

A REVISION OF *Pomaria* (FABACEAE) IN NORTH AMERICA

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Abstract: The genus *Pomaria*, described by Cavanilles in 1799 but subsequently submerged in either *Caesalpinia* or *Hoffmannseggia*, is treated here as a distinct genus and the North American species are revised. This revision provides a key, corrected nomenclature, new combinations, and descriptions for all North American species. One new species is described and distribution maps are provided for each of the nine species.

Resumen: El género *Pomaria*, descrito por Cavanilles en 1799 y subsecuentemente sinonimizado ya sea bajo *Caesalpinia* o *Hoffmannseggia*, es tratado como un género distinto cuyas especies norteamericanas son revisadas aquí. Esta revisión provee claves, una nomenclatura corregida, nuevas combinaciones y descripciones para todas las especies de Norteamérica. Se describe una nueva especie y se proveen mapas de distribución para las nueve especies del subcontinente.

Keywords: *Caesalpinia*, *Pomaria*, *Hoffmannseggia*, Caesalpinieae, Caesalpinioideae

For over 100 years, systematists have disagreed on the circumscriptions of *Caesalpinia* (Fabaceae) and its segregates in North America. The main point of contention has been whether there is one genus, *Caesalpinia*, or whether components of it are more naturally treated as distinct genera. Of concern here are species variously placed in *Caesalpinia*, *Pomaria*, *Hoffmannseggia*, and *Melanosticta*. *Caesalpinia* was described by Linnaeus in 1753 with *C. brasiliensis* now designated as type (Lewis, 1994). Cavanilles described *Hoffmannseggia* (orthographically conserved as *Hoffmannseggia*) in 1798 and *Pomaria* in 1799. He distinguished the two by the presence of punctate dots on the lower leaf surfaces of *Pomaria* (Plate 1) and their absence in *Hoffmannseggia* and by the persistence of the sepals in fruit of *Hoffmannseggia* and their early abscission in *Pomaria*. *Melanosticta* was erected by de Candolle in 1825 for a South African species (*M. burchellii* DC.) similar in appearance to *Pomaria*. In 1840, Torrey and Gray submerged both *Pomaria* and *Melanosticta* in *Hoffmannseggia*. Bentham and Hooker

(1865) and Taubert (1894) also subsumed *Melanosticta* in *Hoffmannseggia* but they treated *Pomaria* as a section of *Caesalpinia*. The uncertainty of workers dealing with the group is exemplified by Fisher (1892) who recognized *Hoffmannseggia* (sensu Torrey and Gray) as a distinct genus but a year later transferred all of the species to *Caesalpinia* (Fisher, 1893). Fisher's original concept of *Hoffmannseggia* is considered as the "traditional" one and as such, contains about 25 species distributed in southwestern United States and adjacent Mexico, west-central South American, and South Africa (Polhill and Vidal, 1981). Britton and Rose (1930), however, fragmented both *Caesalpinia* and *Hoffmannseggia* with the classical species of *Hoffmannseggia* treated as *Larrea*, *Schrammia*, and *Moparia*. Included in their *Larrea* was the type species of the genus *Hoffmannseggia* and various species placed in *Pomaria* by Cavanilles and subsequent workers. *Larrea* is actually the oldest name for *Hoffmannseggia*, but it is illegitimate against the conserved name *Larrea* Cavanilles (= creosote bush in the Zygophyllaceae).

In his important work on the *Caesalpinioideae* of North America, Isely (1975) clearly stated that the "traditional" *Hoffmannseggia* in North America (sensu Fisher, 1982) contained two distinct elements. He consequently retained in *Hoffmannseggia* only those very small shrubs or perennial herbs that lacked glandular-punctate trichomes on their leaves and which had fruits with parallel margins. He placed the species with glandular-punctate trichomes on the leaves (e.g., *Pomaria*) and/or lunate fruits in *Caesalpinia*.

Recently, a study in our laboratory using chloroplast DNA restriction site analysis (Simpson and Miao, 1997) showed that *Pomaria* (including *Melanosticta*) and *Hoffmannseggia* are distinct and not even sister taxa. *Pomaria* forms a sister clade to a group of *Caesalpinia* species. Moreover, the species that comprise either the

Hoffmannseggia or the *Pomaria* clade do not correspond to the *Hoffmannseggia* of Isely (1975) or the group returned by him to *Caesalpinia*. Polhill (1994) has recently suggested, based on the diversity of defense mechanisms including chemistry, that *Caesalpinia* and the group of genera most closely related to it must be reassessed. Dr. Gwilym Lewis (Lewis, 1994) has recently conducted a phylogenetic analysis using morphological characters and also concluded that the genera currently recognized in this *Caesalpinia* group are paraphyletic and should be split into several lineages, among them *Pomaria* and *Hoffmannseggia*. As a result of our data, Rzedowski (Rzedowski and Rzedowski, 1997) has already recognized both *Hoffmannseggia* and *Pomaria* in his *Flora del Bajío*. Here I describe a new species, provide a revision of the genus for all of North America, and make the necessary taxonomic combinations.

Key to *Caesalpinia*, *Hoffmannseggia*, and *Pomaria* in North America

1. Trees or small shrubs or, if perennial herbs, the leaves glandular-punctate-dotted below; sepals dehiscent in fruit, forming a ring at the base of the fruit.
 2. Leaves with conspicuous linear or linear-lanceolate, often fringed or lacinate persistent stipules; flowers highly zygomorphic with the stamens and style curving downward and held within the lowermost sepal; sepals entire; stigma lateral; pods with glandular-punctate orange trichomes that dry black and complex multicellular projections (Fig. 1) consisting of a stalk bearing plumose or apical trichomes. *Pomaria*
 2. Leaves lacking stipules because of early dehiscence; flowers zygomorphic but stamens and style not cupped in the lowermost sepal, or if held in the sepals, the sepals elaborately toothed; stigma terminal or subterminal; pods glabrous, with simple, glandular, or peltate-glandular trichomes. *Caesalpinia*
1. Small subshrubs or perennial herbs; leaves pubescent but never with glandular-punctate trichomes; sepals persisting in fruit [very tardily and jaggedly dehiscent in *H. microphylla*]. *Hoffmannseggia*

Pomaria Cav., Icon. 5: 2. tab 402. 1799. TYPE SPECIES: *P. glandulosa* Cav.

Melanosticta DC, Prodr. 2: 484. 1825.

Small SHRUBS, SUBSHRUBS, or perennials, HERBS with black, fasciculate roots or thick taproots. STEMS unarmed, villous, pubescent, pilose, or canescent, often with orange (drying black) multicellular glandular-punctate trichomes (dots) and complex

multicellular projections consisting of a cylindrical stalk bearing plumose and/or apical trichomes. STIPULES persistent or tardily deciduous, fringed, serrate, or lacinate, often villous or pubescent and with glandular-punctate trichomes. LEAVES imparipinnate, with 1–7 pairs of pinnae with point of attachment often marked by a ring of orange punctate (black when dry) glandular trichomes and filiform stipels; leaflets 2–10 pairs, variously vestitured with



Plate 1. A. Dorsal leaf surface of *Pomaria austrotexana* showing the orange glandular-punctate trichomes characteristic of members of this genus. The trichomes dry black. x 3.5. B. Flowers of *P. brachycarpa* showing the characteristic positions of the petals, stamens, and gynoecium and the tendency for flowers of the genus to turn pinkish when senescing. The rows of glandular-punctate trichomes on the sepals are also clearly visible. x 7.10. C. A flower of *Pomaria jamesii* showing the characteristic attitude of the flower with the bright flag petal upright, the duller lateral petals held back, and the stamens and gynoecium curved downward and held in the large, lowermost sepal. x 3.36. D. Inflorescence of *Pomaria melanosticta* showing the bilabiate appearance of the flower in lateral view. x 3.12.

simple trichomes but always with conspicuous orange (black on drying) glandular-punctate trichomes on the lower surface (Plate 1). INFLORESCENCE a terminal or axillary raceme with pedicels entire or jointed, with flower-buds subtended by early-deciduous, ovate, fringed bracts. FLOWERS (Plate 1) zygomorphic; sepals 5, valvate in bud, entire, lanceolate, acute, unequal in size with the lowermost (abaxial) largest, projecting between the 2 lower lateral petals and cupped around the stamens and gynoecium, dorsally vestitured on the margins and veins and with glandular-punctate trichomes between the margins and veins producing a striped appearance, partially dehiscent in fruit with the sepal bases forming a small ring at the base of the legume; petals 5, arranged with the innermost petal upright forming a flag and the others in two lateral pairs, clawed, yellow often blotched with red, often fading to pink; the flag petal (vexillum) usually bright yellow, folded (pinched) in the middle with a flat blade above and a circular opening below, usually with a tuft of simple trichomes in the fold and often bearing punctate or glandular stipitate trichomes on the dorsal surface, sometimes basally villous; blade of lateral petals ovate, rarely with a tuft of trichomes on the inner claw and a few glandular-punctate trichomes dorsally on the blade; stamens 10, unequal in size, arcuate and lying in the lowermost sepal with the two basally geniculate abaxial filaments densely villous and projecting into the lower opening of the flag petal, variously vestitured along the filament; anthers ca. 1 mm long, dorsifixed, usually red; pollen tricolporate with a reticulate exine; ovary often vil-

lous and densely covered with glandular-punctate trichomes mixed with complex multicellular projections; style arcuate and nestled with the stamens in the lowermost sepal, glabrous or vestitured; stigma lateral, adaxial. FRUITS decumbent or upright, lunate, falcate, lanceolate-oblong or trapezoidal in outline, mucronate by the persistent style, abruptly narrowing at the base and with the valves and margins variously vestitured with simple trichomes, glandular-punctate trichomes and a variable number of complex multicellular projections (Fig. 1) consisting of a cylindrical stalk bearing plumose and/or stellate trichomes; dehiscent along both sutures with the valves (sometimes tardily) tightly curling inward; seeds 1–4 borne on broad funicles.

CHROMOSOME NUMBER: No chromosome counts have been made for any *Pomaria* species. However, every species of *Caesalpinia* (with the exception of *C. pulcherrima* reported with $2n=24$ and 48) and *Hoffmannseggia* counted to date (5 species) has $2n=24$.

DISTRIBUTION: *Pomaria* sensu stricto consists of nine species in the United States distributed from Kansas southward and in Mexico to the state of Hidalgo. Three species occur in South Africa. It is probable that future study will show that three to six South American species of *Hoffmannseggia* or *Caesalpinia* belong to *Pomaria* as well.

The species seem to form two natural groups defined by fruit morphology and vestiture (see couplet 1 in the key below) but I have deferred a cladistic analysis until the South American and African species can be more thoroughly studied.

Key to the species of *Pomaria* in North America

1. Fruits arcuate with margins more or less parallel, or lunate with an expanded lower margin, or symmetrically oval in outline with few multicellular projections consisting of a shaft and trichomes radiating primarily at the tip.
2. Fruits symmetrically oval in outline with the margins fringed by setose projections; valves almost glabrous with a few scattered glandular punctate dots near the margins and a very few multicellular projections; fruit margins and persistent style fringed with multicellular projections to 1.0 mm long.

2. *P. brachycarpa*

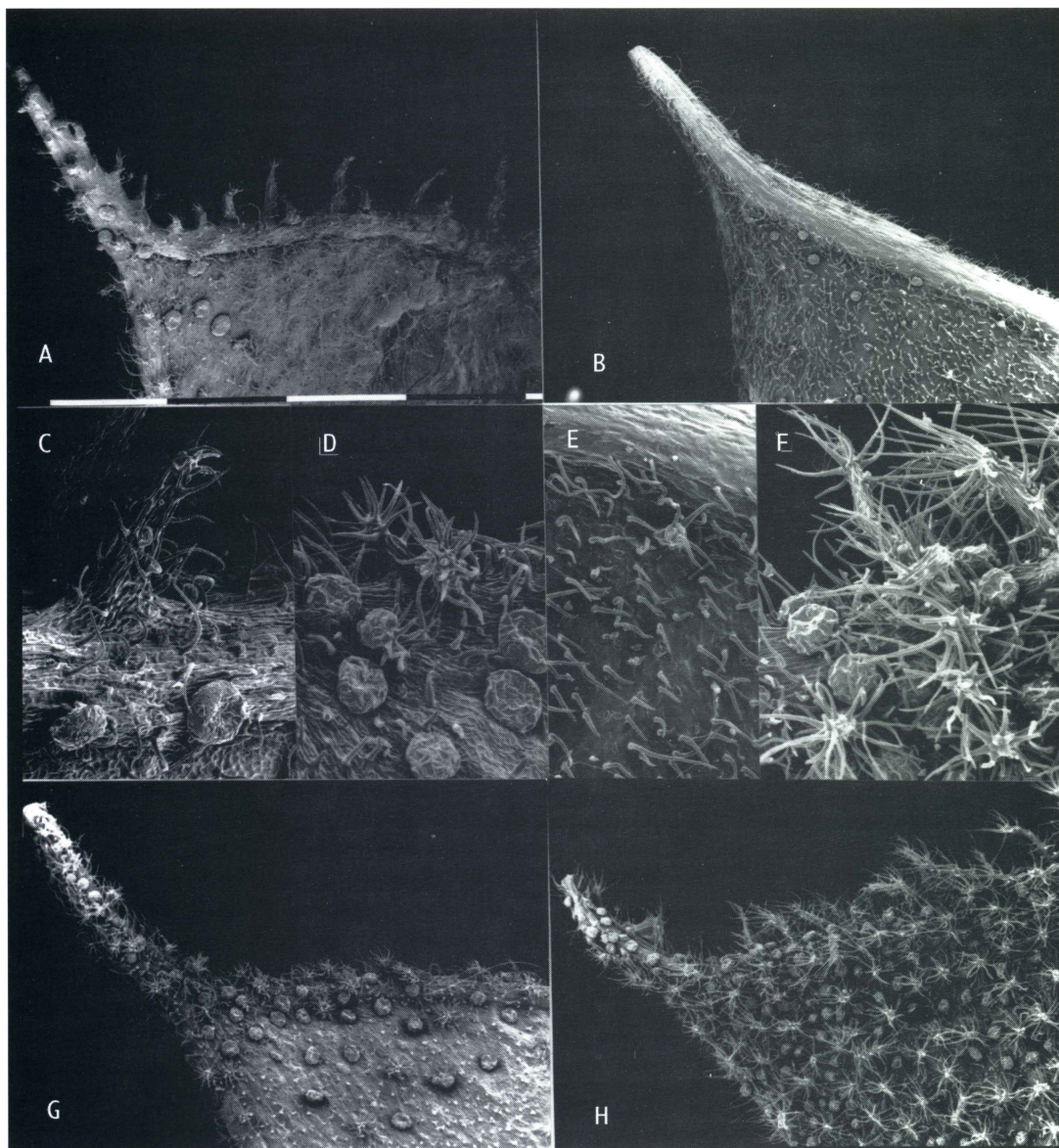


FIG. 1. Scanning electron micrographs of *Pomaria* fruit apices showing the nature and position of the multicellular projections and glandular-punctate trichomes. In all the low magnification pictures, the white bar represents 1 mm. The small inserts show the projections enlarged 5.10 x. A. *P. brachycarpa* (W. R. Carr 11287 [TEX]). B. *P. fruticosa* (Engard H1799 [NY]). C-F. Multicellular projections of: C. *P. brachycarpa*, D. *P. jamesii*, E. *P. fruticosa*, and F. *P. melanosticta*. G. *P. jamesii*. (B. Warnock 10576 [SRSC]) H. *P. melanosticta* (Rogers 218 [SRSC]).

2. Fruits arcuate or lunate in outline with the margins bearing only pilose trichomes or short stellate multicellular projections.
 3. Fruits arcuate, the margins more or less parallel; valves densely covered with glandular-punctate trichomes. 3. *P. canescens*
 3. Fruits lunate with the dorsal margin slightly curved and the lower margin strongly bowed outward; valves with multicellular projections terminating in a variable number of apical radiating arms (trichomes).
 4. Stems angularly branched, lightly pilose; fruits 18–21 mm long with valves and margins with very few, small multicellular projections each bearing few terminal trichomes. 4. *P. fruticosa*
 4. Stems straight or decumbent basally, hirsute with short, curled pilose trichomes; fruits 20–25 mm long with pilose trichomes, sparse glandular-punctate trichomes, and numerous multicellular projections with numerous apical trichomes producing a stellate appearance. 6. *P. jamesii*
1. Fruits lanceolate-oblong or trapezoidal in outline and with numerous long (to 1–2 mm) cylindrical setose projections on the valves and margins or with sparse small (>0.5 mm) multicellular projections with a short stalk and a few unequal, apical, radiating trichomes.
 5. Sepals with large glandular-punctate trichomes that are black when dry mixed with smaller red or orange peltate glandular trichomes; fruit margins with conspicuous long (to 1 mm) multicellular projections. 7. *P. melanosticta*
 5. Sepals bearing glandular-punctate trichomes (black on drying) of one size only; fruit margins lacking complex trichomes on the margins or with only a few small (>0.5 mm long) multicellular projections.
 6. Fruit valves with long (0.5–2.0 mm) multicellular projections.
 7. Leaves with 3–7+ 1 pinnae; leaflets 6–9 per pinna; stems and sepals with elongate stipitate peltate to conical glandular trichomes; dorsal surface of flag petal with elongate multicellular trichomes or very densely covered with glandular-punctate trichomes. 8. *P. multijuga*
 7. Leaves with 2–3+1 pinnae; leaflets 4–5 per pinna; stems and sepals tomentose or pilose with scattered glandular-punctate trichomes; dorsal surface of the flag petal with scattered glandular-punctate trichomes. 9. *P. wootonii*
 6. Fruit valves with few and small (>0.5 mm) multicellular projections.
 8. Flowers ca. 6 mm long, 7–8 mm wide; leaves with 3–6 +1 pinnae; fruit valves densely covered with black glandular-punctate trichomes. 5. *P. glandulosa*
 8. Flowers 12–20 mm long, 6–10 mm wide; leaves with 3+1 pinnae; fruit valves with few black glandular-punctate trichomes. 1. *P. austrotexana*

**1. *Pomaria austrotexana* B. B. Simpson
sp. nov.**

TYPE. UNITED STATES. Texas. Jim Hogg Co.: Farm Rd 649, 11 mi N of Guerra in loose sand, 23 Mar 1962, S. Alvarez *et al.* 7765 (HOLOTYPE: LL!). (Fig. 2)

Pomaria wootonii similis sed statura et floribus majoribus necnon leguminis margine valvulisque trichomatibus complexis minoribus conspersis absim-

ilis; a *P. melanosticta* sepalis extus trichomatibus complexis monomorphis leguminisque margine trichomatibus complexis elongatis (2 mm usque) indutis diversa. Habitatato arenas profundas.

SHRUBLETS decumbent at the base, 15–60 cm tall with a thick woody root-crown; old stems reddish, almost rugose to striate, glabrous; young stems ribbed, green, densely pilose and with scattered glandular-punctate trichomes. STIPULES filiform, more or

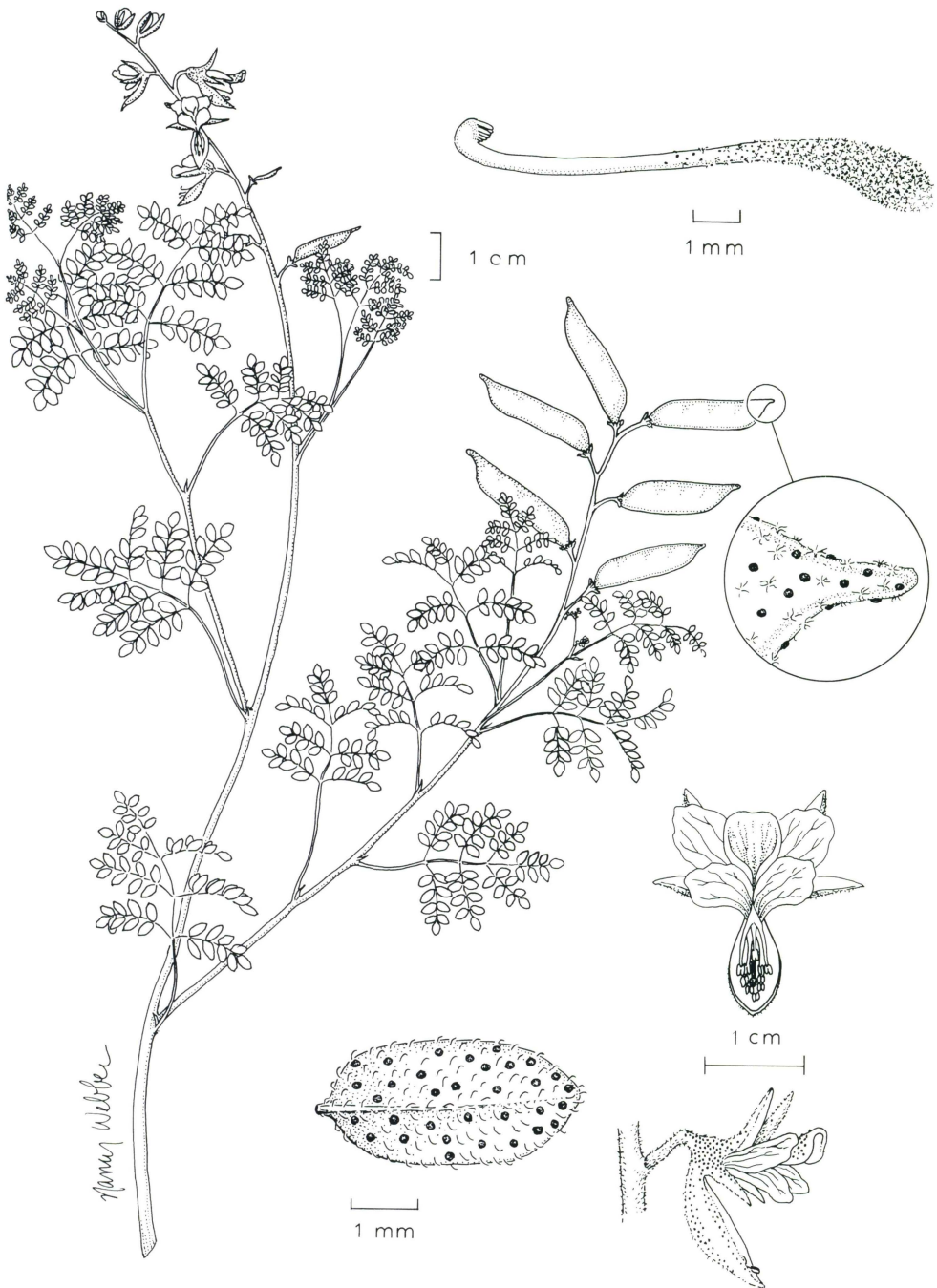


FIG. 2. *Pomaria austrotexana* B. B. Simpson. A. Flowering and fruiting branches showing the attitudes of the flowers and fruits. B. Leaflet with glandular-punctate trichomes and short, curled trichomes on the lower surface. C. Flower, front view showing the attitudes of the petals and the declined stamens and style between the lateral petals. D. Flower, lateral view showing the almost bilabiate aspect. E. Gynoecium showing the covering of multicellular projections and punctate trichomes on the ovary and partially up the style. F. Fruit tip showing the dispersion of the glandular-punctate trichomes and the small, sparse, multicellular projections.

less entire to pinnatifid, densely tomentose, and bearing a few glandular-punctate trichomes, 3 mm long, 0.3 mm wide. LEAVES composed of 2–3+1 pinnae, 55–70 mm long including the rachis, 15–30 mm wide; point of pinnae attachment consisting of clusters of glandular-punctate trichomes, tomentose, often with 1–2 red filiform processes with white trichomes; leaflets 3–5 pair per pinna, oblong and rounded apically, 3–6 mm long, 1.0–2.5 mm wide, moderately to densely tomentose above, densely and evenly pilose with numerous glandular-punctate trichomes below. INFLORESCENCES terminal, 7–12 cm long, bearing 7–15 flowers on simple pedicels. FLOWERS upright, almost bilabiate in lateral view, 12–20 mm long, 6–10 mm wide; lower sepal ca. 9 mm long, 3 mm wide; lateral sepals 8 mm long, 4.0 mm wide; dorsal surfaces of sepals variably pilose with short curled trichomes on the midveins and some on the margins and with glandular-punctate trichomes; flag petal yellow with deep red blotches, ca. 8 mm long, 3 mm wide, with a small tuft of trichomes in the fold of the claw and with a very few glandular-punctate trichomes dorsally, occasionally lightly canescent dorsally at the base; lateral petals yellow, ca. 8 mm long, 4 mm wide, mostly glabrous with some trichomes dorsally at the base; stamens with filaments to 4.5 mm long, bearing trichomes extending half way to the anther; ovary ca. 3 mm long, densely covered with glandular-punctate trichomes on the margins and white to yellow trichomes laterally, surmounted by a style 6 mm long with the lower half bearing glandular-punctate trichomes and small multicellular projections. FRUITS upright, oblong-lanceolate, 20–35 mm long, ca. 10 mm wide, acute apically; valves with a few glandular-punctate trichomes and scattered small (>0.5 mm) multicellular processes with white trichomes radiating apically; margins pubescent with short curled trichomes and a very few multicellular projections (to 0.5 mm long); seeds 2, irregularly circular in outline, mahogany brown, ca. 4 mm long, 2 mm wide.

DISTRIBUTION (Fig. 3) AND HABITAT: In southern Texas in Brooks, Kenedy, Jim Hogg, and Zapata Counties, occasionally in Tamaulipas, Mexico, growing in deep sands from sea level to 200 m.

FLOWERING AND FRUITING: March to June (primarily March) and sometimes again in August.

REPRESENTATIVE SPECIES EXAMINED: MEXICO. Tamaulipas: Mpio. San Fernando, on rd to Mendez, 16 km W of main hwy leading N from San Fernando, 100 m, 25 Sep 1981, *P. A. Fryxell 3724* (MEXU). UNITED STATES. Texas. Brooks Co.: Falfurrias, 10 mi S, 20 Mar 1952, F. B. Jones 693 (TEX). Hidalgo Co.: La Reforma Training area (TX Natl. Guard), 98° 26' 36" W, 26° 38' 05" N, 20 Apr 1994, *W. R. Carr 13599* (TEX-2). Jim Hogg Co.: Hebbronville, 27 mi S, 25 Jun 1962, *D. S. Correll & M. C. Johnston 25530* (GH, LL, MO); Randado, 3 mi S, Mar 1959, *B. L. Turner 4505* (TEX). Kenedy Co.: Armstrong, 3 mi S, 7 Aug 1954, *H. H. Hildebrand & M. C. Johnston 541320* (TEX (2)). Zapata Co.: San Ignacio, ca 5 mi NE on rd to Aguilares, 19 May 1980, *B. L. Turner 80-74M* (TEX); 12.4 mi ENE of San Ignacio on rt 3169, 27° 8.57' N, 99° 16.43' W, 9 May 1997, *B. B. Simpson 9-V-99-2* (TEX).

This rare species is restricted to areas of deep sand in south Texas and neighboring Mexico. Individual plants have a mounded appearance due to the basally decumbent stems. It has large flowers that are extremely zygomorphic. Like *Pomaria melanosticta* with which it has been confused, the foliage has a rank odor. It differs from *P. melanosticta* in having only one type of punctate gland on the sepals and in lack of long multicellular projections on the fruit margins. It differs from *P. wootonii*, which occurs slightly to the south in Mexico, in its larger habit, larger flowers, and short multicellular projections on the valves and margins of the fruit. It differs from both of these species in its preference for deep sandy, rather than limestone, soils.

It is difficult to find plants of *Pomaria austrotexana* in flower and fruit at the same time. The specimen chosen as the holotype has numerous flowers and numerous partially mature fruits. The fruits are mature enough to exhibit the distinguishing charac-

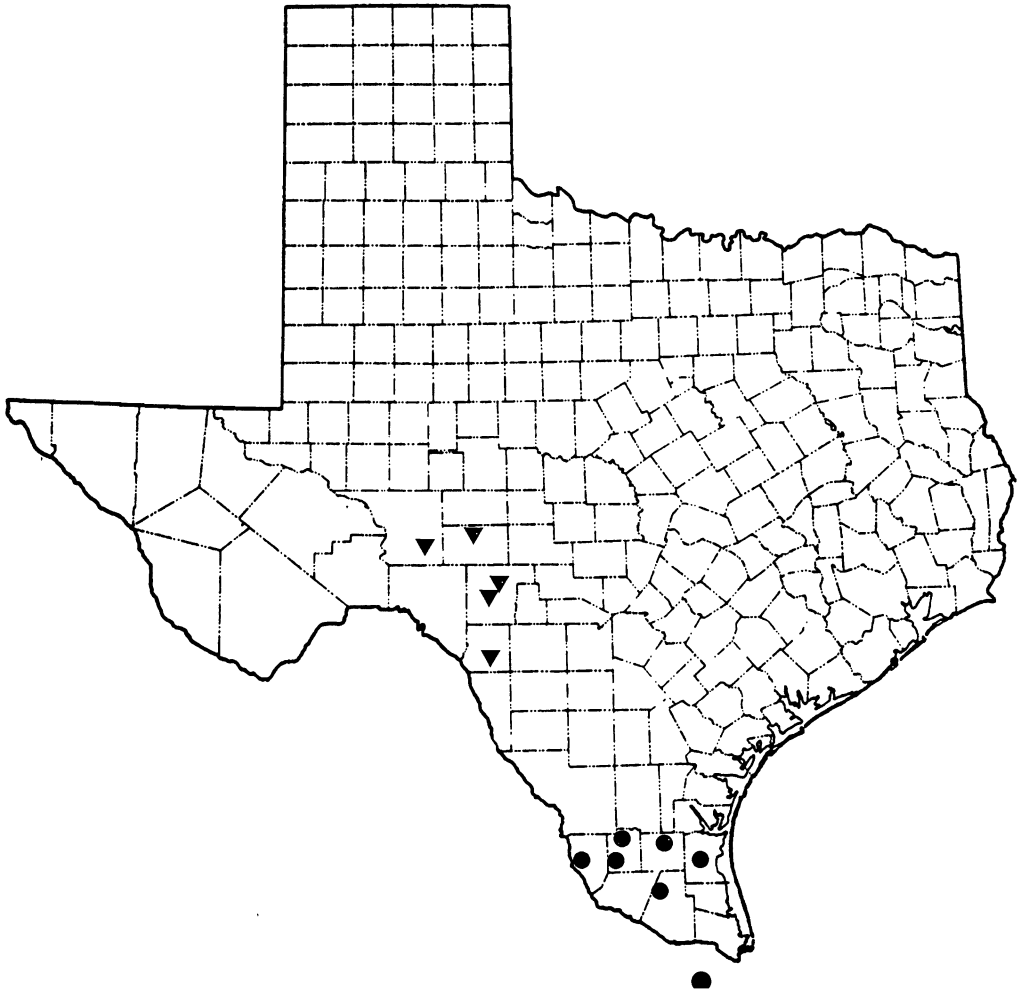


FIG. 3. Distribution of *Pomaria austrotexana* (dots) and *P. brachycarpa* (triangles).

ters of scattered glandular-punctate trichomes and small multicellular projections.

2. *Pomaria brachycarpa* (A. Gray) B. B. Simpson comb. nov. (Fig. 1A, C; Plate 1)

Hoffmannseggia brachycarpa A. Gray, *Plantae wrightianae* 1: 55. 1852. TYPE: [UNITED STATES]. New Mexico [Actually Texas: Kinney Co., high rocky limestone prairie, Turkey Cr. to Elm Cr., 16 May] 1851, *C. Wright 1023* [= *C. Wright 77*, see below] (LECTOTYPE: GH! sprig in the center, here designat-

ed; ISOTYPES: K! NY! US!)

Caesalpinia brachycarpa (A. Gray) Fisher, *Bot. Gaz.* 18: 123. 1893.

Larrea brachycarpa (A. Gray) Britton, *N. Amer. fl.* 23 (5): 315. 1930.

SUBSHRUBS, to 40 cm tall with a thick tap root; old stems yellow to brown, striate and with glandular-punctate dots; young stems green with red markings, sparsely canescent with scattered glandular-punctate dots. STIPULES oblanceolate, slightly serrate to lacinate with simple trichomes marginally and some glandular-punctate

trichomes, 1.5–3.0 mm long, 1.5–2.0 mm wide. LEAVES bearing 2–3 +1 pinnae, 50–60 mm long including the rachis, 30–35 mm wide; point of pinna attachment with a ring of glandular-punctate trichomes and sometimes 1 or 2 elongate processes tipped with trichomes or a black gland; leaflets 3–6 pairs per pinna, oblong, rounded apically, 3–7 mm long, 1.2–3.0 mm wide, glabrous or puberulent above, glabrous or puberulent and with scattered glandular-punctate dots primarily submarginally below. INFLORESCENCES terminal, 70–130 mm long, bearing 6–25 flowers on simple pedicels. FLOWERS nutant, turbinate in lateral view, 6–8 mm long, 6–7 mm wide; lower sepal 5–6 mm long, ca. 2 mm wide; lateral sepals ca. 5 mm long, 3.0–3.5 mm wide; all sepals lightly pilose on the margins and dorsal midvein and with glandular-punctate trichomes submarginally; flag petal yellow, 5–6 mm long, 2.0–2.5 mm wide, with a tuft of trichomes inside of the fold and at inner base of the claw and a few glandular-punctate trichomes dorsally on the upper expanded blade; lateral petals yellow, 5.0–5.5 mm long, 3.0–3.5 mm wide, glabrous; stamens with filaments to 3.5 mm long, villous to the anther; ovary 2.0–2.5 mm long, glabrous laterally with glandular-punctate trichomes and multicellular setose projections on the margins, surmounted by a style 1.5–2.5 mm long with glandular-punctate trichomes and multicellular projections basally. FRUITS upright, oval in outline, bilaterally symmetrical, 15–21 mm long, 7–10 mm wide, mucronate by the persistent style; valves glabrous or puberulent with a few glandular-punctate trichomes; margins bearing black glandular-punctate trichomes and many multicellular projections to 1 mm long terminating in radiating hairs or a black glandular dot; seeds 1–2, circular in outline, dark brown, ca. 3 mm long, 2 mm wide.

DISTRIBUTION (Fig. 3) AND HABITAT: The species is restricted to four counties of the Edwards Plateau, Texas where it occurs in live oak savanna on rocky clay or limestone soils.

FLOWERING AND FRUITING: April and May with a potential second flowering in November.

REPRESENTATIVE SPECIES EXAMINED: UNITED STATES. Texas. Crockett Co.: Rocky prairies, Jun, *J. Reverchon 1510* (DS, F). Edwards Co.: Rock Springs, 11 mi W on Rt 377, 13 Apr 1990, *B. B. Simpson 13-IV-90-1* (TEX); Rt 674 down west fork of the Nueces River, 29 Apr 1959, *D. S. Correll & I. M. Johnston 21210* (LL); Substation No. 14, 2 May 1942, *V. L. Cory 39033* (TEX). Kinney Co.: Brackettville, 10 mi NNE, 26 June 1954, *B. L. Turner 3648* (TEX); Brackettville, 16 mi NE, 17 Apr 1957, *D. S. Correll et al. 15975* (BRY, NY, TEX); Brackettville, 9 mi E, 19.5 mi E of jctn of Rt 334 and rt 90 on rt 344, 100° 17.45' W, 29° 23.75' N, 22 Jun 1992, *B. B. Simpson 92-06-22-3* (TEX). Sutton Co.: Sonora, 14 Apr 1930, *M. E. Jones 26132* (POM).

In his 1892 revision of *Hoffmannseggia*, Fisher stated that the GH specimen, *Wright 1023* marked with the handwritten numbers 77 and 179, is the type of *H. brachycarpa* but there is no indication which of the four sprigs on the sheet is which. Isely (Isely, 1975) indicated that this sheet should be the holotype but again did not specify a particular branch on the sheet. From Wright's field notes, it is obvious that *Wright 77* from Kinney County is the only possible choice since Wright's collection 179 came from "a big bend of the San Pedro" (= Devil's River), Val Verde Co. So far as known, *Pomaria brachycarpa* is restricted to four counties on the southern part of the Edwards Plateau although occurring relatively close to Val Verde County. Gray's statement in the original description (uncorrected by Fisher) that the specimen came from New Mexico resulted from the fact that the printed labels say New Mexico. I have designated the central specimen on the GH sheet as the type since it unequivocally fits Gray's protolog.

As pointed out by Isely (1975), *Pomaria brachycarpa* is unmistakable in fruit because of the oval, flat pods with "setose-muricate" projections (up to 1 mm long) along the margins producing a "fringed" appearance (Fig. 1 A, C). These projections are cylindrical with radiating trichomes at the tip. The stipules of this species are almost oval in outline and fringed. The leaflets often tend to have a red edge and are sometimes slightly lobulate. The glandular-punctate trichomes on the under surfaces of the leaves

are few and tend to be distributed submarginally.

3. *Pomaria canescens* (Fisher) B. B. Simpson, comb. nov.

Hoffmanseggia canescens Fisher, Contr. U. S. Natl. Herb. 1: 149. 1892. TYPE: [MEXICO] Coahuila: near Saltillo, 1–15 April 1880, *E. Palmer* 269 (HOLOTYPE: US!; ISOTYPES: GH! NY!).

Caesalpinia canescens (Fisher) Fisher, Bot. Gaz. 18: 123. 1893.

Larrea canescens (Fisher) Britton, N. Amer. fl. 23 (5): 316. 1930.

SMALL SUBSHRUBS, 20 cm to 1 m tall with a fasciculate taproot; old stems striate, green, variously canescent to tomentose; young stems ribbed, green, densely pilose with retrorse trichomes and glandular-punctate trichomes. STIPULES filiform, lacinate, densely tomentose and bearing a few glandular-punctate trichomes, 3.0–3.3 mm long, 0.3–2.0 mm wide. LEAVES bearing 2–4+1 pinnae, 30–70 mm long including the rachis, 15–50 mm wide; point of pinnae attachment bearing clusters of glandular-punctate trichomes, tomentose, and occasionally with a few elongate processes; leaflets 4–7 pairs per pinna, oblong, acute, rounded or slightly emarginate apically, 2–9 mm long, 1–4 mm wide, pubescent above, densely pubescent below especially on the margins and midvein and with numerous glandular-punctate trichomes. INFLORESCENCES terminal and axillary, 80–190 mm long, bearing 11–23 flowers on simple pedicels. FLOWERS nutant and turbinate in lateral view, 8–10 mm long, 7 mm wide; lower sepal 6–8 mm long, 2–4 mm wide; lateral sepals 7–8 mm long, 4 mm wide; dorsal faces of sepals tomentose primarily on the midvein and to a lesser extent on the lateral veins and margins and with scattered glandular-punctate trichomes; flag petal yellow with red dots, 6 mm long, 3 mm wide, with a tuft of trichomes inside of the fold of the claw and with a variable number of glandular-punctate trichomes

dorsally on the fold and expanded apical portion; lateral petals yellow, 6 mm long, 4 mm wide, glabrous or sometimes with a few glandular-punctate trichomes and/or strigose trichomes dorsally; stamens with filaments to 3 mm long bearing trichomes that can reach to the anther; ovary 3–4 mm long, densely covered with glandular-punctate trichomes especially on the margins and with multicellular projections on the valves, surmounted by a glabrous style 3 mm long. FRUITS arcuate-decumbent, crescent-shaped with the margins more or less parallel, 23–25 mm long, 5 mm wide, acute; valves with dense glandular-punctate trichomes and multicellular projections with white radiating apical trichomes of “palm-tree” or stellate appearance; margins with dense glandular-punctate trichomes and multicellular projections each with few white radiating apical processes; seeds 1–4, circular in outline, mahogany-brown, 4 mm long, 4 mm wide.

DISTRIBUTION (Fig. 4) AND HABITAT: Mexico in the states of Chihuahua, Coahuila, Durango, Nuevo León, San Luis Potosí, and Zacatecas at elevations from 1100–2300 m. Growing on calcareous soils in scrub habitats (matorral micrófilo) with *Larrea* and *Yucca* spp..

FLOWERING AND FRUITING: In Chihuahua, April; Coahuila, April to August; Durango, August; Nuevo León, Tamaulipas and Zacatecas, June through August.

REPRESENTATIVE SPECIES EXAMINED: MEXICO. Coahuila: 19 mi S of Saltillo, 2050 m, 19 Aug 1940, *F. Shreve & E. R. Tinkham* 9600 (ARIZ); Saltillo, Apr 1880, *E. Palmer* 269 (NY); Estación Marte, 10 air km NNE, Sierra La Paila, 100° 41' W, 25° 52' N, 1600 m, 25 Jul 1993, *B. L. Turner* 93-128 (TEX); Fraile, 3 km SW, 100° 15' W, 25° N, 2100 m, 12 Jul 1941, *L. R. Stanford et al.* 351 (ARIZ); Morillo, 1600 m, Apr 1942, *P. Lyonnet* 3485 (US (2)); San Juan de la Vaquería, on the rd to General Cepeda, 101° 15' W, 25° 16' N, 1825 m, 5 Jun 1972, *F. Chiang et al.* 8261B (TEX). Nuevo León: 3 km W of San Rafael, 19 Aug 1968, *H. D. Ripley* 14921 (NY, US); Canelito, 2 km SE on rd to San Juan de Dios, 100° 42' W, 24° 37' N, 1925 m, 19 Jun 1972, *F. Chiang et al.* 7989 (TEX); Doctor

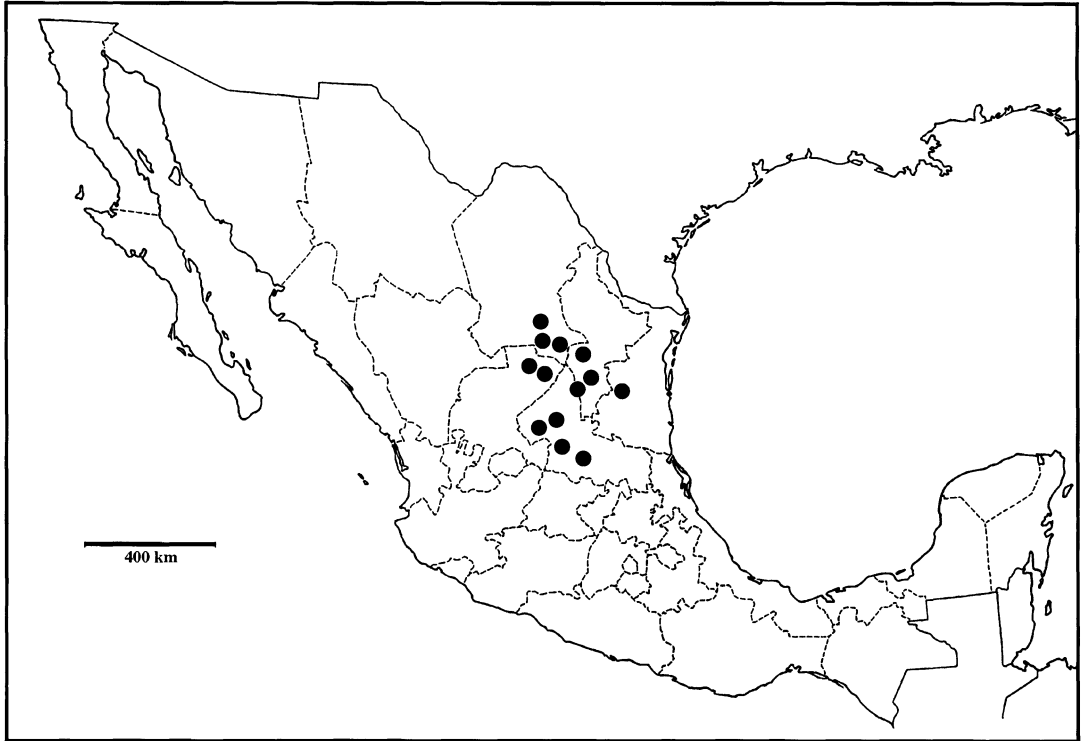


FIG. 4. Distribution of *Pomaria canescens*.

Arroyo, Santa Rita, 640 m, 6 Sep 1993, *J. Hinton* 22877 (TEX); Galeana, near Ejido El Tokio, 1830 m, 6 Sep 1989, *A. E. Estrada* C. 1745 (TEX); Nuevo León-San Luis Potosí border, Matehuala-Dr. Arroyo hwy, 101° 29' W, 23° 40' N, 1500 m, 22 Jun 1972, *F. Chiang et al.* 8072 (TEX); San Roberto, 39 mi S on Saltillo-Matehuala hwy, 100° 24' W, 24° 1' N, 1600 m, 7 Nov 1960, *M. C. Johnston & J. Crutchfield* 6041A (TEX). **San Luis Potosí:** Mpio. San Luis Potosí, 2 km before La Mantequilla, 1885 m, 6 Jun 1988, *F. Sánchez* B. s. n. (MEXU); Laguna Seca, 3 km E, Mpio. Soledad, 1850 m, 25 Aug 1956, *J. Rzedowski* 7999 (TEX); Charcas, Jul 1934, *C. L. Lundell* 5341 (ARIZ, WIS); Charcas, 40 km N and 9.1 mi N of El Cuba, 101° 00', 23° 21' N, 2100 m, 3 Jul 1972, *F. Chiang et al.* 8228A (TEX); 2 km from Terreros on rd to Reforma Terreros, 100° 25' W, 22° 6' N, 1100 m, 30 Jun 1972, *F. Chiang et al.* 8179 (NY, TEX). **Tamaulipas:** Miquihuana, 1.5 mi W, Palmitas-Miquihuana-Doctor Arroyo, 2 Jun 1970, *T. Whiffen & J. Grashoff* 334 (TEX). **Zacatecas:** 55 km NE of Zacatecas on the rd to Saltillo, 2020 m, 10 Sep 1978, *R. Grether* 1013 (MEXU); 30 mi from Concepción del Oro and 14 mi from San Tiburcio on the winding rd between them, 2233 m, 26 Jun 1955, *M. C. Johnston* 2610C (TEX); Tecolotes, 10 km WNW on the rd to Coapas, 102° 02', 24° 39', 1800 m, 17 Jun 1972, *F. Chiang et al.* 7894 (TEX).

Pomaria canescens has decumbent, arcuate fruits with parallel margins that readily distinguish it from other members of the genus. Plants are densely vestitured and the glandular-punctate trichomes on the leaves are dense compared to many other species.

4. *Pomaria fruticosa* (S. Watson) B. B. Simpson, comb. nov. (Fig. 1 B, E)

Hoffmanseggia fruticosa S. Watson, Proc. Amer. Acad. Arts 21: 451. 1886. TYPE: [MEXICO]. Coahuila: [in mountain canyons] near Jimulco, 28 April 1885, *C. G. Pringle* 230 (HOLOTYPE: VTI; ISOTYPES: GH!, US!)

Caesalpinia fruticosa (S. Watson) Fisher, Bot. Gaz. 18: 123. 1893.

Larrea fruticosa (S. Watson) Britton, N. Amer. fl. 23 (5): 314. 1930.

Angularly branched SHRUBS, 40 cm to 1.5 m tall with a unknown root type; old stems red and black-fissured or black with

red undertones; young stems lightly pilose. STIPULES filiform to oblong, slightly pectinate, canescent on both surfaces, 2–3 mm long, 0.5 mm wide. LEAVES composed 1–3+1 pinnae, 19–30 mm long including rachis, 12–40 mm wide; point of pinna attachment with of a ring of black punctate trichomes; leaflets 2–5 pairs per pinna, oblong, slightly emarginate, 2.5–7.0 mm long, 1.0–2.5 mm wide, lightly canescent above, moderately to densely canescent with a few glandular-punctate trichomes dispersed primarily submarginally below. INFLORESCENCES terminal, 18–50 mm long, bearing 6–17 flowers on pedicels jointed about 0.50 to 0.75 distant from the rachis. FLOWERS turbinate in lateral view, 6–8 mm long, 6–8 mm wide; lower sepal 6–8 mm long, 3 mm wide; lateral sepal 5–6 mm long, 3.4–4.5 mm wide; dorsal faces of sepals very tomentose especially on the veins and margins and bearing glandular-punctate trichomes; flag petal yellow, often with red markings, 4.0–6.0 mm long, 2 mm wide, with a tuft of trichomes inside of the fold of the claw and with glandular-punctate trichomes dorsally on the expanded blade; lateral petals yellow, 5–6 mm long, 3.4–4.5 mm wide, with trichomes on the inner basal claw; anthers with filaments 3.0–3.5 mm long, vestitured almost to the anther; ovary 2 mm long, villous on the faces and bearing glandular-punctate trichomes and multicellular projections on the margins; style 2 mm long, variously villous to the stigma and with glandular-punctate trichomes on the lower third. FRUITS lunate in outline with a more or less straight ventral margin, 18–21 mm long, 6–9 mm wide, shortly mucronate due to persistence of part of the style; valves lightly pilose, with a very few glandular-punctate trichomes and a few, small, multicellular projections to 0.3 mm long; margins lightly pilose, with a very few glandular-punctate trichomes and a few small multicellular projections to 0.3 mm long; seeds 1, oval in outline, dark brown, 3.5–4.0 mm long, 4–5 mm wide.

DISTRIBUTION (Fig. 5) AND HABITAT: Apparently restricted to a relatively high elevation region (1100–2200 m) of Mexico in southern Coahuila and adjacent Durango.

FLOWERING AND FRUITING: from March to July and apparently in October.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO.

Coahuila: 11 km northeast of Jimulco, 103° W, 25° N, 2100 m, 27 Jun 1941, *L. R. Stanford et al. 15* (ARIZ); Mpio. Torreon Flor de Jimulco, 10 km NE, 103° 13' 30" W, 25° 6' 30" N, 2150 m, 25 Aug 1988, *J. A. Villarreal & M. Carranza 4439* (TEX); Las Margaritas, 13 km N, E side of Sierra de las Margaritas, 102° 50' – 102° 51' W, 26° 34' 30" to 26° 33' N, 1100–1400 m, 23 Mar 1973, *M. C. Johnston et al. 10360* (TEX); Puerto de Sardinias, 3 km S, Sierra de las Delicias, 103° 00' 00" W, 26° 21' 30" – 26° 22' N, 1200–1400 m, 9 Aug 1973, *M. C. Johnston et al. 12181* (TEX); Tlahualillo, 32 air mi NE, Sierra de las Delicias, 103° 06' W, 26° 22' N, 1400 m, 9 Aug 1973, *J. Henrickson 12225* (LL). Durango: foothills of Sierra de Mapimí below Dinamita, 20 Oct 1965, *H. D. Ripley & R. C. Barneby 14210* (NY (2)); 25–30 mi W of Mapimí, 9 Jul 1982, *R. Engard & W. Hodgson H1799* (NY); Mpio. Rodeo, 10 km N of Alamillo on the rd to Parral, 4 Aug 1987, *O. Téllez V. 10637* (MEXU); 49.6 mi S of Chihuahua state line, Hwy 45, 2020 m, 21 Jul 1975, *Torke et al. 142* (MO, NY); El Entronque, 16 mi S, 1100 m, 7 Oct 1955, *M. C. Johnston 2966* (TEX); La Zarca, 9 mi E on Rt 30, 26 Jul 1958, *D. S. Correll & I. M. Johnston 20239* (LL); NW third of Sierra del Rosario, 2200 m, 25 Jun 1973, *M. C. Johnston et al. 11468* (NY, TEX); Mpio. San Pedro del Gallo, El Papalote, 1800 m, 28 Oct 1980, *J. G. Ochoa G. 20* (MEXU).

Pomaria fruticosa has a distinctive angular branching pattern and branches that are woody, shiny, and reddish. This is one of the two species of the genus (*P. multijuga* is the other) that has jointed pedicels. The short broadly lunate fruits are reminiscent of those of *Hoffmannseggia drummondii*.

5. POMARIA GLANDULOSA Cav.

Pomaria glandulosa Cav., Icon. 5: 2. tab. 402. 1799.

TYPE: NOVA-HISPANIA. [Mexico]. Querétaro, Oct, [no year] *Née s.n.* (lectotype: M—xerox seen). There are two specimens at MA. One, labeled Querétaro in Nova Hispania, has no fruits and only one ragged flower. The other, labeled Chili et Nova Hispania, has several fruits

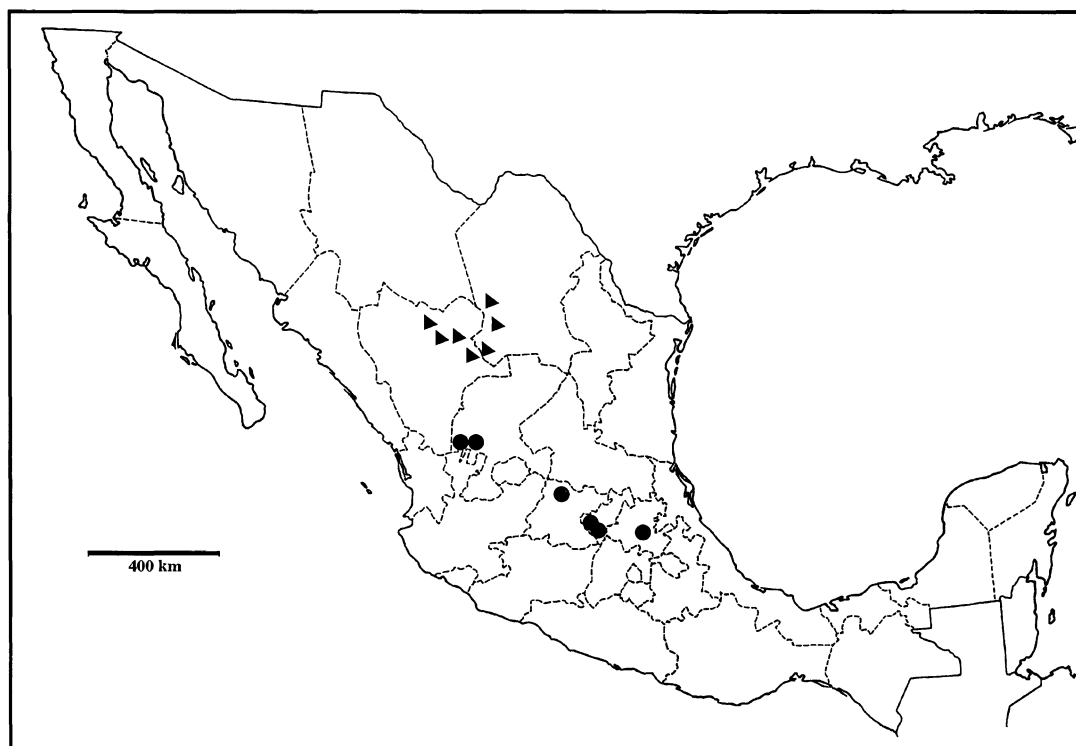


FIG. 5. Distribution of *Pomaria fruticosa* (triangles) and *P. glandulosa* (dots).

and flowers and is very similar to the drawing (tab. 402) accompanying Cavanilles' original description. This second sheet is here considered the lectotype.

Hoffmanseggia glandulosa (Cav.) Torr. & A. Gray, Fl. N. Amer. 1: 392. 1840, non *H. glandulosa* Willd. ex Vog. Linnaea 11: 404. 1837.

Larrea glandulosa (Cav.) Britton, N. Amer. fl. 23 (5): 314. 1930.

Larrea montana Britton, N. Amer. fl. 23 (5): 316. 1930.
TYPE: MEXICO. Jalisco: Between Huejuquilla [=Huejuquilla] and Mesquitec [=Mezquitic], 25 Aug 1897, J. N. Rose 2575 (HOLOTYPE: NY!).

SHRUBS 30 cm to 2 m tall with an unknown root type; old stems puberulent and with scattered punctate trichomes; young stems red, striate, pilose and with scattered glandular-punctate trichomes. STIPULES linear to oblanceolate, pectinate, fimbriate and densely pubescent, 3.0 mm long, 1.5 mm wide. LEAVES composed 3–6+1 pinnae, 65–80 mm long including the rachis, 25–48 mm wide; point of pinna-

attachment consisting of a ring of glandular-punctate trichomes; leaflets 7–10 pairs per pinna, oblong with a rounded apex, 3.0–8.5 mm long, 1.0–2.5 mm wide, glabrous above with a few curled trichomes on the margins and veins and some glandular-punctate trichomes primarily submarginally below. INFLORESCENCES terminal, up to 25 cm long, bearing 10–23 flowers on simple pedicels. FLOWERS turbinate in lateral view, 6 mm long, 7–8 mm wide; lower sepal 4.0 mm long, 2.0 mm wide; lateral sepals 4.0 mm long, 3.0 mm wide; dorsal sepal surfaces bearing short curled trichomes at the tips and on the midveins and dense glandular-punctate trichomes elsewhere; flag petal yellow, 5.0 mm long, 1.5 mm wide, villous inside the fold of the claw and densely covered with glandular-punctate trichomes on dorsal folded portion and expanded blade, villous basally; lateral petals yellow, 4.0 mm long, 3.0 mm wide with glandular-punctate trichomes

dorsally and villous trichomes on the inner claw; stamens to 4.5 mm long, villous on lower 3/4; ovary 2.0 mm long, bearing glandular-punctate trichomes on the margins and on parts of the lateral surfaces with the rest of the lateral surfaces and margins villous, surmounted by a style 2.0 mm long, white-villous to the stigma. FRUITS upright, obliquely oblong to lanceolate in outline, curved, 20–28 mm long, 10 mm wide, mucronate by the persistent style; valves puberulent and densely covered with black glandular-punctate trichomes and a few short multicellular projections to 0.25 mm long that terminate in radiating arms or a glandular dot; margins pilose and with glandular-punctate trichomes; seeds 1–3, cordate in outline, medium brown, 5.0 mm long, 4.0 mm wide.

DISTRIBUTION (Fig. 5) AND HABITAT: In Mexico in chaparral-like habitats in the states of Guanajuato, Hidalgo, Jalisco, and Querétaro (fide Rzedowski & Rzedowski, 1997) at elevations from 1800 to 2300 m, mostly on igneous rock.

FLOWERING AND FRUITING: July to November.

REPRESENTATIVE SPECIES EXAMINED: MEXICO. **Guanajuato:** Cañada de Moreno, rd to Victoria, 2000 m, 19 Aug 1991, *E. Ventura* & *E. López* 9294 (TEX-2). **Hidalgo:** beginning of the descent into Barranca Grande de Mezquititlan from Zoquitlan, 2000 m, 6 Nov 1946, *H. E. Moore Jr.* 1864 (GH). **Querétaro:** rd to San Luis Potosí at km 10, 2150 m, 6 Jul 1980, *E. Argüelles* 1398 (MEXU); km 13 on the Querétaro-San Luis Potosí rd, 1800 m 16 Jun 1977, *M. González* & *E. García M. s. n.* (MEXU); km 6 on the rd to Huimilpan, 2297 m, 27 Jul 1984, *E. Argüelles* 2153 (MEXU).

According to Rzedowski (1997), plants of *Pomaria glandulosa* can be 1.4(–2) meters tall although most are much shorter. The flowers tend to turn purplish as they senesce and have conspicuous punctate glands on the dorsal petal surfaces.

6. *POMARIA JAMESII* (Torr. & A. Gray) Walp., *Repert. bot. syst.* 1: 811. 1843. (Fig. 1 D, G; Plate 1)

Hoffmanseggia jamesii Torr. & A. Gray, *Fl. N. Amer.* 1: 393. 1840. TYPE: [UNITED STATES]. New Mexico: Sources of the Canadian, [1820], *Dr. E. James s.n.* (LECTOTYPE: NY plant on the left!; ISOTYPE: GH plant on the left!). [Isely (1975) stated that the GH specimen was a “mixture” because there are two labels, one says “ex herb. Torrey” and the second, *A. Fendler 173*. The Torrey specimen on the left is in flower only. The sprig on the right is in fruit. Interestingly, the NY specimen has both a flowering and a fruiting sprig that match those on the GH specimen although there is only one label. Since they appear to represent the same pair of specimens I have designated the left specimen at NY the type.]

Caesalpinia jamesii (Torr. and A. Gray) Fisher, *Bot. Gaz.* 18: 123. 1893.

Larrea jamesii (Torr. & A. Gray) Britton, *N. Amer. fl.* 23 (5): 316. 1930.

H. jamesii var. *popinoensis* Fisher, *Contr. U.S. Natl. Herb.* 1: 150. 1892. TYPE: UNITED STATES. Kansas, 1876, *Popinoe s.n.* (HOLOTYPE: US, not found).

Semiprostrate to erect HERBACEOUS PERENNIALS to 50 cm tall with a thick spindle-shaped taproot; old stems yellow, striate, puberulent; young stems green, striate with dense short curled trichomes. STIPULES linear to lanceolate, more or less entire, pubescent and with a few glandular-punctate trichomes, 4.0 mm long, 0.5 mm wide. LEAVES composed of 2–3+1 pinnae, 42–75 mm long including the rachis, 25–60 mm wide; point of pinna-attachment sometimes villous and with an accumulation of glandular-punctate trichomes and 1–2 projections each up to 1 mm long and bearing white trichomes; leaflets 5–10 pairs per pinna, oblong with a rounded apex, 2.5–7.0 mm long, 1.0–2.5 mm wide, with a few scattered trichomes to moderately strigose above, densely strigose or covered with short curled trichomes mixed with scattered glandular-punctate trichomes especially toward the margins below. INFLORESCENCES lateral and terminal, 12–15 cm long, bearing 16–26 flowers on simple pedicels. FLOWERS generally nutant at anthesis, turbinate in lateral view, 6–10 mm long, 9–10 mm wide; lower sepal 7–9 mm long, 4 mm wide; lateral

sepal 6–9 mm long, 3.0–3.5 mm wide; dorsal surfaces of the sepals villous or with short curled trichomes on the bases, tips, and margins and with scattered glandular-punctate trichomes (occasionally of different sizes); flag petal bright yellow with red markings, 5–9 mm long, 2.0–2.5 mm wide, villous inside of the fold of the claw and bearing glandular-punctate trichomes on the back of the fold and the basal portion of the expanded blade; lateral petals yellow sometimes red basally, 6–8 mm long, 3.0–3.5 mm wide, sometimes with a few glandular-punctate trichomes dorsally at the base and slightly villous on the inner claw; stamens to 6 mm long, yellow-villous for 0.75 of the filament length; ovary 5–7 mm long, with glandular-punctate trichomes overlain by dense multicellular projections with apically radiating trichomes that produce a stellate appearance, surmounted by a style 4–5 mm long with multicellular projections and glandular peltate trichomes on the lower half. FRUITS decumbent, lunate in outline, 20–25 mm long, 8–10 mm wide, mucronate by persistent base of the style apically; valves with scattered glandular-punctate trichomes and short (to 0.4 mm) multicellular projections that appear stellate primarily along the upper margin and at tip; margins densely covered with complex trichomes similar to those on the valves; seeds 2, obovate in outline, dark brown, 7 mm long, 5 mm wide.

DISTRIBUTION (Fig. 6) AND HABITAT: In the United States and adjacent Mexico from Kansas and Colorado south through Arizona, New Mexico, Oklahoma, and Texas to northernmost Coahuila and Chihuahua, Mexico in grasslands with sandy or clay soils from 600 to 2300 m elevation.

FLOWERING AND FRUITING: May to September throughout the range with a slight preponderance of specimens in flower and fruit collected in June.

COMMON NAMES AND USES: Badger medicine and with edible root (*G. Tierney s.n.* [UNM]); false mesquite (*F. A. Bronson 502* [UNM]); camote de ratón and rush pea (*O.*

Baca 2672 [RSA]).

REPRESENTATIVE SPECIES EXAMINED: MEXICO. Chihuahua: Cd. Juárez, 15 mi SW on Hwy 10, 106° 39' W, 31° 37' N, 1510 m, 18 Aug 1971, *J. Henrickson 5700* (LL); km 131.5 on the rd from Chihuahua to Sueco, 14 Aug 1955, *M. S. González E. s.n.* (TEX); Samalayuca, 4.1 rd mi N on Hwy 45, 106° 27' W, 31° 24' N, 1550 m, 13 Sep 1972, *J. Henrickson 7432* (LL); Samalayuca, 6.9 mi N, 14 Aug 1955, *M. C. Johnston 2736A* (TEX). Coahuila: Santa Rosa Mts, 27 Jul 1938, *E. G. Marsh s.n.* (TEX). **UNITED STATES. Arizona.** Apache Co.: 18 mi N of St. Johns along US Rt 666, 1 Aug 1966, *R. J. Barr 64-395* (ARIZ); 5.2 mi NE of Concho along Hwy 61, roadside, 4 Jun 1974, *D. Atwood 6159a, 6159* (BRY); just outside north entrance to Petrified Forest, 14 Aug 1966, *E. Lehto 7237* (RSA). Cochise Co.: 20 mi N of Bisbee on rd to Tombstone, 1600 m, 5 Jul 1928, *C. B. Wolf 2494* (CAS, DS, GH, RSA); 4 mi E of Dragoon, 26 May 1935, *B. Maguire 11684* (GH, NY); 4 mi NE of Dragoon, 6 May 1935, *B. Maguire 11198* (NY); Dragoon Summit, 6 Sep 1914, *F. Shreve s. n.* (WIS); 6 mi S of Dos Cabezas; on roadside, 5 Sep 1944, *R. A. Darrow et al. 1218* (ARIZ); 5 mi E of Santa Cruz Co on hwy 82, 22 Aug 1969, *D. Isely 10900* (NY, US); 8 mi W of Wilcox, 1500 m, 10 Sep 1942, *R. Darrow 3557* (ARIZ). Coconino Co.: 20 mi S of Cameron, 1833 m, 22 Aug 1945, *R. A. Darrow 2708* (ARIZ); Flagstaff to Cameron, 2 Jun 1935, *R. H. Peebles 11801* (F); N of Grand Falls, Navajo Indian Reservation, 20 May 1961, *D. Demaree 44169* (NY); on Rt 89 in the NW corner of Wupatki Natl. Monument, 1900 m, 15 Oct 1941, *A. F. Whiting 1089* (ARIZ); 5 mi W of Taylor on rd to Pinedale, 9 Oct 1966, *V. L. Bohrer 1169* (ARIZ); between Winslow and Holbrook, 21 May 1934, *S. D. McKelvey 4562* (A). Winslow Co.: HP-36 site area, 1633, 20 Jun 1988, *K. R. Adams 17-88* (ARIZ). Colorado Co.: Ft. Lupton, 2 Sep 1916, *E. L. Johnston 208B* (NY); Rocky Ford, 1300 m, 13 Jun 1891, *C. S. Crandall s.n.* (NY). Baca Co.: 23 mi S of Walsh Upland prairie pasture, 5 Jun 1968, *S. Stephens & R. Brooks 21797* (DS); Carrizo Canyon region, 12 Jul 1947, *C. L. Porter 4290* (DS, GH, NY, RSA). Kiowa Co.: N of Eads, 26 Jun 1935, *L. Williams 2544* (WIS). Las Animas Co.: Kim, 7 m S and 16 mi E just W of Baca line, 8 Aug 1948, *W. A. Weber 4410* (DS); 3 mi E of Alcreek, 1500 m, 7 Jul 1937, *R. C. Rollins 1827* (GH, NY). Prowers Co.: Lamar, 10–15 mi S, 1 Jun 1941, *W. T. Penland 1612* (CAS). Pueblo Co.: NE of Pueblo, 7 Jun 1915, *F. W. Pennell 5758* (NY); Pueblo, 7 Jul 1908, *A. Mitchell s. n.* (F). Kansas. Grant Co.: 15 Aug 1891, *B. B. Smyth 252* (NY); Golden, 20 May 1891, *B. B. Smyth s.n.* (NY). Meade Co.: Upland south of Wolf Canyon, 916 m, 11 Jul 1950, *W. H. Horr 3502* (GH). Seward Co.: Arkalou, 27 Jun 1888, *W. A. Kellerman s. n.* (NY). Stevens Co.: 15 mi W and 1 mi S of Moscow S31 T21S R38W, 21 Jun 1978, *R. Brooks 13864* (NY); 5 mi NW of Hugoton, sand dune, 26 Aug

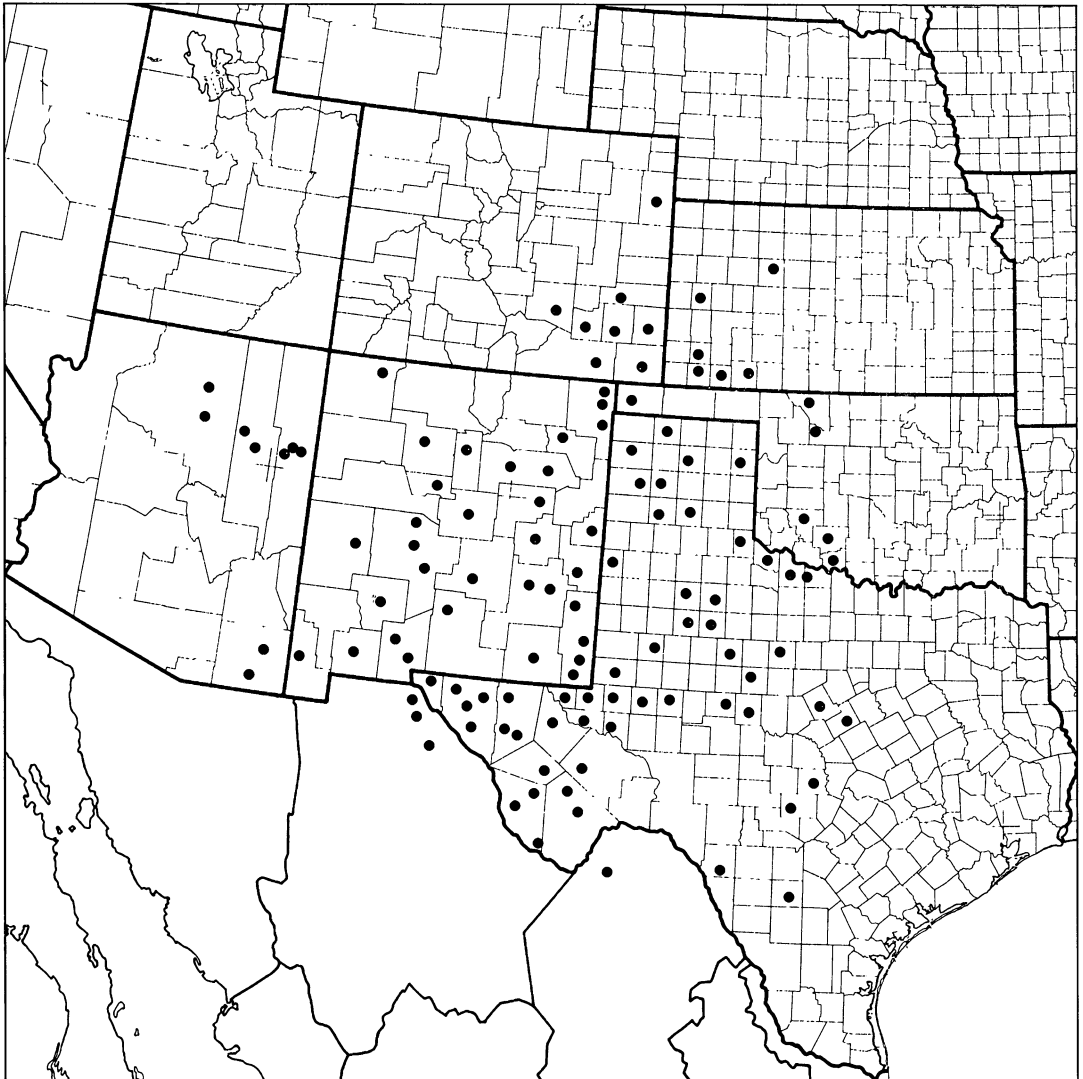


FIG. 6. Distribution of *Pomaria jamesii*.

1951, R. L. McGregor 5089 (NY). Trego Co.: 2 Jul 1888, J. E. Bodin s. n. (F); 15 mi S and 2 mi E of Collyer, 5 Aug 1952, W. H. & D.A. Horr 4145 (GH, NY). Wichita Co.: stony hills, 1 Aug 1895, A. S. Hitchcock s.n. (GH); Stony hills, 1 Aug 1895, A. S. Hitchcock 123 (GH, NY). New Mexico. Bernalillo Co.: 2 mi E of Albuquerque, 1600 m, 1915, A. L. Kammerer 35 (F NY); 4 mi N of Bernalillo, 1600 m, 4 Sep 1927, G. Arsène 18983 (F, POM); E slope of the Sandias, lower spruce-fir zone, 21 May 1961, L. D. Potter 350 (UNM); hwy 556, 4 mi E of Coronado Airport at Albuquerque, 2100 m, 7 Jul 1977, B. Hutchins 7091 (UNM). Catron Co.: Hwy 12, 23 mi SW of Datil, 2350 m, 3 Jul 1976, B. Hutchins 6094 (UNM). Chaves Co.: 10 mi NE of Roswell, 13 Jul

1976, D. Tuttle 80 (ARIZ). De Baca Co.: 0–15 mi W of Ft. Sumner on hwy 60, 6 Jun 1974, L. C. Higgins 8651 (BRY, NY); 6–8 mi N of Ft. Sumner, 31 May 1955, G. Nisbet 8292 (UNM); Hwy 60, 2 mi W of Ft. Sumner, 1400 m, 30 Jun 1977, B. Hutchins 7005 (UNM). Dona Ana Co.: 2 m E of Vado, 1250 m, 13 Aug 1930, F. R. Fosberg S3606 (RSA); 6 mi W of Las Cruces immediately E of Crawford Airport along rd to Box Canyon of Picacho Mtn., 1433 m, 17 Apr 1982, D. Ward & G. Forbes. 82-004 (NMC); Little Mt. nr Las Cruces, 26 Jan 1902, O. B. Metcalfe s.n. (NMC); Mesa west of the Organ Mountains, 1333 m, 5 Oct 1907, E. O. Wooton & P. Standley 3180 (ARIZ, DS, F GH, NY); on the mesa west of the Organ Mountains, Tortugas Mt., 25

- July 1895, *E. O. Wooton s. n.* (POM). Eddy Co.: Los Medanos Site nr Carlsbad; T22S R31E Sec. 20, 1133 m, 14 Jun 1978, *G. A. Marley s. n.* (UNM). Guadalupe Co.: Hwy 129, 4 mi N of Newkirk, 1550 m, 13 Jul 1978, *B. Hutchins 7619* (UNM); Hwy I-40, 13 mi E of Santa Rosa, 1650 m, 13 Jul 1978, *B. Hutchins 7611* (UNM); nr road bank at rest area near Hwy 40, 8.3 mi E of Milagro, 13 Jul 1975, *R. A. Norris 2672* (RSA); T10N R21E, 1573 m, 18 Jul 1979, *S. Tschaikowsky 275* (ARIZ). Harding Co.: Kiowa National Grassland Unit 46, 1450 m, 11 Aug 1987, *C. W. Dunmire et al. s. n.* (UNM). Hidalgo Co.: 0.9 mi N of rr crossing on US 80 N of Rodeo T28S R21W 19 MW1/4, 10 Jun 1978, *M. J. Warnock 741* (TEX); along US 80 E of Rodeo, 1500 m, 10 Jul 1964, *R. J. Barr 64-359* (ARIZ); nr State Rd 81 0.5 mi N of Antelope Wells, 1583 m, 8 Aug 1983, *B. Hutchins 11064* (UNM). Lea Co.: 31 mi WNW of Jal, 1133 m, 17 Jun 1966, *R. C. Barneby 14479* (CAS, NY); 5 mi NW of Hobbs at the campus of New Mexico Junior College, Mar 1967, *R. Pearce 2678* (ARIZ); 6 mi W of Hobbs, 103.08° W, 32.35° N, 1191 m, 10 Jul 1962, *F. A. Branson 502* (UNM); Hwy Loop 18, 4 mi N of Eunice, 1166 m, 5 Jul 1977, *B. Hutchins 7039* (UNM); vic. of Caprock, 26 Aug 1969, *D. Isely 10958* (NY). Lincoln Co.: Hwy 54, 20 mi S of Carrizozo, 1653 m, 8 Jul 1972, *B. Hutchins 3809* (UNM); Hwy 349, 0.5 mi E of Hwy 54, 0.25 mi N of Carrizozo, 22 Jul 1973, *R. Spellenberg et al. 3361* (NY). Luna Co.: 13 mi W of Gage, 25 Jun 1906, *E. O. Wooton s. n.* (UNM). Otero Co.: Hwy 54, 2 mi N of Three Rivers, 1586 m, 8 Jul 1972, *B. Hutchins 3814* (UNM). Quay Co.: 12 mi NE of Logan, 103.15° W, 35.32° N, 1333 m, 13 Jul 1962, *R. S. Aro & F. A. Branson 513* (UNM); 3 mi N of San Jon, 6 Jul 1938, *L. N. Goodding 4287* (ARIZ); Hwy 54, 19 mi N of Tucumcari, 1333 m, 11 Jun 1976, *B. Hutchins 5764* (UNM). Roosevelt Co.: 1 mi E of the Chaves-Roosevelt County line on Hwy 70, 13 Jun 1974, *L. C. Higgins 8663* (BRY, NY). San Juan Co.: Mouth of Amarillo Canyon, 4 Jul 1979, *B. Kramp 192* (NY). San Miguel: halfway from Anton Chico to Santa Rosa, 2 Aug 1926, *G. Arsène 16675* (WIS); Las Vegas, 11 Sep 1895, *E. N. Plank s. n.* (NY); Near Conchas Dam along Hwy 104, 10 May 1972, *L. C. Higgins 5147* (BRY, NY). Sandoval Co.: 2.3 mi SE of Zia Pueblo, 2000 m, 2 Oct 1974, *V. L. Bohrer 1924* (ARIZ); along rd to Armijo 1 mi W of Rt 44, 2000 m, 25 Jul 1966, *T. Plowman & S. Kilham AP 326* (GH); at corner of 26th & 27th St. in undeveloped Rio Rancho Estates, 2100 m, 26 Jun 1969, *G. Tierney s. n.* (UNM); Placitas area, T13N R4E sec. 13 SW 1/4, 1766, 11 Aug 1981, *R. Fletcher 5497* (UNM). Santa Fe Co.: N of Santa Fe, 2333 m, 31 May 1940, *A. L. Hershey s. n.* (NMC). Sierra Co.: 19 mi N of Hatch, 28 Jul 1938, *F. Shreve 8231* (ARIZ). Socorro Co.: rd to Riley, 2220 m, 30 Jul 1990, *K. Mactavish 85* (UNM); White Sands Missile Range Trinity Test Site, 16 Aug 1963, *R. Spellenberg 522* (NY); 1.25 mi S of US 380, of Fite Rd, 2 Aug 1977, *J. Edwards & R. Repass 4748* (NY); along new US 85 S of Bernardo W of La Jolla refuge, 1533 m, 2 Jun 1965, *O. Baca 97* (UNM); along new US 85, 2 mi S of Bernardo, 1666 m, 16 Aug 1965, *O. Baca 176* (UNM); Bosque del Apache NWR 0.5 mi S of hdqt, 12 Aug 1985, *R. Mongold 6* (UNM); Between Socorro and Los Lunas, 1930 m, *A. Davidson s.n.* (RSA); Hwy 380, 12 mi E of San Antonio, 1633 m, 15 Jul 1977, *B. Hutchins 7096* (UNM); Hwy 380, 14 mi E of Bingham, 1933 m, 17 Jul 1977, *B. Hutchins 7126* (UNM); Hwy I-25 21 mi S of Belen, 1566 m, 15 Aug 1976, *B. Hutchins 6531* (UNM); plains E of Datil on Hwy 60, 17 Jul 1973, *L. C. Higgins 7747* (BRY, NY); Sevilleta about 3 mi W of junction of Hwys 6 and 60, 1600 m, 10 Aug 1975, *T. Manthey 245* (UNM); Sevilleta sand dunes, 1633 m, 24 Sep 1982, *T. Dunbar 291* (UNM). Torrance Co.: 3 mi N of Willard, 8 Sep 1961, *L. D. Potter 590* (UNM). Union Co.: Hwy 18, 17 mi N of Nara Visa, 1500 m, 11 Jun 1976, *B. Hutchins 5773* (UNM); Hills nr Clayton, Aug 1906, *F. Bartlett 249* (NMC); N Canadian S of Moses, 9 Aug 1951, *O. Clark 16166* (UNM). Valencia CO.: 15 mi W of Los Lunas, 17 Jul 1924, *R. Bacigalupi 566* (DS); 8 mi NW of Los Lunas on NM-6, 1733 m, 9 Jul 1979, *C. Pase 2485* (UNM); Hwy I-25 south edge of Belen, 1600 m, 15 Jul 1977, *B. Hutchins 7093* (UNM). Oklahoma. Comanche Co.: South of bridge from Barber Co., bank of Big Mule Creek, 22 May 1974, *J. Barrell 7-74* (US). Texas. Andrews Co.: 21-23 mi NE, 9 May 1966, *D. S. Correll 32789* (LL). Armstrong Co.: Claude, 15 mi SW, 8 Jun 1957, *C. M. Rowell 5345a* (TEX). Bailey Co.: 1 mi S of Muleshoe, 10 Jul 1963, *D. S. Correll & E. C. Ogden 28440* (NY). Baylor Co.: banks of the Brazos, Seymour, Sep 1879, *J. Reverchon s. n.* (NY). Brewster Co.: 2 mi N of Alpine, 1533 m, 3 Aug 1947, *B. H. Warnock 6673* (SRSC); along Hwy 9 mi E of Alpine, 1533 m, 20 Jun 1948, *B. H. Warnock 7853* (SRSC); Marathon, 3 mi N, 1350 m, 14 Jun 1949, *B. H. Warnock 8719* (LL). Childress Co.: ca. 8 mi E of Memphis on Hwy 256 nr Jonah & Salt Creek, short grass, 4 Jun 1973, *L. C. Hinckley 7069* (NY). Coke Co.: Fort Chadburn, 7 Jul 1917, *E. J. Palmer s. n.* (US). Comanche Co.: Gustine, 2 Jun 1931, *H. Porter s.n.* (TEX); Leone River, 8 Aug 1877, *Reverchon 803* (NY). Crane Co.: 14 mi S of Penwell Ranch, Rd 1601, 15 Jun 1966, *D. S. Correll & H. B. Correll 33012* (NY); Crane, 5.5 mi W, 930 m, 28 Jun 1957, *B. H. Warnock 15523* (LL, SRSC). Crosby Co.: along shores of the Blanco River, 27 Jun 1925, *C. O. Erlanson 1189* (LL). Culberson Co.: 15 mi W of Sierra Blanca, 1333 m, 3 Sep 1951, *B. H. Warnock 10071* (SRSC); 15-18 mi E of Van Horn on Hwy 10, 24 May 1988, *L. C. Higgins 17628* (NY); 17 mi NE of Van Horn, 10 Jul 1943, *U. T. Waterfall 4980* (GH); along hwy 10 mi W of Kent, 1166 m, 7 Aug 1949, *B. H. Warnock & B. L. Turner 8963* (SRSC). Dawson Co.: Lamesa, 24 mi W, 22 Jun 1940, *E. Hamby 1177* (LL). Dickens Co.: oak shinnery 1 mi W and 2 N of Dickens, 28 Jun 1964, *C. M. Rowell 10282* (GH). Ector Co.: 15 mi W of Odessa along Hwy 80, 933 m, 22 Jun 1952, *M. McCullough 81* (SRSC). El Paso Co.: 1.5 mi S of Newman, 17 Aug 1942, *U. T. Waterfall. 3945* (GH, ARIZ); 20 mi N of Guadalupe

Canyon, 1666 m, 28 Jul 1938, C. L. Hitchcock et al. 4346 (CAS, DS); 5 mi W of Hueco, Hueco Mountains, 1366 m, 7 Sep 1955, B. H. Warnock 13749 (SRSC); along hwy between Ysleta and Hueco (Farm Rd 659), 1266 m, 7 Sep 1955, B. H. Warnock 13674 (SRSC); E side of East Mt., Hueco Tanks State Park, 28 Aug 1988, R. D. Worthington 17145 (NY); El Paso to monument 6, Sep 1892, E. A. Mearns 906 (NY); S of Hueco Tanks 1 mi N of intersect 62/180, 1420 m, 27 Aug 1989, M. Mayfield 42 (SRSC, TEX). Garza Co.: NW of Post, 28 Jun 1957, D. S. Correll & I. M. Johnston 17190 (NY). Gillespie Co.: extreme NE part of the county nr Coal Creek, 26 Aug 1994, B. L. Westlund s.n. (TEX). Glasscock Co.: Garden City, 5 Jun 1943, V. L. Cory s.n. (TEX). Hamilton Co.: Hamilton, 9 mi NE, 29 May 1947, V. L. Cory 53813 (DS, GH, LL, NY). Hardeman Co.: Chillicothe, 12 mi N, 13 May 1935, V. L. Cory 13308 (TEX). Hartley Co.: Dalhart, 5 mi S, Aug 1949, C. L. & C. M. Rogers 293 (TEX). Hemphill Co.: 6 mi E of Canadian Management Study Area, 20 May 1972, T. Rosson 1779 (NY); Canadian, 5 mi E, 14 Jun 1955, C. M. Rowell 4098 (TEX); mixed grassland dune area adjacent to Canadian River 7 mi ENE of the Canadian, 20 Jun 1964, J. D. Hunt 63 (GH). Hudspeth Co.: 27 mi W of Cornudas Rt 62, sandhills, 3 Jul 1958, D. A. Correll & I. M. Johnston 19215 (BYR, LL, NY); 32 mi W of Sierra Blanca on hwy 62, 23 Jul 1946, B. C. Tharp 46141 (F, MA); Baier Ranch, 30 Jul 1943, B. C. Tharp 43-617 (NY); W of Guadalupe Mts. about 12.5 mi E of Dell City on and just W of Park boundary, 10 Jun 1976, A. M. Powell 2849 (NY, SRSC, TEX). Hutchinson Co.: Stinnett, 9 mi E, 19 Jun 1950, W. A. Thornton 52-404 (TEX). Jeff Davis Co.: Ft. Davis, 3 Jul 1931, E. Whitehouse s.n. (TEX). Kent: Jayton, 1.5 mi SW, 24 Jun 1944, C. L. Lundell 13059 (LL). Llano Co.: Llano, 23 Jun 1916, E. J. Palmer 10281 (DS); Llano, 8 mi E, 7 May 1955, B. C. Tharp s.n. (TEX). Loving Co.: Between Wink and Mentone, 1570 m, 13 Jul 1952, B. H. Warnock 10711 (LL); Mentone, 5 mi N in sandy limestone, 4 Jun 1949, B. L. Turner s.n. (SRSC). Midland Co.: 4 mi E of Midland, 4 Jun 1943, V. L. Cory 42022 (GH, NY). Nolan Co.: W of Sweetwater, 2 Sep 1941, B. C. Tharp s.n. (NY, TEX). Oldham Co.: 7 mi N of Vega, limestone, 21 May 1974, S. Stephens 76135 (NY); Vega, 13 mi N on Hwy 385, 25 Jun 1974, J. Smith 117 (LL). Pecos Co.: Between Ft. Stockton and Marathon, 22 Aug 1970, J. C. Semple & L. Love 334 (LL). Potter Co.: Alibates National Monument, 5 Jun 1971, L. C. Higgins 4360 (NY); Amarillo, 2 mi W on Rt 1061, 8 Jul 1963, D. S. Correll & E. C. Ogden 28402 (LL). Presidio Co.: 2 mi SW of Casa, in sand, 1500 m, 19 Jun 1943, L. C. Hinckley 2792 (NY, SRSC); along hwy 2 mi W of Marfa, 1533 m, 18 May 1949, B. H. Warnock 5593 (SRSC); along hwy about 3 mi S of Marfa toward Shafter, 1366 m, 12 July 1952, B. H. Warnock 10576 (SRSC). Randall: 12 mi SE of Canyon Buffalo Lake, 9 Jul 1963, D. S. Correll & E. C. Ogden 28426 (NY); Palo Duro Canyon, 4 Jul 1946, D. S. & H. B. Correll 13010 (LL); Palo Duro Canyon about 2 mi NE of Canyon off

Interstate 87, 2 Sep 1977, L. C. Higgins 11359 (BRY). Reeves Co.: 25 mi NW of Pecos, 866 m, 15 May 1949, B. H. Warnock 8582 (LL, SRSC). Runnels Co.: RM 3115, 0.4 mi NW of Colorado River, 100 to 101°47' W, 31 47° 55' N, 28 May 1992, W. R. Carr 11974 (TEX). Shackelford Co.: Ft. Griffin, 4 mi S on Rt 283, 30 Jun 1961, M. C. Johnston 6601 (LL). Sherman Co.: Stratford, 25 mi E, 25 Jun 1945, R. McVaugh 7268 (LL). Taylor Co.: 18 mi SW of View on Edwards Plateau in grassland, 11 May 1943, V. L. Cory 7229 (GH); SW part of the county, 11 May 1943, W. L. Tolstead 7229 (TEX). Ward Co.: 4 mi E of Monahans, 950 m, 2 Jul 1959, A. Sims 150 (SRSC); Ector sand hills, 3 Sep 1925, B. C. Tharp 3468 (F, TEX); Monahans, 4 mi E, 20 Jun 1948, B. H. Warnock 7891 (LL). Wichita Co.: big bend of Red River, 13 May 1935, J. W. Tyson s.n. (LL). Wilbarger Co.: Vernon, above on Red River, 2 Jul 1926, B. C. Tharp 4402 (TEX). Winkler Co.: 12 mi E of Kermit, 963 m, 29 Jun 1948, D. Fernandez s.n. (SRSC).

Pomaria jamesii is the most widespread of the North American species. It is a calcifuge occurring in grasslands. Its small size, fasciculate roots, and lunate fruits with 1-2 seeds make it easy to recognize.

Fisher described from Kansas a variety of *Pomaria jamesii* supposedly different from the nominate variety in possessing taller and thicker stems and very dense punctate glands on the sepals and upper stems. I have not seen the type of Fisher's variety but can find no consistent tendency for the plants in Kansas to be more robust than those elsewhere. Plants of *P. jamesii* appear to be variable in size with no geographical patterns evident.

7. POMARIA MELANOSTICTA S. Schauer, *Linnaea* 20: 748. 1847. TYPE: MEXICO. Hidalgo: Zimapán, [no date], *Aschenborn* 234 (HOLOTYPE: B presumably destroyed). (Fig 1 F, H; Plate 1)

Hoffmanseggia melanosticta (S. Schauer) A. Gray, *Pl. wright.* 1: 54. 1852.

Caesalpinia melanosticta (S. Schauer) Fisher, *Bot. Gaz* 18: 123. 1893. A later homonym of *C. melanosticta* Sprengel, *Syst. veg.* 4 (Curae posteriores) 169. 1827]

Larrea melanosticta (S. Schauer) Britton, *N. Amer. fl.* 23(5): 314. 1930.

Caesalpinia atropunctata Eifert, in M. C. Johnston and D. S. Correll, Manual of the Vascular Plants of Texas p. 797. 1970. an illegitimate name. [This name is included here only because it was used in Johnston and Correll's manual. Realizing that his combination *C. melanosticta* was a later homonym, Eifert proposed a new name on transferring the species to *Caesalpinia* but he made no reference to the basionym.]

Hoffmanseggia melanosticta var. *parryi* Fisher, Contr. U.S. Natl. Herb. 1: 149. 1892. TYPE: [MEXICO]. [Chihuahua]: Mexican Boundary Survey, Rio Grande, below San Carlos [=Benavides], October [no year], C. G. Parry 283 (HOLOTYPE GH! ISOTYPE NY! US!). [Fisher lists New Mexico as the type locality, but the species occurs only in Texas and Mexico.]

Caesalpinia melanosticta var. *parryi* (Fisher) Fisher, Bot. Gaz. 18: 123. 1893.

Larrea parryi (Fisher) Britton, N. Amer. fl. 23 (5) 315. 1930.

Hoffmanseggia parryi (Fisher) B. L. Turner, Field & Lab. 18: 47. 1950.

Caesalpinia parryi Eifert in D. S. Correll & M. C. Johnston, Manual of the Vascular Plants of Texas 797. 1970.

H. melanosticta var. *greggii* Fisher, Contr. U.S. Natl. Herb. 1: 149. 1892. TYPE: MEXICO. Coahuila: southern Coahuila, [no date], Gregg 497 (HOLOTYPE: GH!; ISOTYPE: MO!)

C. melanosticta var. *greggii* (Fisher) Fisher, Bot. Gaz. 123. 1893.

SUBSHRUBS 30–60 cm tall with a root thickened at ground level; old stems gray to red-brown striate, sometimes canescent; young stems ribbed, green to red, densely villous and with scattered glandular-punctate trichomes. STIPULES linear-lanceolate, slightly pectinate to doubly lacinate and densely villous, 2–4 mm long, 0.5–1.0 mm wide. LEAVES composed of 2–4+1 pinnae, 30–75 mm long including the rachis, 20–45 mm wide; point of pinna-attachment tomentose and with clusters of glandular-punctate trichomes and sometimes with 1–2 red filiform processes each to 1 mm long; leaflets 2–4 pairs per pinna, oblong to oblong-obovate, rounded to slightly emarginate apically, 3.0–13.0 mm long, 2–7 mm wide, lightly pilose above, densely white-vil-

lous to strigose below especially on the margins and midveins and evenly covered with numerous glandular-punctate trichomes. INFLORESCENCES terminal, 7–30 cm long, bearing 10–31 flowers on simple pedicels. FLOWERS upright, turbinate in lateral view, 6–10 mm long, 6–10 mm wide; lower sepal 5–8 mm long, 2–3 mm wide; lateral sepal 5–9 mm long, 2–3 mm wide; dorsal surface of the sepals villous on the veins and margins and densely covered with glandular trichomes of two sizes, the larger punctate and drying black and the smaller stipitate and drying orange or red; flag petal bright yellow with red spots, 4–6 mm long, 1.5–2.0 mm wide, densely villous inside of the fold of the claw and the dorsal portion of the claw and glabrous or with glandular-punctate trichomes on the back of the blade; lateral petals yellow fading pink to red, 5–6 mm long, 2–3 mm wide, glabrous to villous on the dorsal claw; stamens to 5 mm long with trichomes extending half way to the anther; ovary 2.5–3.0 mm long, densely white-villous laterally and ciliate with glandular-punctate trichomes and multicellular projections, surmounted by a style 2 mm long, red with long trichomes, glandular-punctate trichomes and some multicellular projections almost to the stigma. FRUITS upright, obliquely oblong in outline but curved distally, 20–32 mm long, 10–15 mm wide, mucronate by part of the style; valves with scattered glandular-punctate trichomes and densely covered with long (to 2 mm) red columnar multicellular projections bearing white trichomes laterally and apically; margins fringed by the dense arrays of long (to 2 mm) multicellular projections bearing white trichomes laterally and apically; seeds 1–2, oval to pyriform in outline, olive to dark brown, 4–6 mm long, 3–4 mm wide.

DISTRIBUTION (Fig. 7) AND HABITAT: Mexico in Chihuahua, Coahuila, Hidalgo, Nuevo León, San Luis Potosí, Querétaro, and Zacatecas and United States in Brewster and Presidio Counties (Texas), always in

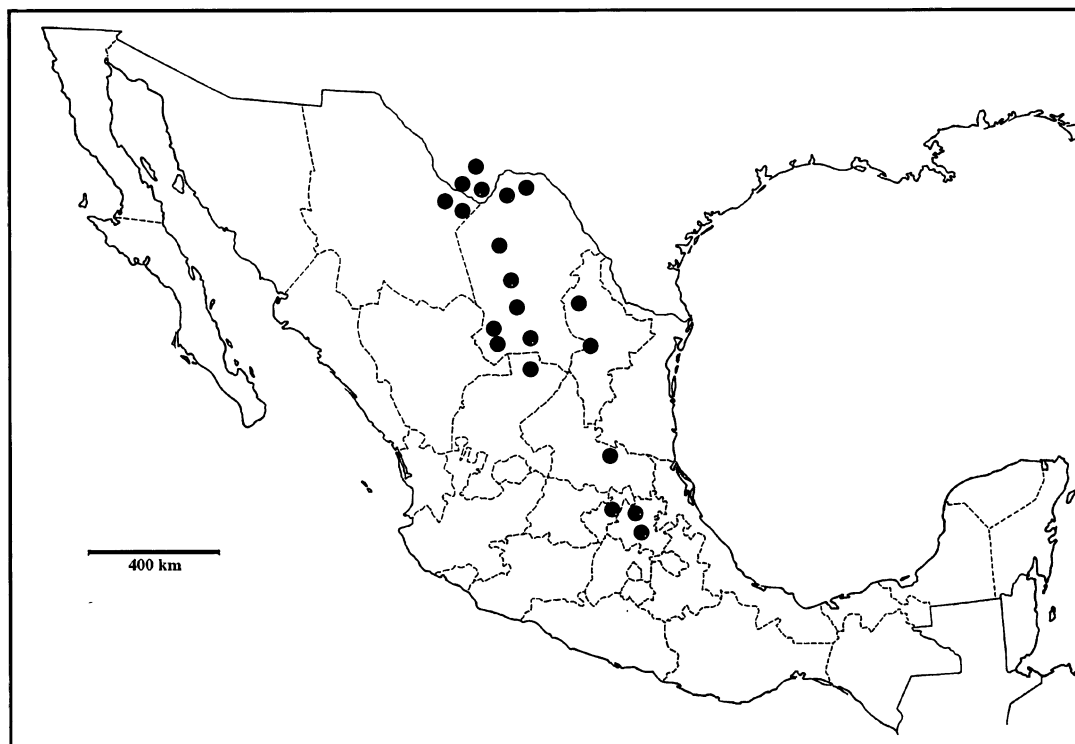


FIG. 7. Distribution of *Pomaria melanosticta*.

limestone or gypsum soils from 500–2000 m elevation.

FLOWERING AND FRUITING: Primarily June through October with flowering and fruiting specimens collected in March (Coahuila and Nuevo León), November (San Luis Potosí), and December (Texas).

REPRESENTATIVE SPECIES EXAMINED: MEXICO. Chihuahua: E side of Sierra del Cuchillo Parado, 104° 55' W, 29° 37' N, 1000–1300 m, 21 Oct 1972, *T. Wendt et al.* 9780 (MEXU, TEX); Mina las Marias on Mesa de Aguila, 103°40' W, 29° 09' N, 900 m, 3 Oct 1972, *F. Chiang et al.* 9679 (TEX). Coahuila: Boquillas, 9.5 km S, 102° 51' W, 29° 07' N, 775 m, 14 Sep 1972, *F. Chiang et al.* 9244a (LL); Boquillas Canyon, below the rapids, 102° 53' 30" W, 26° 17' N, 720 m, 20 Oct 1973, *M. C. Johnston et al.* 12371 (TEX); Bullis Canyon, 1.5 mi across Brewster Co. line, 102° 39' 30" W, 29° 43' to 29° 44' N, 500–600 m, 8 Apr 1973, *M. C. Johnston et al.* 10594 (TEX); Castaños, 36 mi S, Puerto de San Lázaro, 14 Oct 1959, *J. Graham & M. C. Johnston* 4325 (TEX); Cuatro Ciénegas, 11 km W, 102° 09' 30" W, 26° 58' 30" N, 900 m, 6 Aug 1973, *M. C. Johnston et al.* 12087 (TEX); Cuatro Ciénegas, 43 air mi W, 102° 50' W, 29° 02' N, 1200 m, 7 Aug 1973, *J. Henrickson* 12080 (LL);

just across the Rio Grande from Black Gap Wildlife Management area, 102° 45' to 102° 46' W, 29° 33' to 29° 34' N, 500–950 m, 6 Apr 1973, *M. C. Johnston et al.* 105895 (MEXU, TEX); La Cuchilla, 5.5 km E of carr. 40, Sierra del Refugio, 102° 49' W, 25° 34' N, 20 Oct 1989, *J. A. Villarreal et al.* 5497 (TEX); Las Margaritas, 13 km N, 102° 50' to 102° 51' W, 26° 30' to 26° 33' N, 1100–1400 m, 23 Mar 1973, *M. C. Johnston et al.* 10360a (TEX); south of Parras, 1275 m, 20 Sep 1993, *J. Hinton et al.* 23368 (TEX); Rancho Cerro de la Madera - Cuatro Ciénegas rd, 102° 22' 50" W, 27° 07' 20" N, 1150 m, 1 Sep 1980, *T. Wendt & E. Lott* 2159 (TEX); Rosario Station, 2 mi E, 3–4 Sep 1941, *I. M. Johnston* 8832 (LL); Saltillo, 15 mi N, 5 Aug 1965, *J. Strother* 474 (TEX); Castaños to San Lázaro, 17 Jun 1936, *F. L. Wynd & C. H. Mueller* 144 (ARIZ, WIS–2); San Rosendo Canyon that flows into the Rio Grande, 102° 32' to 102° 33' W, 29° 44' to 29° 45' N, 500–600 m, 9 Apr 1973, *M. C. Johnston et al.* 10602 (TEX); Sierra de Jimulco, 103° 12' W, 25° 11' N, 1500 m, 28 Jun 1973, *M. C. Johnston et al.* 11498 (TEX); Sierra de Jimulco near the ejido La Trinidad, 103.22° W, 25.08° 25' N, Aug 1988, *J. A. Villarreal et al.* 4396 (TEX, ARIZ); Sierra de San Marcos, 8 Jun 1968, *D. J. Pinkava* 5097 (TEX); Sierra del Carmen, SW flank, 102° 45' – 102° 46' W, 29° 04' – 29° 08' N, 1050–1450 m, 15 Sep 1972, *F. Chiang et al.* 9251 (TEX). Hidalgo: Ixmiquilpan, 7 mi S on rd to Actopan, 2150 m, 26 Aug

1965, *M. C. & L. A. Johnston* 7237 (LL, TEX); between Zoquital and Los Venados, 2000 m, 19 Jun 1947, *H. E. Moore, Jr.* 3100 (GH); dirt rd to Cardonal from Ixmiquilpan, 1850 m, 21 Jun 1991, *B. B. Simpson* 91-VII-18-1 (TEX); Zimapán, 22 Jun 1947, *L. A. Kenoyer* 1105 (A). Nuevo León: Dry roadside 25 km east of Saltillo at Sesteo de Las Aves, 22 Jul 1971, *H. M. Parker* 532 (TEX-2); Puerto de Pedernales, 100° 41' W, 26° 15' N, 775 m, 16 Mar 1973, *M. C. Johnston et al.* 10228B (TEX). Querétaro: Higuierillas, 6 m towards Vizarrón, 99° 45' W, 20° 56' N, 1850 m, 25 Jun 1972, *F. Chiang et al.* 8122 (LL). San Luis Potosí: 23 mi W of Ciudad del Maíz, 1200 m, 25 Nov 1966, *H. D. Ripley & R. C. Barneby* 14767 (GH, US). Zacatecas: La Presa de Los Angeles, due W, 102° 07' to 102° 08' 30" W, 25° 04' N, 1400–1500 m, 30 Jun 1973, *M. C. Johnston et al.* 11531B (TEX). UNITED STATES. Texas. Brewster Co.: 0.7 mi W of tunnel near Rio Grande Village Big Bend National Park, 746 m, 18 Mar 1985, *T. R. Van Devender et al.* 85-65 (ARIZ); 11 mi from hwy down old Boquillas rd; lower slopes of Dead Horse Mountain, 1200 m, 21 Sep 1958, *B. H. Warnock & M. C. Johnston* 16835 (SRSC); 2 mi W of Terlingua, 1000 m, 19 Jun 1949, *B. H. Warnock et al.* 1155 (SRSC); 3 mi from Rio Grande, 625 m, 24 Dec 1946, *B. H. Warnock & L. C. Hinckley* 461069 (SRSC); 61 mi SE of Marathon, 11 Apr 1938, *V. L. Cory* 28625 (GH); 8.6 mi along rd to Rio Grande River from Black Gap Headquarters, 30 May 1982, *L. J. Toolin & T. R. Van Devender* 1839 (ARIZ); Black Gap Refuge; 65 mi S of Alpine, 733 m, 7 Jul 1962, *T. Rogers* 16 (SRSC); along Terlingua-Lajitas hwy, 1166 m, 28 Sep 1947, *B. H. Warnock* 7580 (SRSC); Alpine, 65 mi S, Packsaddle Mt. 1250–1300 m, 17 Oct 1964, *B. McAfee* 124 (SRSC); Boquilla Canyon, 666 m, 1 Apr 1961, *B. H. Warnock* 18410 (SRSC (2)); Dead Horse Mountains at head of Heath Canyon, Big Bend Natl. Park, 1266 m, 19 Jul 1952, *B. H. Warnock* 10830 (SRSC); Green Basin Chisos Mountains, 23 Sep 1938, *H. B. Parks* 30173 (AA). Presidio Co.: Lajitas, 6 mi E in limestone hills, 16 Jun 1976, *A. M. Powell* 2880 (SRSC).

Despite its distinctive characters, there has been continued confusion about the identity of this species, which was originally described from Zimapán, Hidalgo, Mexico. Even though the type of *Pomaria melanosticta* was presumably destroyed during World War II, the description given by Schauer is extremely good and only this species of *Pomaria* occurs at the type locality.

Fisher later described two varieties of *Pomaria melanosticta*: *P. melanosticta* var.

parryi and *P. melanosticta* var. *greggii*. He stated in his description that *P. melanosticta* var. *parryi* differed from the nominate variety in more slender habit, leaves with fewer than 3 pairs of pinnae and glabrous flag petal. The type is from San Carlos (now called Benavides), just south of Lajitas on the Texas-Mexico border. However, an examination of specimens from Texas and adjacent Mexico shows that some plants have punctate trichomes on the dorsal surface of the flag petal and many are extremely villous. Numbers of pinnae from elsewhere can also range from two to three per leaf.

In 1950, Turner elevated *Pomaria melanosticta* var. *parryi* to specific rank because he considered the plants in south Texas to be genuine *H. melanosticta*. Since the plants in west Texas were obviously different, he decided that specific recognition was warranted. However, it turns out that the plants in south Texas are not *P. melanosticta* and those in west Texas are. Plants from the type locality are very similar to those in west Texas and adjacent Mexico and different from those in south Texas.

Fisher distinguished his *Pomaria melanosticta* var. *greggii* from the nominate variety on the grounds that it was "scarcely villous" and had 3–4 (usually 3) pairs of pinnae. Study of plants from across the broad range of the species shows that both vestiture and numbers of pinnae per leaf are variable and do not show any particular geographic pattern.

Pomaria melanosticta is easily distinguished from other species of the genus by the mixture of glandular-punctate trichomes that dry black and smaller globose glandular trichomes on the dorsal sepal surfaces that retain an orange or red color. In addition, both the valves and margins of the fruits of this species are densely covered with long multicellular projections with apical trichomes. When fresh, the plants have a rank odor.

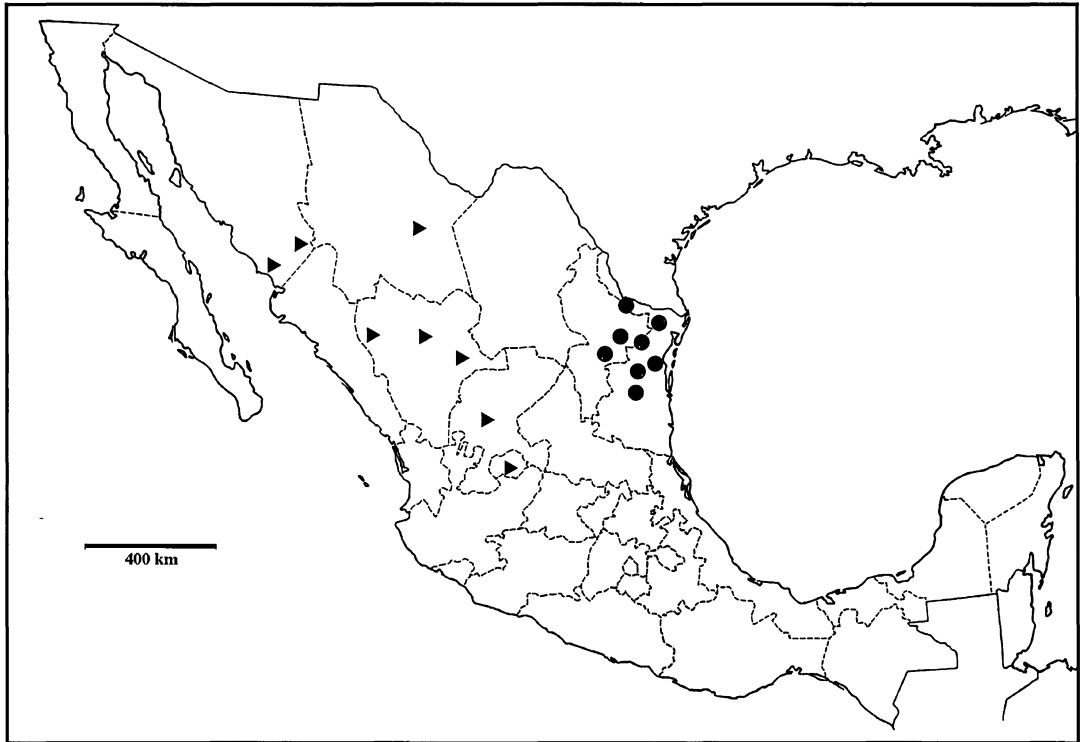


FIG. 8. Distribution of *Pomaria multijuga* (triangles) and *P. wootonii* (dots).

8. *Pomaria multijuga* (S. Watson) B. B. Simpson, comb. nov.

Hoffmanseggia multijuga S. Watson, Proc. Amer. Acad. Arts 21: 451. 1886. TYPE: MEXICO. Chihuahua: Rocky hills near Chihuahua, 25 May 1885, C. G. Pringle 138 (HOLOTYPE: VT! ISOTYPES: GH! NY! RSA! US!).

Caesalpinia multijuga (S. Watson) Fisher, Bot. Gaz. 18: 123. 1893.

Larrea multijuga (S. Watson) Britton, N. Amer. fl. 23 (5): 315. 1930.

Caesalpinia ortegae Standley, J. Wash. Acad. Sci. 13: 6. 1923. TYPE: MEXICO. Sinaloa: [without specific locality], J. G. Ortega 890 (PHOTO OF HOLOTYPE: US!).

Poincianella ortegae (Standley) Britton, N. Am. fl. 23 (5) 334. 1930.

SHRUBS to 2 m tall with an unknown root type; old stems yellow striate, with simple trichomes and with conical peltate-glandular trichomes; young stems yellow, striate, densely short-pubescent and with resin-

tipped peltate glandular trichomes. STIPULES linear, 2.5–5.0 mm long, 0.3–1.5 mm wide with fimbriate margins, densely pubescent, and with elongate glandular trichomes. LEAVES composed of 3–7+1 pinnae, 12–21 cm long wide including the rachis, 4–10 cm; point of pinnae attachment consisting of dense accumulations of glandular-punctate trichomes; leaflets 6–9 pairs per pinna, oblong with a rounded apex, 5.0–13.0 mm long, 2–4 mm wide, mostly glabrous above with few curled trichomes on the margins and the midvein and pilose with moderately dense glandular-punctate trichomes below. INFLORESCENCES lateral and terminal, 19–25 cm long, bearing 30–33 flowers on pedicels jointed mid-way. FLOWERS upright, almost bilabiate in lateral view, 10–16 mm long, 9–10 mm wide; lower sepal 7–11 mm long, 2–5 mm wide; lateral sepal 6–8 mm long, 4.0–4.5 mm wide; sepals lanose on margins and to some extent on the dorsal midveins, densely covered with glandular-punctate

trichomes, some elongate apically; flag petal bright yellow with red markings, 6–8 mm long, 2–3 mm wide, villous inside of the fold of the claw and densely covered with glandular-punctate trichomes or elongate, filiform black multicellular glandular trichomes dorsally; lateral petals yellow fading pink, 7–9 mm long, 4.0–4.5 mm wide, glabrous dorsally, villous on the inner claw; stamens with filaments variable in length to 5 mm long, anterior very geniculate, others straight; ovary 2.5–4.0 mm long, with glandular-punctate or elongate trichomes on the upper margin and villi on the lateral surfaces and lower margin, surmounted by a style 4 mm long with villous trichomes that can reach to the stigma. FRUITS upright, rhombic in outline, 28–43 mm long, 10–11 mm wide, acute to mucronate by persistent style; valves densely and evenly covered with glandular-punctate trichomes some with conical tip, and long filiform multicellular projections to 1 mm long, each with a few radiating trichomes especially on the upper portions; margins pubescent and with glandular-punctate trichomes and multicellular projections similar to those on the valves; seeds 1–4, oval to pyriform in outline, brown, 5–7 mm long, 3.5–5.5 mm wide.

DISTRIBUTION (Fig. 8) AND HABITAT: Northwestern Mexico, states of Aguascalientes, Chihuahua, Durango, Sonora, and Sinaloa from 500–2200 m elevation, calcifuge.

FLOWERING AND FRUITING: Primarily in July and August but flowering specimens collected in Chihuahua in March and fruiting specimens in Durango in September and December.

COMMON NAMES: tavachin chica and talpakapachi nuindi (fide *Standley 1641* [ARIZ]).

REPRESENTATIVE SPECIES EXAMINED: MEXICO. Aguascalientes: rd to Calvillo, 19–20 mi W of Aguascalientes nr km 31, 2200 m, 24 Aug 1960, *R. McVaugh 18287* (MEXU). Chihuahua: Chihuahua City, 8 mi E, Santa Eulalia Plain, 1608 m, 10 Aug 1939, *F. Shreve 9096* (GH); Chihuahua City, SE, Santa Eulalia,

23 Jul 1969, *F. B. Marks & C. Marks 1272* (WIS); hills nr Chihuahua, 7 Aug 1885, *C. G. Pringle 371* (RSA). Durango: 10 mi N of Tamazula, 666 m, 18 Dec 1939, *H. S. Gentry 5263* (ARIZ); 13 mi SW of Guadalupe Victoria, 2200 m, 18 Sep 1970, *C. D. Johnson 123-70* (NY). Sonora: Canyon Sapopa, Río Mayo, 28 Aug 1935, *P. C. Standley 1641* (ARIZ); ridge south of Arroyo Gochico east of San Bernardo, 1050 m, 5 Aug 1935, *F. W. Pennell 19565* (GH); along the rd from Los Tanques to Las Chinacas, 0.1 mi N of Agua Salada, ca 30 km NE of Alamos, 27° 15' N, 108° 46' W, 500 m, 22 Aug 1993, *M. Fishbein 1338* (MEXU).

The immediate impression one receives when seeing *Pomaria multijuga* is of robustness. As the name implies, plants have large leaves with many pinnae (and leaflets). The fruits are borne upright and are rough in appearance. The plants are also densely covered with punctate or elongate glandular trichomes, the flag petal particularly so. In plants from Chihuahua and Durango, these glandular trichomes on the back of the flag petal resemble a mass of worms. This species is the only North American member of the genus except *P. fruticosa* that has jointed pedicels.

9. *Pomaria wootonii* (Britton) B. B. Simpson, comb. nov.

Larrea wootonii Britton, N. Amer. fl. 23 (5): 315. 1930.
TYPE: [MEXICO]. Tamaulipas: Chamal, 25 Jun 1919, *E. O. Wooton s.n.* (HOLOTYPE: US!).

Caesalpinia wootonii (Britton) Eifert ex Isely, Mem. New York Bot. Gard. 25 (2): 51. 1975.

SMALL SHRUBS 45–60 cm tall with an unknown root type; old stems brown, striate, pilose, and with scattered glandular-punctate trichomes; young stems green, striate, tomentose, and with scattered glandular-punctate trichomes. STIPULES linear, more or less entire, densely pubescent, 2–3 mm long, 0.3 mm wide. LEAVES composed of 2–3+1 pinnae, 27–95 mm long, 22–50 mm wide including the rachis; point of pinna-attachment consisting of a few glandular-punctate trichomes and often 1 or 2 penicillate projections ca 0.75 mm long each bearing lateral trichomes; leaflets 4–5 pairs

per pinna, oblong, apiculate, 4–11 mm long, 2–5 mm wide, very lightly pilose above, and with short, curled trichomes especially on the margins and veins mixed with numerous evenly dispersed glandular-punctate trichomes below. INFLORESCENCES axillary and terminal, 20–80 mm long, bearing 6–10 flowers on simple pedicels. FLOWERS upright and almost bilabiate in lateral view, 6–9 mm long, 7–9 mm wide; lower sepal 5.5 mm long, 2.5 mm wide; lateral sepals 6 mm long, 2.0–3.5 mm wide; dorsal surfaces of sepals shortly lanose on the margins, lightly pilose at the base and along the veins and with a few scattered glandular-punctate trichomes; flag petal yellow, 3.0–5.5 mm long, 2 mm wide, very villous inside of the fold of the claw, occasionally lanose basally, and bearing glandular-punctate trichomes (sometimes elongate) dorsally; lateral petals yellow, 5–6 mm long, 2.0–3.5 mm wide, sometimes lightly villous on the inner claw and sometimes with a few peltate glandular trichomes dorsally; stamens variable in length to 4 mm long, villous to the anther; ovary 1.5–3.0 mm long, covered, primarily on the margins, with glandular-punctate trichomes, these sometimes urn-shaped and dense, villous laterally, surmounted by a style 1.25 mm long, glabrous or villous for half its length. FRUITS lanceolate-oblong, 20–21 mm long, 7–8 mm wide, acute; valves pilose, with scattered glandular-punctate trichomes and a few, 0.5–2.0 mm long multicellular projections with lateral and apical trichomes; margins pronounced and pilose; seeds 1–3, round to pyriform in outline, light brown, 4.5 mm long, 3 mm wide.

DISTRIBUTION (Fig. 8) **AND HABITAT:** Mexico in the states of Coahuila, Nuevo León, and Tamaulipas, in caliche, shale or limestone soils from sea level to 800 m.

FLOWERING AND FRUITING: Sporadically, perhaps in response to rain, collected in flower in April, June, and from September to October and in fruit in June and from September to November.

COMMON NAME: Camote del ratón fide

Correll and Johnston (*Correll and Johnston, 1970*) [as *Caesalpinia atropunctata*].

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Coahuila: Múzquiz, 12 Apr 1936, E. G. Marsh 2146 (F, TEX). Nuevo León: Hualahuises, 3 mi N, 7 Sep 1962, B. L. Turner & A. M. Powell 1042 (TEX, WIS); Tamaulipas border, 1 mi N on Linares-Victoria hwy, 530 m, 12 Nov 1959, M. C. Johnston & J. Graham 4655 (TEX); Mpio. Linares, 5 km W of La Petaca, 1 Oct 1986, A. E. Estrada Castillón 697 (MEXU). Tamaulipas: 10 mi from jctn of San Fernando-Reynosa hwy and rd to Méndez, 9 Dec 1960, M. C. Johnston & C. McMillan 6075 (TEX); 9 mi N of the Victoria-Jiménez hwy on gravel rd to San Carlos, 800 m, 14 Dec 1959, M. C. Johnston & J. Crutchfield 5009 (MEXU, TEX); between Reynosa and San Fernando at km 109, 4 Jun 1967, *Birdsong* 24 (LL); Reynosa, 29 mi from the rd to San Fernando, 130 m, 19 Oct 1959, M. C. Johnston & J. Graham 4364A (TEX); 15 mi from Río Conchos on the rd from Méndez to China, 8 Dec 1960, M. C. Johnston & C. McMillan 6073 (TEX); Río Salado ferry crossing, 7 mi N on the rd from Nuevo Guerrero to Laredo, 130 m, 17 Oct 1959, M. C. Johnston 4341 (LL, MEXU, TEX); San Fernando, 24 mi N on Matamoros hwy, 16 m, 7 Dec 1959, M. C. Johnston 4883A (TEX); San Nicolás, 98° 50' W, 24° 41' N, 500 m, 12 Sep 1994, J Martínez 342 (TEX); Santander, 6 mi S, 20 Oct 1959, M. C. Johnston & J. Graham 4392E (TEX).

The name *Pomaria wootonii* has been misapplied in the past, in part because of a confusion with *P. melanosticta* and in part because of a nomenclatural error. As pointed out under the discussion of *P. melanosticta*, botanists for many years assumed that the species in south Texas and northeastern Mexico was *P. melanosticta*. When this epithet resided in *Hoffmannseggia*, there was no problem. When Eifert transferred the species to *Caesalpinia*, a new epithet was needed because *C. melanosticta* was occupied. He therefore renamed the species *C. atropunctata*. Correll and Johnston, in verbal consultation with Eifert, used the name in the Manual of Vascular Plants of Texas (1970). However, as pointed out by Isely (1975), Eifert never published *C. atropunctata* and no basionym was cited in the Manual. Consequently, *C. atropunctata* is an illegitimate name. Isely (1975) decided that Britton's *Larrea wootonii*, described from a specimen collected at Chamal, Tamaulipas,

was the same species and he adopted this name. Britton's species is a good one, but is not the same as the species growing in the deep sands of south Texas. It differs in possessing small flowers and long, thin complex projections on the fruits whereas the projections on the fruits of *P. austrotexana* are very sparse and small. In addition the two species occupy different substrates with the latter occurring in sandy siliceous soils and *P. wootonii*, rocky, calcareous soils.

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