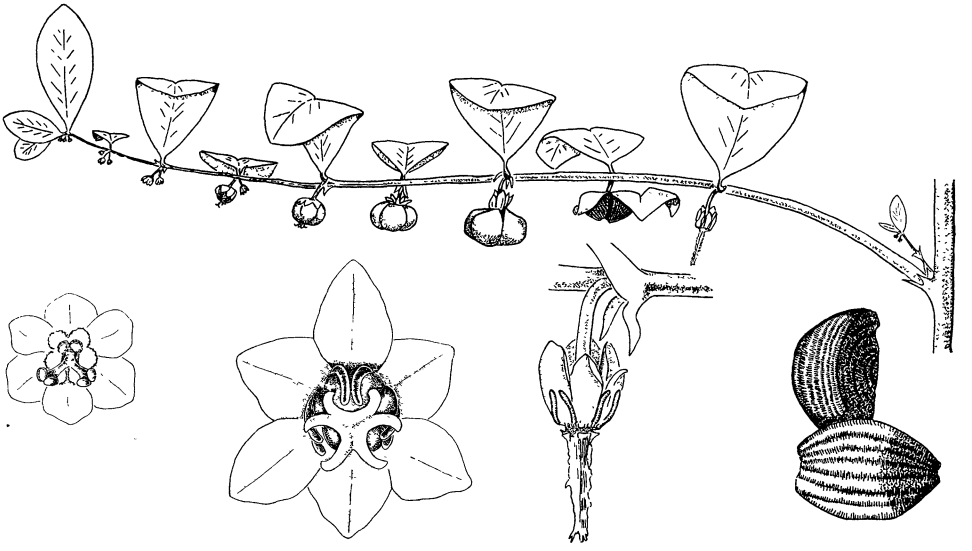


FIG. 29. *Phyllanthus hexadactylus.* Drawings from the type. Flowering branchlet, ca. ×2; flowers (♀ and ♂), calyx and columella after dehiscence of the capsule, and seeds, all ca. ×12.

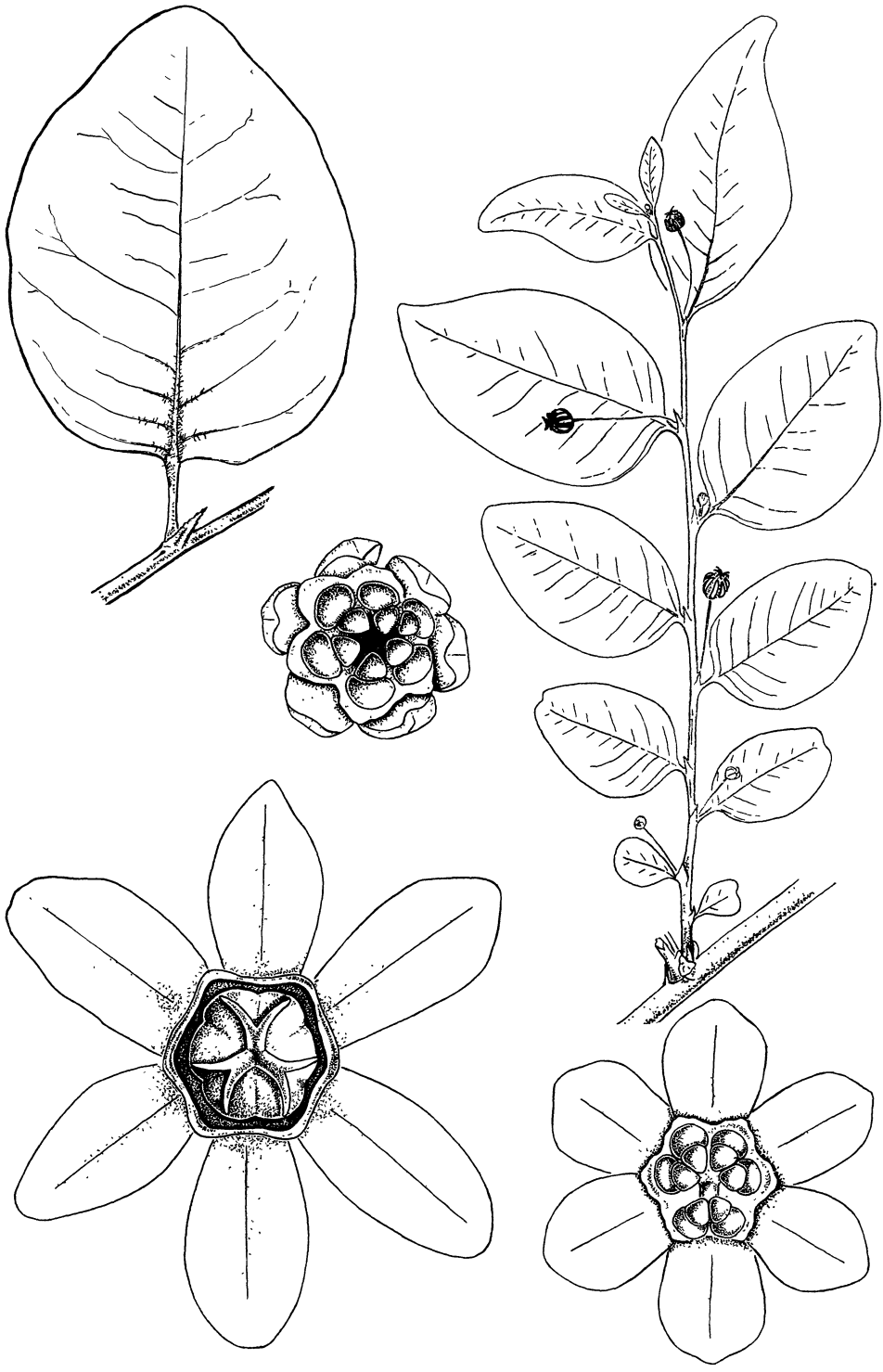


FIG. 30. *Phyllanthus mickelii*. Drawings from the type. Flowering branchlet, ca. ×1.25; lower surface of leaf, ca. ×3, showing hairs at base; flowers, ca. ×13 (opening ♂ bud at center, ♀ flower lower left, ♂ lower right).

0.3–0.6 mm longi, ultra medium bipartiti, basi crassi, apicibus attenuatis; sepala ♂ biseriata 6, ovata vel obovata, apice rotundata, ad 1 mm longa, 0.8 mm lata; stamina distincta 3, antheris subsessilibus (filamentis crassis 0.2 mm longis latisque), 0.5 mm latis, ut videtur subhorizontaliter dehiscentibus, loculis valde inaequalibus, superioribus minoribus; discus concavus, lobis late quadratis 3; fructus ignotus.

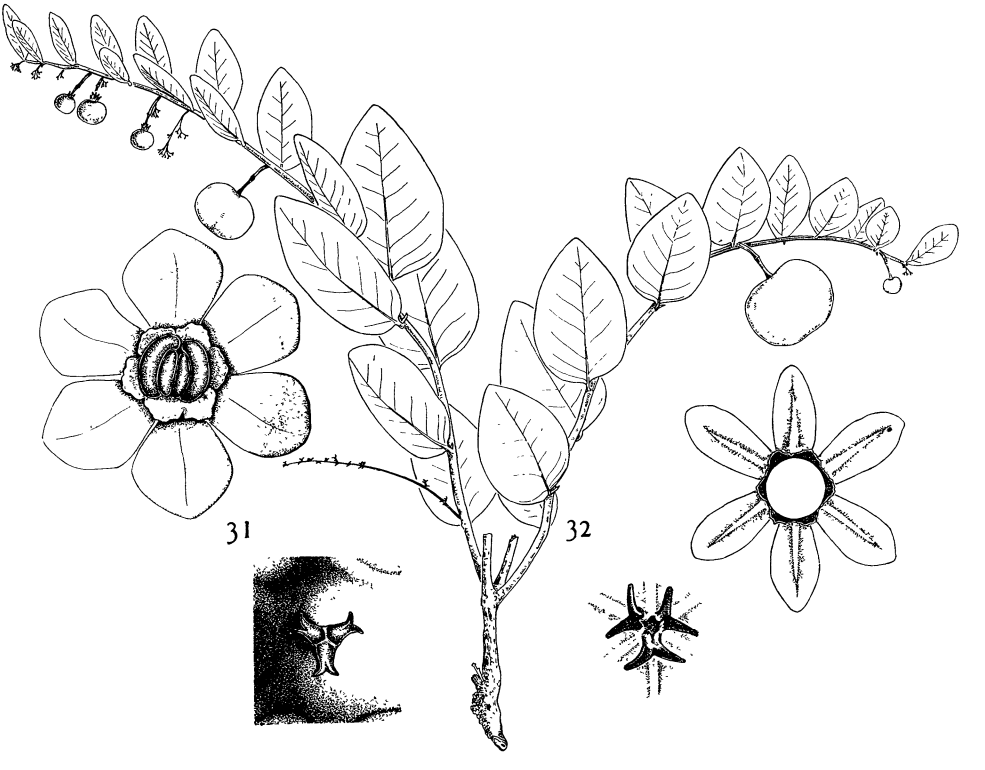
Species discipulo adjutoreque John Thomas Mickel (1934–), qui mecum plantas praecipue colimenses anno 1957 collectavit, dedicavi.

COLIMA: Rocky hills in deciduous woodland with *Bursera, Ficus, Tabebuia,* 8 miles w n w of Santiago, elevation 135 m, in flower 25–26 Jul 1957, *McVaugh 15763* (MICH, type).

This species superficially resembles *P. rupestris* HBK., a species of northern lowland South America. The foliage in *P. rupestris,* however, is entirely glabrous and the leaves are rather prominently reticulate-venose beneath. The known distribution of *P. rupestris* makes its occurrence in western Mexico most unlikely.

4. Phyllanthus micromalus McVaugh, sp. nov. Fig. 32.

Suffrutex monoicus suberectus pauciramosus 40–60 cm altus, radice crassa lignescenti; ramuli teretes, rufo-ferruginei; folia crassa, in siccitate rigida, utraque pagina minutissime asperulata, supra olivacea, subtus flavo-viridia; lamina ovata vel eliptica, (2–) 3–5 (–6.5) cm lata, 4–10.5 cm longa, apice in



FIGS. 31–32. *Phyllanthus micromalus* and *P. tequilensis.* FIG. 31. Floral structures in *P. tequilensis;* ♂ flower, ×10 (*McVaugh 15340*); styles from fruit ca. 1 cm diam., ×7.5 (*Feddema 1029*). FIG. 32. *P. micromalus.* Drawings from the type. Habit, ca. ×¼; styles from fruit ca. 1 cm diam., ×7.5; ♀ calyx and gland from within, ×2.5 (immature fruit removed).

fastigium obtusum exacuta, basi rotundata vel subcordata; nervi utroque latere 5–7 (–9), secondariis subtus praecipue inconspicuis; petioli 2–2.5 mm longi, facie adaxiali plana; stipulae lanceolatae vel oblanceolatae, 1–2 mm latae, 5–7 mm longae; inflorescentia paniculata, axillaris, inferiores (semper ♂ ?) subracemosae, tenues, ad 16 cm longae; superiores 1–2 (–3) cm longae, subcorymbosae, apice saepissime fructum solitarium gerentes; flores ignoti; fructus carnosus, eo mali parvi similis, inflatus, bucca rubella viridis, ad 3.3 cm altus, 4.2 cm diametro, pedunculo 1 cm longo, 1–2 mm crasso, sepalis persistentibus 6, 1–1.5 mm latis, 3–4 mm longis; fructus juventute styli recurvati, 0.5 mm longi, ultra medium bipartiti, apicibus attenuatis.

NAYARIT: Open grasslands on sunny hills 10 miles s e of Tepic, elevation ca. 1000 m, 30 Aug 1957, *McVaugh 16569* (MICH, type); sparse oak forest, Santa María del Oro, *Feddema 674* (MICH).

This new species belongs to a group characterized by shrubby or arborescent habit, large leaves and many-flowered paniculate inflorescences (the ♂ ones usually at the lower nodes, longer and more floriferous than the upper panicles which are often mostly ♀). The nomenclatural type of this species-complex is *P. grandifolius* L. The several Mexican species (including probably *P. glaucescens* HBK., *P. laxiflorus* Benth., *P. adenodiscus* Muell. Arg. and *P. tequilensis* Rob. & Greenm.), are superficially almost indistinguishable. From the others *P. tequilensis* differs in having the anthers 2 and sessile, rather than 3 at the summit of a column. (Figure 31.) A revision of the entire group is needed.

From *P. tequilensis*, even in the sterile condition, *P. micromalus* is readily distinguished by the completely smooth and featureless yellow-green lower leaf-surface; in *P. tequilensis* the corresponding surface is whitened by innumerable tiny vermiform hairlike papillae, and the primary lateral veins are usually connected by a conspicuous network of elevated and more or less ladderlike secondary veins. Staminate material and other flowering material, to establish more precisely the systematic position of *P. micromalus*, are much needed.

5. Phyllanthus standleyi McVaugh, nom. nov. Fig. 33.

P. perpusillus Standl. Am. Midl. Nat. **36**: 178. 1946. Not *P. perpusillus* Baill. 1865.

This is a delicate annual, glabrous, or the lower and middle parts of the stems delicately glandular-pilose. The species is readily recognized by the

FIG. 33. *Phyllanthus standleyi*. ♀ *and* ♂ flowers, ca. ×23. (*McVaugh 16038*).

4-parted ♂ flowers and the peculiar ring-like disposition of the 2 anthers.

Rocky woods, often in disturbed situations, in pine-forest zones or in deciduous woodlands, at elevations of 500–1800 meters, southern Jalisco to Guerrero, flowering in July and August.

1. Stem pilose; anthers divergent on short filaments at the summit of the column; seeds with 5–7 lines on the backs.

JALISCO: North of La Resolana, *Wilbur & Wilbur 1580* (MICH); gorge of Río Cihuatlán [Maravasco], north of Santiago, Colima, *McVaugh 15820* (MICH).

2. Glabrous; anthers subsessile; seeds with about 9 lines.

COLIMA: 11 miles s s w of Colima, *McVaugh 16038* (MICH). MICHOACAN: 2 miles w of Uruapan, *Leavenworth & Hoogstraal 1282*, type. GUERRERO: Vallecitos, *Hinton 10549*.

It is a pleasure to give this species the name of Paul Carpenter Standley (1884–), student extraordinary of Mexican and Central American plants. Even if Mr. Standley had written nothing else, all taxonomists working with these floras would owe him a debt of gratitude for the *Trees and Shrubs of Mexico*, one of the great floras of the 20th Century. Published in parts from 1920 to 1926, when relatively few specimens were available for study, when the study of types in European herbaria was relatively difficult, and above all at a period when useful floras of tropical America were almost non-existent, the *Trees and Shrubs* remains after almost 4 decades an essential reference work, distinguished, in spite of its inevitable lacunae, by the thoroughness and careful consideration of the author.

SEBASTIANIA

This genus of about 75 species, mostly Brazilian, was reviewed by Pax [Pflanzenreich IV.147.v (Heft **52**) : 88–153. 1912]. The few species in western Mexico are poorly known.

1. **Sebastiana corniculata** (Vahl) Muell. Arg. in DC. Prodr. 15^2: 1168. 1866.

Tragia corniculata Vahl, Eclog. Am. **2**: 55. *t.19*. 1798.

Sebastiania mexicana Brandg. Zoe **5**: 205. 1905.

This small herbaceous species, widely distributed in the West Indies and South America, is scarcely known in continental North America. Pax said that "*S. mexicana* Brandegee . . . certissime ad *S. corniculatam* pertinet", but apparently he did not see any specimens from North America. It is therefore interesting to record yet another instance of a species with its principal range far to the east and south, and a smaller disjunct portion of its range in western Mexico. The following citations suggest that *S. corniculata* may prove to be rather widely distributed in the states bordering the Pacific Ocean. At the two localities known to me it is moderately or very abundant in shallow soils among grasses on exposed hillside savannahs with species of *Quercus* or with *Byrsonima crassifolia*. Many similar habitats occur at low elevations in hills near the coast, from Sinaloa southward.

SINALOA: Culiacán (type-locality of *S. mexicana;* type not seen). NAYARIT: 9 miles n of Compostela, elevation 1200 m, 28 Aug 1957, *McVaugh 16510* (MICH). JALISCO: 8 miles s w of La Resolana, road to La Huerta, elevation 400–500 m, 16 Nov 1960, *McVaugh 21101* (MICH).

2. **Sebastiania jaliscensis** McVaugh, sp. nov. Fig. 34.

Arbor glabra usque ad 8 m alta, foliis novellis petiolisque saepe rubrotinctis; folia longepetiolata, subtus insigniter pallida, elliptico-ovata vel ovata-lanceolata, 1.5–4.5 cm lata, 5–13 cm longa, serrulata, caudato-acuminata, base acuta vel rotundata; petiolus eglandulosus, 1.5–5.5 cm longus; dentium laminae pares 1–2 infimi dilatati, glandulosi, glandulae depressae vel brevi-cylindricae; stipulae cito deciduae, 2–3 mm longae, anguste triangulae, basi glandulosae; costa

subtus prominens, supra in siccitate convexa; nervi laterales inconspicui, utroque latere 7–10, arcuati; spica terminalis, subpendula, androgyna, 4.5–6 cm longa, basi ♀; bracteae ♂ appressae, ovatae, acutae, integrae vel paulum dentatae, 2 mm longae, basi calcare obtuso et glandulis 2 lateralibus 3–5-lobatis instructae; flores ♂ 3, 1–2 evolventes, stipitati; calycis ♂ lobi suborbiculares, fere 1 mm longi, 2 abaxiales connati, inter se incisi, lobus tertius distinctus; stamina 2–3, filamentis calycis lobisque aequilongis; filamenta 2 divaricata (antheris vix exsertis), tertium sub lobam duplicatum calycis erectum; flos ♀ 1 (–2), brevipedicellatus; calyx 1.5 mm longus, ei lobi valde inaequales 4–5, imbricati, ovati, acuti, eroso-denticulati, paullo scariosi; styli ca. 2 mm longi, carnosi, valde recurvati, usque ad medium fere connati; ovula 1, pendula; capsula valde 3-lobata, inermis, ca. 1 cm lata; semina carunculata, laevia, nitida, fusca, depressa, 6.5 mm longa.

JALISCO: Barranca in the pine forest, Sierra de Manantlán above the lumber camp at Durazno, elevation 1700 m, 7 Nov 1952, *McVaugh 14016* (MICH, type); headwaters of Río de Talpa, 10–12 miles s of Talpa de Allende, rocky streamside in high forest of *Quercus, Carpinus, Ostrya, Podocarpus,* elevation 1400 m, 26 Nov 1960, *McVaugh 21445* (MICH). NAYARIT: Santa Gertrudis, *Rose 2061* (GH, US).

This species differs markedly from the other species of *Sebastiana* known from western Mexico, *S. pavoniana* (Muell. Arg.) Muell. Arg., in the somewhat larger and caudate-acuminate leaves, in having the petioles 2–5.5 cm long (as against 0.5–1.5 cm), and in the broadly rounded and erose (rather than subulate and setaceous-acuminate) staminate sepals.

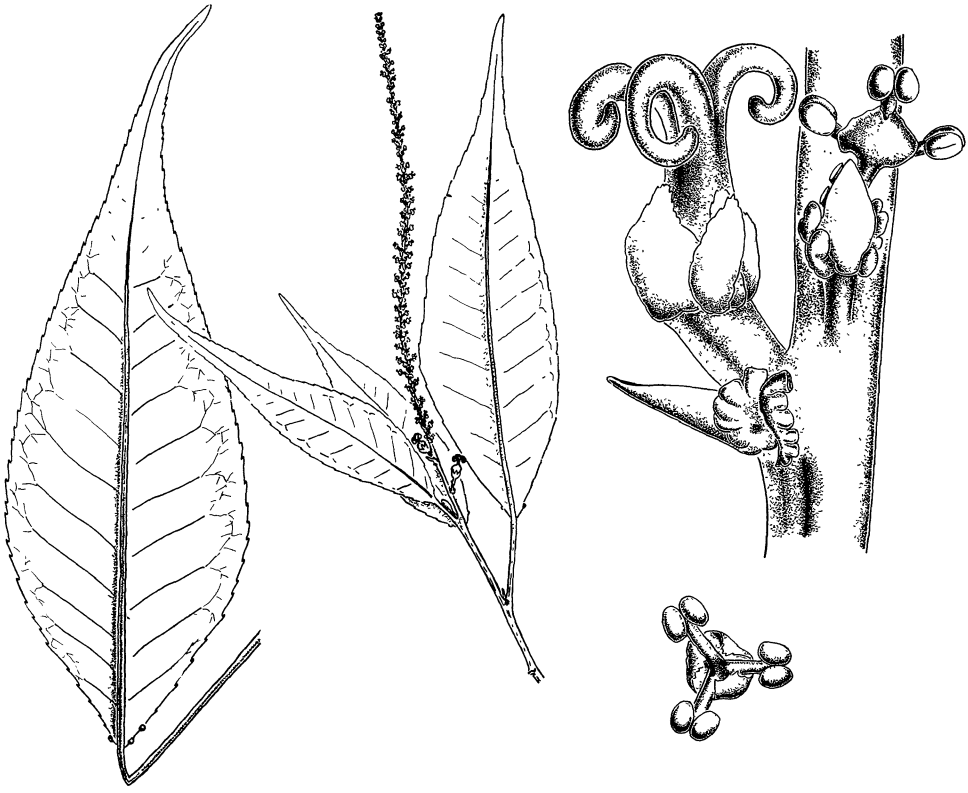


FIG. 34. *Sebastiania jaliscensis.* Drawings from the type. Leaves and inflorescence, slightly reduced. Flowers, ×12.5.

TRAGIA

A genus of more than 100 species, chiefly in the tropics and subtropics, in both Old and New Worlds, reviewed by Pax & Hoffmann [Pflanzenreich IV.147. IX (Heft 68): 32–101. 1919]. These authors saw little material from western Mexico, and none of the taxa cited below, with the possible exception of *T. affinis,* is adequately treated in their monograph.

Styles 4–6 mm long, united at base and long-exserted; stamens about 10 (–18?); pubescence non-glandular; a vine with broadly cordate-ovate leaves 2.5–7 cm wide. *T. affinis* Rob. & Greenm.

Styles mostly 2 mm long or less (up to 3.5 mm in fruit in one species), often scarcely exserted from the hairs of the ovary; stamens 3; branches of the inflorescence often copiously and usually at least sparingly stipitate-glandular.

Inflorescence copiously glandular; ovary conspicuously glandular; fruit long-tuberculate with numerous subulate or cristate gland-tipped processes; styles exserted, the column 1.5 mm long (or up to 2.5 mm long in fruit); a vine with ovate-cordate leaves mostly 2–4.5 cm wide. *T. pacifica* McVaugh.

Inflorescence sparingly if at all glandular; ovary densely hairy but not glandular, the fruit smooth or with an occasional low non-glandular tubercle.[5]

Styles exserted, the column ca. 1 mm long; style branches nearly smooth, merely irregularly roughened on the inner face; inflorescence somewhat glandular; a vine with deltoid- or ovate-cordate finely serrate leaves mostly 2 cm wide or less [see No. 5 below].

Styles united at base only, the column very short and the tips of the branches scarcely exserted from the hairs of the ovary; style-branches lacerate-papillose on the inner faces.

Vine with deltoid and coarsely incised-serrate leaves, the upper ones 1–2 cm wide, the petioles up to 2 cm long [see under *T. nepetifolia* var. *setosa*]. *T.* sp.

Herb mostly 50 cm high or less, the tips often twining; lower leaves cordate or deltoid, the upper ones much narrower, mostly 1 cm wide or less, declined and often trough-shaped, narrowly triangular to linear, shallowly serrulate with 15–25 teeth on each side; petioles 5–7 (–13) mm long. *T. nepetifolia* var. *setosa* S. Wats.

1. Tragia affinis Rob. & Greenm. Proc. Am. Acad. **29**: 393. 1894.

A very distinct species, previously known only from the type (Barranca of Guadalajara, *Pringle 5474,* GH) and from Morelos and the State of Mexico. A recent collection from Jalisco (Puente San Pedro near Tecalitlán, *McVaugh 18104*) is apparently also this species.

2. Tragia nepetifolia [*"nepetaefolia"*] Cav. Ic. **6**: 37. *t. 557. fig. 1.* 1801.

This name, as loosely interpreted by recent botanists, has been made to apply to a wide variety of herbaceous plants with the stems erect or nearly so, and only the tips twining, from Arizona and eastern United States to Guatemala. Some revision of the group is needed to determine specific limits. Modern material (*Lundell 12546*) from near the type-locality ("Inter Ixmiquilpan et Cimapan") compares well with Cavanilles' plate and description. The plants are low and scarcely if at all twining, the leaves (including the uppermost) are ovate with salient teeth and slender petioles often half as long as the blades. The variety described below is strikingly different in a number of vegetative characters, and study based on more ample material than is now available may show that it is specifically different:

2a. Tragia nepetifolia var. **setosa** S. Wats. Proc. Am. Acad. **22**: 451. 1887.

Lower leaves often ovate and slender-petiolate, the upper increasingly nar-

[5] Here should be sought also *Tragia volubilis* L., discovered in Jalisco too late for inclusion in the key. It is a vigorously twining half-woody vine often 2–3 m long, distinguished from the other species in our flora by the filiform and much elongated pedicels of the pistillate flowers; these are often longer than the staminate portion of the inflorescence; in fruit they may reach a length of 2.5–5 cm.

rower, those above the middle of the stem narrowly triangular to almost linear, 7–10 (–20) mm wide at base, (3–) 4–7 cm long, usually folded along the midrib toward the upper surface and the whole blade declined and somewhat appressed to the stem; petioles 5–13 mm long, much shorter than the blades; serrations shallow and elongated with the axis of the blade, 15–25 on each side; inflorescences 1–1.7 (–3) cm long, the single ♀ flower well above the base, the ♂ part of the raceme 8–13 mm long, with 12–20 flowers; styles 1.5–1.7 mm long, connate at base only, the tips at anthesis scarcely exserted from the abundant hairs of the ovary, the inner surfaces strongly papillose (Figure 35, upper left); seed 3 mm in diameter.

Rather widespread in western Mexico, from Jalisco to Guerrero and the State of Mexico, in rather dry places in oak woodlands and grassy openings at elevations of 1200–1500 meters.

JALISCO: Río Blanco, *Palmer 65* in 1886 (GH, type); 13 miles s s w of Autlán, *Wilbur & Wilbur 2353* (MICH); Puente San Pedro near Tecalitlán, *McVaugh 16018* (MICH). GUERRERO: Vallecitos, *Hinton 16021* (MICH, US). E. DE MEXICO: Chorrera, *Hinton 1292* (US).

Noted especially in the key above is a collection from the little-known region between Mezquitic and Huejuquilla, Jalisco, *McVaugh 17685*. This was a vine hanging from rocks, the leaves ovate and very strikingly incised. On technical features of the inflorescence it was almost inseparable from *T. nepetifolia* and as very little is known about the limits of variability in leaf-shape and in capacity to develop the twining habit, such an extreme may be noted but should not be named until more is known about it.

3. Tragia pacifica McVaugh, sp. nov. Fig. 35.

Volubilis, ad 2.5 m longa, basi lignescens, caulibus puberulentibus hispidisque, pilis urentibus; inflorescentiae rami ovariumque valde stipitato-glandulosi;

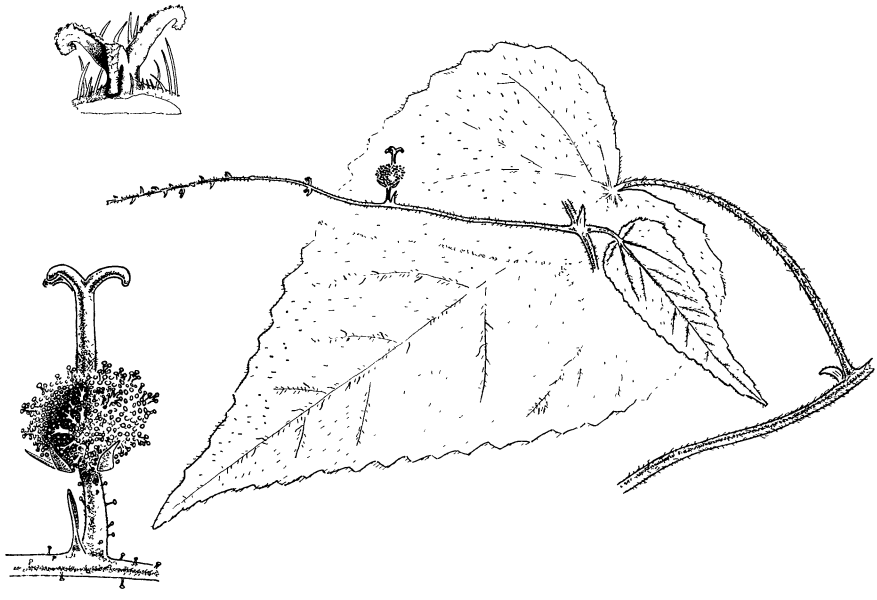


FIG. 35. *Tragia.* Inflorescence and leaf of *T. pacifica,* ×1.5, from the type; lower left, styles and ovary of *T. pacifica,* ×7.5, from the type; upper left, style of *T. nepetifolia* var. *setosa,* ×7.5, from *Hinton 10621.*

folia ovata vel triangulari-ovata 2–4.5 (–8) cm lata, 4–8 (–13) cm longa, saepe duplo (1.75–3-plo) longiora quam latiora, apice acuta, plerumque acuminata, basi cordata sinu lato lobisque latis suborbicularibus instructa, ambitu crasse acuteque sed breve serrata, dentibus utroque latere 15–25; lamina 3-nervia, nervis lateralibus omnibus adscendentibus curvatis, anastomosantibus, in dentes marginales directe non exeuntibus; petioli 1.5–4 (–7) cm longi; stipulae foliaceae, triangulares, ad 1 mm latae, 3 mm longae; racemi subfiliformes 3–7 cm longi, flore ♀ supra basin 2–2.5 cm, deinde floribus ♂ 15–50; sepala ♀ lineari-lanceolata, anthesi 1.5–2.5 mm longa (fructus maturitate ad 3 mm); pedicelli fructus 3–3.5 mm longi, ad medium vel infra articulati; styli e calyce florendi exserti, in columnam 1.5 mm longam coaliti, ramis vix papillosis 1 mm longis recurvatis; ovarium dense glandulis stipitatis obsitum; flores ♂ pedicellis 1.5–2 mm longis, medio articulatis instructi; stamina 3; capsula valde 3-lobata lobis suborbicularibus, 7–8 mm lata, superficie aculeis herbaceis subulatis vel cristatis ad 2 mm longis apicibus glandulosis obsita; columella 2 mm longa, ramis triradiatis 1.5 mm longis; semina globosa, 2.75 mm diametientia, brunneo-lutea, fusco-marmorata.

SINALOA: Capadero, Sierra Tacuichamona, canyon in short-tree forest, elevation ca. 1000 m, 13 Feb 1940, *H. S. Gentry 5613* (GH, MICH). NAYARIT: María Madre, woods 1 mile w of the Penal Colony, 23 Oct 1925, *R. S. Ferris 5655* (US). JALISCO: Wooded summits between Barra de Navidad and Tenacatita, with *Cordia, Conzattia, Bursera,* elevation 500–600 m, 12 Nov 1960, *McVaugh 21006* (MICH). COLIMA: Palm forest near sea-level, 15 miles s e of Manzanillo, 9 Dec 1959, *McVaugh & Koelz 1624* (MICH, type).

All the collections of this species are from the winter-dry lowlands where the prevailing cover is a deciduous woodland. The type came actually from openings in the coastal *Orbignya* forest, a short distance from typical deciduous woodland. Gentry's collection has triangular leaves about 3 times as long as wide, but seems to be conspecific with the others cited.

4. Tragia volubilis L. Sp. Pl. 980. 1753.

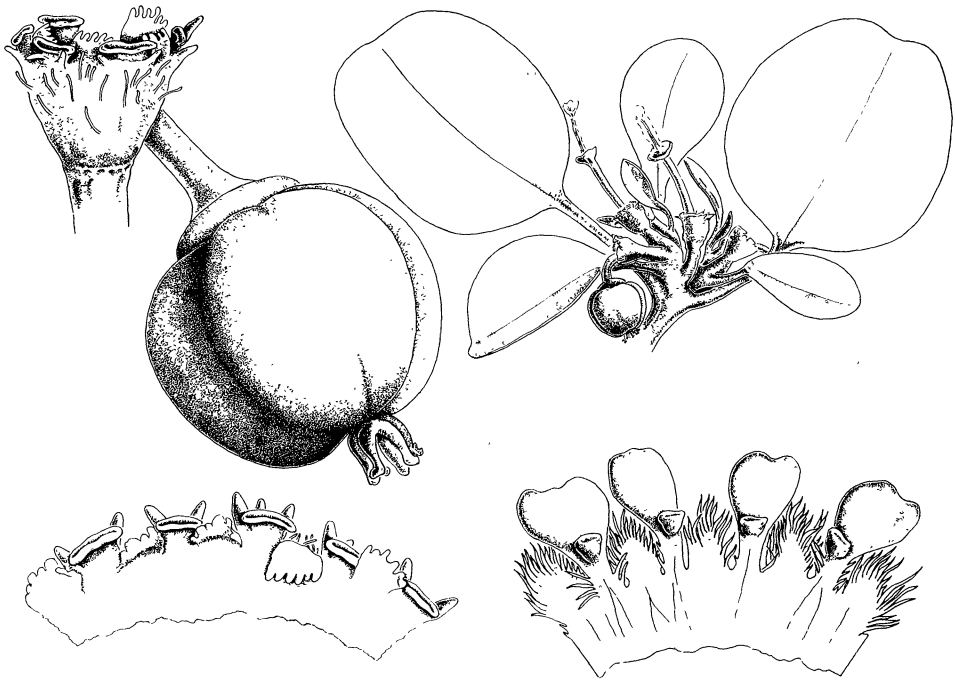
A variable and widespread species of the American and African tropics, readily recognized by the long filiform peduncles. Apparently it has not previously been reported from western Mexico. At the locality cited below it occurs in humid tropical forest, in deep shade, with *Margaritaria nobilis, Celtis monoica, Bursera, Ficus,* and *Cnidoscolus.* It is a vine 2–3 m long, woody at base, the herbage nearly glabrous and not or scarcely stinging.

JALISCO: Steep humid mountainsides 2.5–4 miles above (north of) La Cuesta, elevation 800–1000 m, 20 Nov 1960, *McVaugh 21189* (MICH).

5. Tragia sp.

A collection (*Wilbur & Wilbur 2477*) from "dry, over-grazed cactus-covered slopes about 1 mile south of Autlán", is said by the collectors to be a "climbing twining vine from a woody base". Superficially it much resembles *T. yucatanensis* Millsp. but it appears to be somewhat more vinelike than that species, and to have smaller seeds and slightly less papillose style-branches. In view of these discrepancies and in view of the geographical hiatus between the two, I hesitate to refer the Wilbur collection to the Yucatán species.

What appears to be the same species was collected on the semi-arid hills above Amacueca, Jalisco, in the basin of Lake Sayula, 3 Nov 1960, *(McVaugh 20726).* This was a much-branched and tangled vine 1 m long, tough and woody at base, in habit and leaf-shape quite unlike *T. nepetifolia* which occurs in the same region. I am still uncertain of the taxonomic position of the species represented by Wilbur's collection and by my own.



FIGS. 36–37. *Euphorbia.* FIG. 36. *E. biuncialis,* from the type. Tip of flowering branchlet, ×4.5. Lobes and glands of the involucre, ×20. Capsule and involucre, ×20. FIG. 37 (lower right). *E. paludicola,* from the type. Lobes and glands of the involucre, ×20.

DARBAKER PRIZE IN PHYCOLOGY.—The Committee on the Darbaker Prize of the Botanical Society of America will accept nominations for an award to be announced at the annual meeting of the Society at Lafayette, Indiana in 1961. Under the terms of the bequest, the award is to be made for *meritorious work in the study of the algae.* Persons not members of the Botanical Society are elegible for the award. The Committee will base its judgment primarily on the papers published by the nominee during the last two full calendar years previous to the closing date for nominations. At present, the award will be limited to residents of North America. Only papers published in the English language will be considered. Nominations for the 1961 award accompanied by a statement of the merits of the case and by reprints of the publications supporting the candidacy should be sent to the Chairman of the Committee in order to be received by June 1, 1961. The value of the Prize for 1961 will depend on the income from the trust fund but is expected to be about $250.00. —Robert W. Krauss, Botany Department, University of Maryland, College Park, Maryland, Chairman of the Committee.