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# A REVISION OF *HOFFMANNSEGGIA* (FABACEAE) IN NORTH AMERICA

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**Abstract:** *Hoffmannseggia*, a genus of the Caesalpinieae, Caesalpinioideae, has been treated as a synonym of *Caesalpinia* or as a distinct genus with as many as 25 species. Recent molecular and morphological work has provided strong support for a monophyletic *Hoffmannseggia* distinct from either *Caesalpinia* or *Pomaria*. This revision provides the first complete nomenclature and discussion of the 11 species (12 taxa) of *Hoffmannseggia* occurring in North America. Included are a key to the species, maps showing distributions, and photographs of flowers or fruits of six species.

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

Since 1892, *Hoffmannseggia* has generally been understood to include *Hoffmannseggia* and *Pomaria* of Cavanilles (1798, 1799) and *Melanosticta* of de Candolle (1825), all of which are small, spineless shrubs or perennial herbs that generally have some type of glandular trichomes on the stems and/or fruits. As such, the genus has usually been considered to contain about 25 species distributed in southwestern North America and adjacent Mexico, west-central South America (Peru to northern Argentina and Chile), and South Africa (Polhill and Vidal, 1981). Nevertheless, there has been disagreement about whether *Hoffmannseggia* is distinct from *Caesalpinia* and if so, what species should be included in it. Baillon, in fact, wrote an article (1869) titled "Sur la valeur du genre *Hoffmannseggia* (sic)" (On the value of the genus *Hoffmannseggia*) in which he argued that there were no consistent characters on which to base the genus *Hoffmannseggia* and he subsequently treated the species as one of fifteen sections within *Caesalpinia* (Baillon, 1872). Fisher, the only previous author to deal with all of *Hoffmannseggia* in North America, must have come to the same conclusion because one year after revising the genus (Fisher, 1892), he trans-

ferred all of the species to *Caesalpinia* (Fisher, 1893). Recent molecular work using cpDNA restriction site data (Simpson and Miao, 1997) and morphology have shown that the traditional *Caesalpinia* is polyphyletic, which may have caused much of the previous confusion. The molecular data also show that a monophyletic *Hoffmannseggia* does exist and that it and *Pomaria* (including *Melanosticta*) are separate genera, both distinct from *Caesalpinia*. The cpDNA restriction fragment site analysis (Simpson and Miao, 1997, Fig.1) and unpublished work with the nuclear trnL-trnF spacer and intron regions place *Pomaria* (including *Melanosticta*) as a sister to the *Erythrostemon* group of *Caesalpinia* and not to *Hoffmannseggia*. From this work, it is now clear that the traditional taxonomy of the entire *Caesalpinia* group of the Caesalpinieae needs to be reconsidered.

In a previous paper the *Pomaria* species of North America were treated in detail; the present paper provides a revision of the *Hoffmannseggia* species in North America. Earlier workers, such as Isely (1975), already noted that the traditional *Hoffmannseggia* in North America contained two distinct elements. In his treat-

ment of the Caesalpinioideae of North America, and later in his *Native and naturalized Leguminosae (Fabaceae) of North America*, Isely (1998) retained in *Hoffmannseggia* only those species of very small shrubs or perennial herbs that lack glandular dots on their leaves and have fruits with parallel margins. He referred all the species that have punctate dots (e.g., *Pomaria*) and/or lunate fruits to *Caesalpinia*.

There have been few attempts to define formal infrageneric groupings within *Hoffmannseggia*. Torrey and Gray (1840) named two sections, sect. *Hoffmanseggiaria* for species with subsessile petals (i.e., not strongly clawed), terminal stigmas, and pedicellate glands, and sect. *Pomaria* for species with unequal sepals, lateral stigmas, and glandular punctate trichomes. Gray (1852) later elaborated on this scheme and stated that *H. stricta*, *H. falcaria*, *H. trifoliata*, *H. gracilis*, *H. prostrata*, and *H. viscosa* (the latter five South American species), all with stipitate glands on the rachises and sepals, would form section *Hoffmanseggia* [sic]. Section *Pomaria* he divided into subsection *Gladiata*, containing *H. gladiata* and *H. platycarpa*, subsection *Lunatae* with *H. oxycarpa*, *H. drummondii*, and *H. caudata*, and subsection *Melanosticta* containing those species with glandular dots on the undersurface of the leaves. While it is true that all members of Gray's section 'Hoffmanseggia' do belong in *Hoffmannseggia*, his other section and its subsections are poly- or paraphyletic. Of the species in his section *Pomaria*, *H. gladiata* and *H. platycarpa* (treated here as a synonym of *H. gladiata*), *H. oxycarpa*, and *H. drummondii* are true *Hoffmannseggia*, while *H. caudata* is allied to members of the *Erythrostemon* group of *Caesalpinia*, and subsection *Melanosticta* corresponds to *Pomaria*. Gray's original sectional descriptions, however, define well the genera *Hoffmannseggia* and *Pomaria* as recognized here. In the present revision, no formal infrageneric groups are recognized, although it is clear

that the westernmost, shrubby species (*H. intricata*, *H. microphylla*, and *H. peninsularis*) form a well-supported clade. The position of *H. drummondii* remains equivocal, although on morphological grounds it appears to belong to the shrubby group with lunate fruits.

Several morphological characters in combination set *Hoffmannseggia* apart from its close relatives. First, as noted by virtually all systematists, species of the genus are herbaceous perennials or small shrubs (less than 1 m tall). The use of this character alone, however, led to the previous incorrect placement of *Pomaria* species in *Hoffmannseggia*. A better apomorphy for the genus is the persistence of the sepals throughout fruiting (Plate 1C, E, F). All species of both *Caesalpinia* and *Pomaria* have a line of separation at the base of the free portion of the sepals. These species shed their sepals after flowering along this zone leaving a smooth ring around the base of the pod. *Hoffmannseggia microphylla*, and to a lesser extent *H. intricata*, shed some or all of their sepals during fruiting, but the separation is late, uneven, and leaves a jagged ring at the legume base. Cavanilles (1798, 1799) noted this loss of sepals in his original circumscriptions of *Hoffmannseggia* and *Pomaria* but the character was subsequently ignored when *Pomaria* was merged with *Hoffmannseggia* by Torrey and Gray (1840) or *Caesalpinia* (Bentham and Hooker, 1865; Taubert, 1849). Ulibarri (1996) however, used this character in his synopsis of *Caesalpinia* and *Hoffmannseggia* of South America. Other characters noted by most systematists are the lack of prickles in *Hoffmannseggia* species and the multicellular glandular trichomes on their flowering stalks and sepals. *Pomaria* species also lack prickles, but all have glandular punctate trichomes on the undersurface of the leaves and on the sepals. In addition, they all bear branched, multicellular processes on the fruits and sepals. An additional character of *Hoffmannseggia* is the position of seed attach-



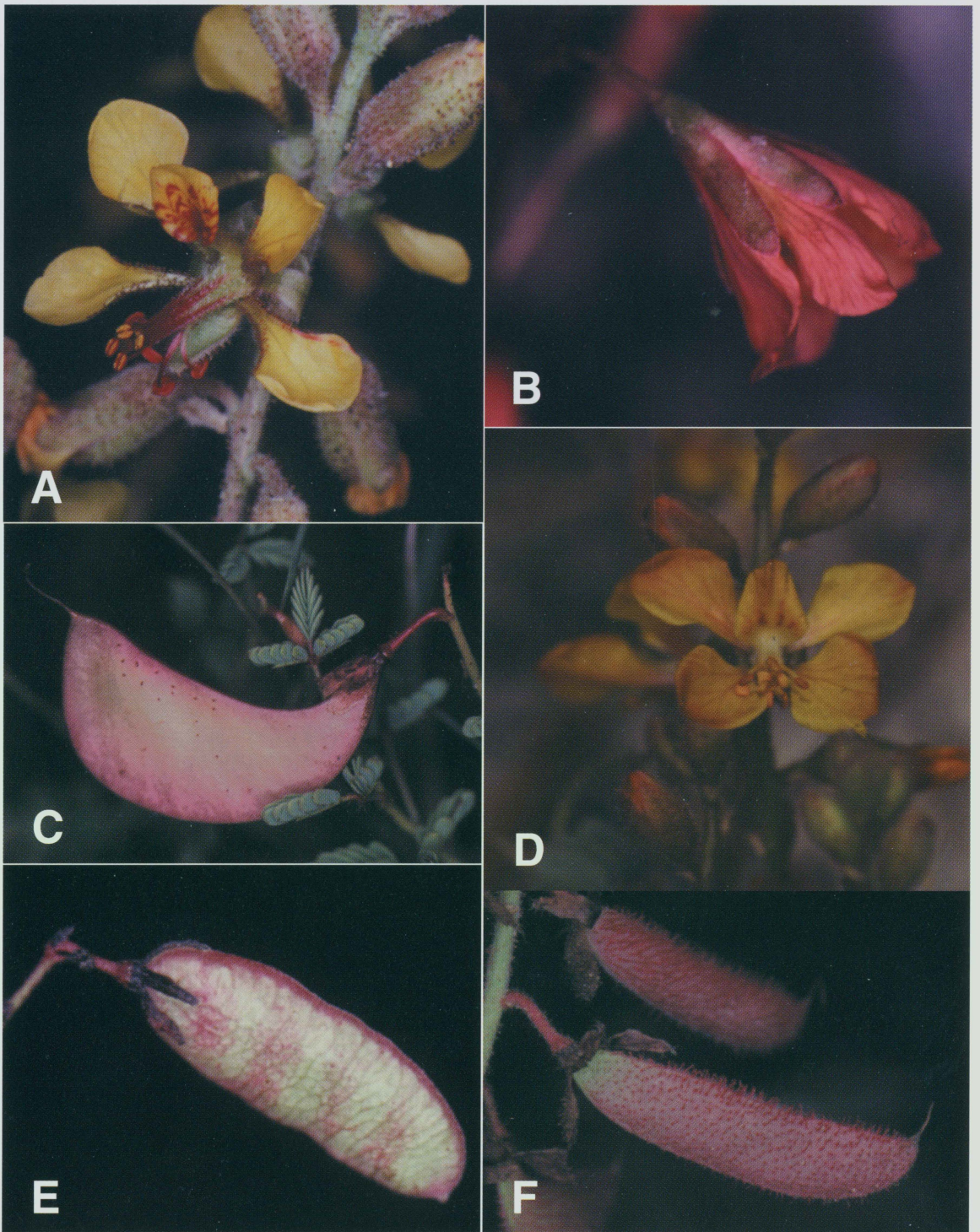


PLATE 1. A. Flower of *Hoffmannseggia glauca* showing the characteristic shape of the flowers of most species of the genus and the dense, prominent glandular processes on the petal claws which are unique to *H. glauca*. x 2.7. B. Flower of *Hoffmannseggia watsonii* showing the turbinate aspect in side view and the rose color of the petals. x 3. C. Lunate fruit of *Hoffmannseggia drummondii*. x 2.8. D. Flower of *Hoffmannseggia peninsularis*. x 13.0. E. Fruit of *Hoffmannseggia tenella*. x 3.6. F. Fruits of *Hoffmannseggia oxycarpa* with their characteristic long, multicellular glandular trichomes. x 1.8. All photos by Dr. J. L. Neff.

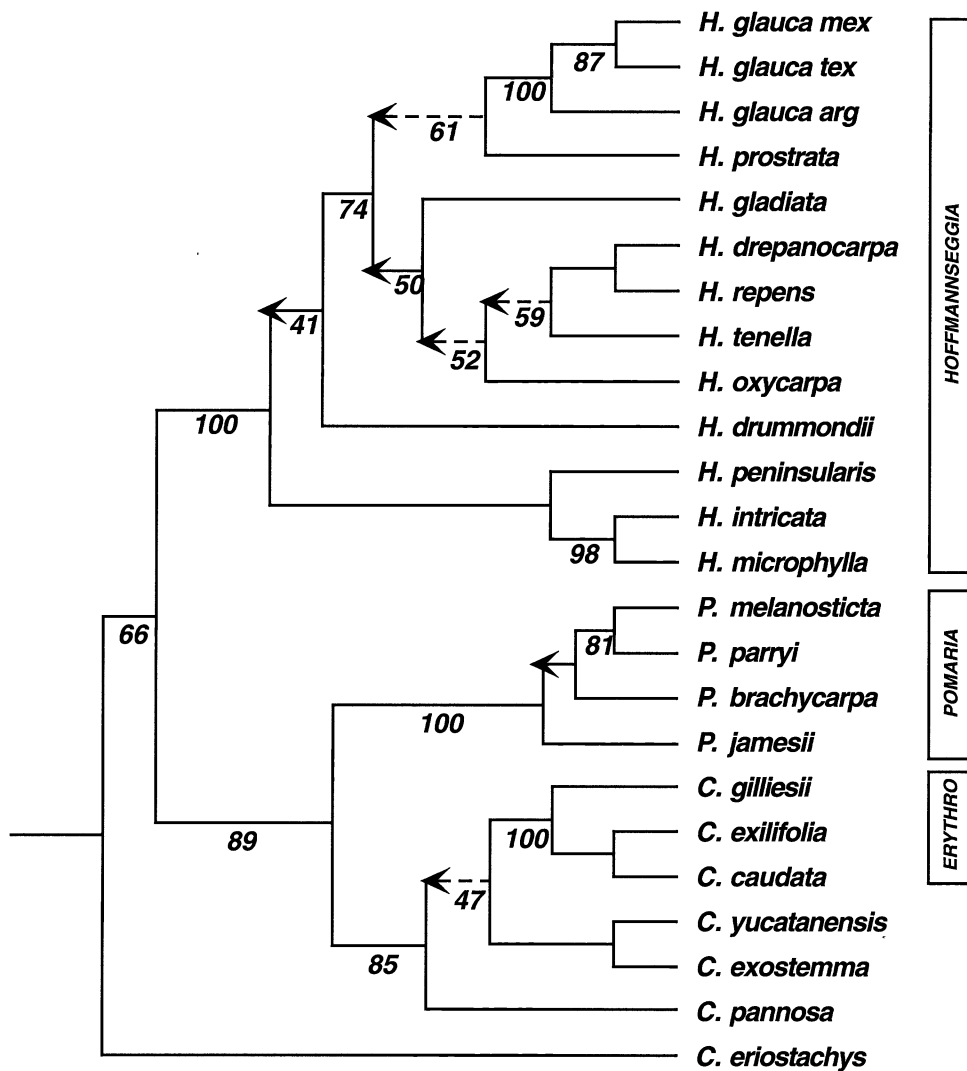


FIG. 1. Hypothesis of relationships of *Hoffmannseggia* species based on combined data from cpDNA restriction site analyses and morphology. "Erythro" refers to the *Erythrostemon* group sensu Lewis (1998). C.=*Caesalpinia*, P.=*Pomaria*. From Simpson and Miao (1997).

ment to the funiculus, slightly off-center and below the seed apex. The effect of this placement is the production of a "shoulder" at the top of the seed.

Within *Hoffmannseggia*, species differ from one another in habit, small woody shrubs in the group including *H. microphylla* and its closest relatives (Fig. 1) and herbaceous or suffrutescent perennials in the remainder. The most conspicuous dif-

ferences among species are in the fruit size, shape, and dehiscence. Some species have rectangular, acute, indehiscent fruits (e.g., *H. gladiata*, *H. tenella*, *H. watsonii*). Others have indehiscent arcuate fruits with parallel margins (*H. drepanocarpa*, *H. glauca*). One species (*H. oxycarpa*) has dehiscent fruits with valves each of which twists around itself after the fruit splits. The members of the *H. microphylla* clade

and *H. drummondii* have lunate or crescent-shaped fruits that are always dehiscent. In addition to fruit shape and dehiscence, vestiture type and abundance varies among species, some villous, others densely covered with glandular trichomes, and some merely puberulent. Differences in vestiture type are most pronounced on the flowering rachises, pedicels, and sepals.

In the following descriptions, plant height is measured from the beginning of the root to the tallest part of the plant (usually the inflorescence), leaf length is measured from the base of the petiole to the

end of the terminal pinna, and leaf width is measured from the tip of the longest lateral pinna to the tip of the opposite pinna. Inflorescence length is the length of a flowering inflorescence with the realization that sometimes it has not fully expanded. Flower length is from the constriction at the base of the calyx to the end of the corolla and flower width is the width in lateral view. Fruits lengths were measured from tip to tip, not around the curvature and fruit widths were measured at the widest part of the fruit.

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

1. Small shrubs, subshrubs or perennial herbs; sepals persisting in fruit or very tardily and jaggedly deciduous (*H. microphylla*); rachises and sepals with simple trichomes or linear, multicellular glandular trichomes, or both; funiculus attached subapically, producing a shoulder on one side of the point of attachment.

#### *Hoffmannseggia*

1. Trees, vines or small woody shrubs; rachises and sepals with simple trichomes, or peltate glandular trichomes, or complex multicellular trichomes, or mixtures; sepals deciduous in fruit leaving a smooth ring around the base of the pod (except in *C. pumilio*); seeds with the funiculus attached apically on the seed.
2. Stipules conspicuous, often fringed, persistent; stamens and style curving downward and held within the lowermost, entire sepal; stigma lateral; pods with complex cylindrical, fringed trichomes.

#### *Pomaria*

2. Stipules lacking or early deciduous (except in *C. coulterioides*); stamens and style not cupped in the lowermost sepal or the sepal fringed; stigma subterminal; pods with simple trichomes, glandular trichomes, or punctate dots (with the exception of *C. trichocarpa* which had plumose trichomes).

#### *Caesalpinia*

HOFFMANNSEGGIA Cav., Icon 4:63. tab. 392. 1798. 'Hoffmanseggia' orth. cons. Type: *Hoffmannseggia falcaria* Cav., nom. illeg. = *Hoffmannseggia glauca* (Ortega) Eifert.

*Larrea* Ortega (1797) nom. rej. against *Larrea* Cav. (1880)

SHRUBS, SUBSHRUBS, OR SUFFRUTESCENT TO ROSETTE-FORMING PERENNIAL HERBS arising from taproots and/or thick caudexes, sometimes with spreading, underground stems that in *H. glauca* form tubers. LEAVES alternate, odd-pinnate with 1–13 pairs of pinnae; stipules

present, persistent, ovate to lanceolate, entire, or serrate, either glabrous, ciliate, or villous; area of pinnae attachment to the rachis variable, swollen, glabrous, vestitured, and/or bearing few to several, often capitate, multicellular glandular trichomes or processes that sometimes form a crown-like mass; pinnae with 4–13 even-pinnate leaflets sometimes with a glandular process on the rachilla at the point of leaflet insertion; leaflets oblong to irregularly ovate or obovate, usually unequally truncate or attenuate at the base, obtuse apically, rarely emarginate with a glandular process at the tip, entire, or rarely with multicellular glandular processes along the edges, some-



times vestitured, often red along the margins; ventral leaflet surfaces usually glabrous, sometimes puberulent, pubescent, strigose, or villous; dorsal surfaces glabrous or variously vestitured. Inflorescences of terminal racemes 4–14 cm long, bearing 4–27 flowers, non-congested or with the immature flowers clustered at the tip; flower buds subtended by ovate to lanceolate, serrate to ciliate bracts that are shed before the flowers open. FLOWERS hermaphroditic, pedicellate, zygomorphic usually by differentiation of the banner (flag) petal; sepals 5, slightly imbricate or valvate, fused basally for about 1 mm, with the free portion 3–12 mm long, lanceolate, oblong, or oblanceolate, acute, variously vestitured with simple trichomes or linear, multicellular glandular trichomes, or both on the dorsal faces and margins, often red along the margins, persistent throughout fruiting (except for *H. microphylla* and to a lesser extent *H. intricata*); corollas yellow, yellow orange, or rose often fading to pink with age, consisting of 5 subequal, clawed, spatulate petals; banner petal having the most pronounced claw and often with red markings, sometimes with the claw folded and bearing a tuft of trichomes on the inner base and glandular trichomes on the dorsal surface and claw margins; lateral petals less pronouncedly clawed, sometimes with red markings on the ventral surface and glandular trichomes on the dorsal surface; stamens 10, free, subequal, about as long as the corolla; filaments bearing clear, flattened, apiculate, often retorse processes and sometimes with multicellular glandular trichomes and/or villous trichomes primarily on the lower half; anthers dorsifixed, dehiscing introrsely via longitudinal slits, yellow or red; gynoecium consisting of an elongate, laterally compressed ovary on a short stipe, glabrous, glandular and/or variously vestitured; style as long as or longer than the ovary, glabrous, vestitured, or bearing glandular trichomes basally; stigma terminal to very obliquely terminal, sunken, bearing a fringe on one side. FRUITS dehiscent or

indehiscent legumes, compressed laterally, lunate, arcuate, rectangular, oblong, or sword-shaped in outline, 8–53 mm long, 4–20 mm wide, acute, mucronate, or rounded apically, attenuate basally, sometimes compressed between the seeds; valves, if dehiscent, curling outward or twisting, smooth or reticulately veined, glabrous or variously adorned with simple trichomes and/or multicellular glandular trichomes, these usually capitate and almost sessile to 1.2 mm long; margins obscure or pronounced, glabrous, vestitured and/or with multicellular glandular trichomes. Seeds 1–10 per pod, 2–7 mm in length, generally ovoid or oval in outline with the funiculus attached to the seed subterminally creating a “shoulder” at the apex and only slightly expanded where attached to the pod, smooth, glabrous, dark green to dark brown.

**CHROMOSOME NUMBER:** All counts that have been made have yielded  $2n=24$  (see individual species), a number common among *Caesalpinia* and its allies.

**DISTRIBUTION:** In North America, *Hoffmannseggia* consists of 11 species in the central and southwestern United States and Mexico from Kansas and Colorado southward to Oaxaca. A disjunct cluster of species occurs in South America from Peru to south-central Argentina (Ulibarri, 1979).

Named for Johann Hoffmannsegg, a German botanist who explored France, Hungary, Portugal, and Spain. Cavanilles's spelling with one n is treated as an orthographic error and the name is conserved as *Hoffmannseggia*. As a footnote to his description of *Hoffmannseggia* with its sole species *H. falcaria*, Cavanilles (1798) clearly stated that his name was a substitute for *Larrea glauca* Ortega (1797). As pointed out by Eifert (1972), Ortega's epithet must be retained because of priority, but his generic name *Larrea* was superseded by *Larrea* Cav. (*Zygophyllaceae*), the creosote bush.

## Artificial key to the species of *Hoffmannseggia* in North America

1. Woody, spreading, almost prostrate or upright small shrubs; fruits lunate with acute ends, expanded in the center, dehiscent with the valves sometimes curling outward.
  2. Plants 50–250 cm tall; stems upright; the terminal pinna of leaves noticeably longer than the lateral ones; flowers 12–15 mm long; sepals absent in fruit. 6. *H. micrphylla*
  2. Plants to 40 cm tall; stems divaricately or fasciculately branching; 1–4 pairs of pinnae only slightly longer or shorter than the terminal one; flowers 3–9 mm long; sepals persistent in fruit or only partially deciduous.
    3. Plants highly branched but not zig-zag; rachises, pedicels, and dorsal face of sepals glabrous or with a few scattered glandular trichomes; sepals retained in fruit or partially and jaggedly deciduous; valves brown.
      4. Sepals in fruit partially deciduous; fruit valves with scattered glandular multicellular trichomes; plants of Baja California and Sonora, Mexico. 5. *H. intricata*
      4. Sepals in fruit persistent; fruit valves more or less glabrous; plants of southern Texas and Tamaulipas, Mexico. 2. *H. drummondii*
    3. Plants with zig-zag branching; rachises, pedicels and dorsal face of sepals densely covered with multicellular glandular trichomes; sepals always persistent in fruit; valves red. 8. *H. peninsularis*
1. Perennial herbs; fruits arcuate, broadly oblong to orbicular, or rectangular with parallel margins, or sword-shaped, indehiscent or dehiscent with the valves tightly twisting.
  5. Sepals and pedicels with conspicuous multicellular glandular trichomes.
    6. Petals with numerous conspicuous multicellular glandular trichomes on all claw margins; fruits indehiscent, slightly arcuate, the valves sparsely tomentose only. 4. *H. glauca*
    6. Petals lacking glandular processes on the claw margins or only a few on the banner petal claw margins; fruits rectangular or sword-shaped, the valves with numerous multicellular trichomes.
      7. Fruit rectangular in outline, reticulately veined, indehiscent; leaflets usually strigose or villous. 3. *H. gladiata*
      7. Fruit sword-shaped obscurely veined, dehiscent; leaflets generally glabrous.
        8. Glandular trichomes on the fruit valves red or orange-tipped shorter than 0.75 mm; plants of southern Texas, New Mexico, and northern Mexico (Coahuila, Nuevo León, and Tamaulipas). 7a. *H. oxycarpa* subsp. *oxycarpa*
        8. Glandular trichomes on the fruit valves black-tipped, longer than 0.75 mm; plants of south-central Mexico (Hidalgo and Querétaro). 7b. *H. oxycarpa* subsp. *arida*
  5. Sepals and pedicels pubescent, strigose, or tomentose but lacking glandular trichomes.
    9. Fruits strongly arcuate, round at apex. 1. *H. drepanocarpa*
    9. Fruits oblong, rectangular (sometimes almost orbicular in *H. repens*), straight, acute.
      10. Flowers 20–45 mm long; fruits 10–20 mm wide; plants of Utah and Colorado. 9. *H. repens*
      10. Flowers 6–19 mm long; fruits less than 10 mm wide; plants of Texas and northern Mexico.
        11. Plants decumbent; endemic to east Texas. 10. *H. tenella*
        11. Plants upright; endemic to northern Mexico (Chihuahua). 11. *H. watsonii*

1. **HOFFMANNSEGGIA DREPANOCARPA** A. Gray, Pl. wright. 1: 58. 1852. TYPE: UNITED STATES. Texas: (Between Texas and El Paso) "Wright, Coll. Tex. N. Mex." 1851, *Wright* (Gray number 1027) (LECTOTYPE: GH! here designated; possible ISOLECTOTYPES: K!, GH!, MO!, NY!, US!). There are two specimens at GH labeled 1027 in Gray's writing, one says "Wright coll. Tex. N. Mex. no. 352" and has a date of 1851 which matches the protologue. However, according to

the collection records (Johnston, 1940), there is no Wright field number 352 collected during 1851 that is a *Hoffmannseggia* (352 is an *Asteraceae*). The second 1027 specimen at GH with the name in Gray's writing is labeled 1852. It is obvious that the *Wright* 1027 collections are from several localities, although all that I have examined are *H. drepanocarpa*. I therefore hesitantly designate the *Wright* 1027 specimens at MO, NY, and US as isolectotypes (even though Isely, 1975, page 215 listed the US and MO sheets as isolectotypes). Possible localities from which the type



collections may have come (cf. Johnston, 1940) are: New Mexico, Dona Ana Co., Rio Grande Valley at Dona Ana, stiff black soil, 26 Jul 1851 (Wright 47), or New Mexico, Grant Co., Prairies from Mimbres to Coppermines, 1 Aug 1851 (Wright 131). I have seen only one specimen from Grant Co. which would make the Dona Ana locality the most logical.

*Caesalpinia drepanocarpa* (A. Gray) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.

*Larrea drepanocarpa* (A. Gray) Britton, N. Amer. fl. 23 (5): 312. 1930.

PERENNIAL HERBS with very short internodes producing an almost fasciculate appearance, 8–30 cm tall, arising from a taproot; young stems and leaf rachises glabrescent to pubescent. LEAVES consisting of 4–9 pairs of pinnae plus a single terminal one, 3–10 cm long including a petiole 1–7 cm long, 1.3–3.0 cm wide; stipules lanceolate, entire, 2–3 mm long, 1.0–1.3 mm wide; area on the rachis of pinnae insertion not differentiated; leaflets 6–9 per pinna, ovoid-obtuse in outline, 1.0–5.5 mm long, 1.0–2.3 mm wide, with glabrous to slightly pubescent upper surfaces and glabrous to slightly strigose lower surfaces. INFLORESCENCES terminal, 6–27 cm long, 3–11-flowered, the rachis and pedicels strigose; pedicels green to brown, 2–7 mm long. FLOWERS turbinate in side view, 6–9 mm long, 3.5–5 mm wide; free portion of sepals 3–5 mm long, 1–2 mm wide, dorsally pubescent to strigose; banner yellow, sometimes tinged with red, 5–8 mm long with the expanded portion 2.5–4.5 mm wide, bearing a small tuft of trichomes at the base of the inside of the claw and glabrous on the dorsal surface; lateral petals yellow sometimes tinged with red, 6.5–8 mm long, 2–5 mm wide, glabrous dorsally; filaments 3–5 mm long, with fleshy projections along the basal half; anthers 0.5–0.75 mm long; ovary 3–6.5 mm long, glabrous; style 2.5–3.0 mm long, shortly pubescent; stigma terminal. FRUITS indehiscent, falcate (sometimes almost making a full circle) with parallel margins, reticulately veined, pale brown or reddish, 23–40 mm measured straight from tip to

tip, 5–8 mm wide; tip round; valves puberulent, brown or red; margins pronounced, puberulent; seeds 6–11 per fruit, oval in outline, 4 mm long, 2.5 mm wide, dark brown.

COMMON NAME AND USES: Sickie-pod Rush-pea.

CHROMOSOME NUMBER:  $2n=24$  (Turner and Fearing, 1960).

DISTRIBUTION (FIG. 2) AND HABITAT: A widely distributed species in the grasslands of southwestern United States (Kansas and Colorado to California and Texas) and adjacent Mexico, in sandy or clay limestone soils, often with mesquite or *Yucca*, from 900–2000 m elevation.

FLOWERING AND FRUITING: Primarily April to June but sometimes flowering in August and September.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Chihuahua: 6.9 mi N of Samalayuca, 14 Aug 1955, *M. C. Johnston et al.* 2736B (TEX); ca. 20 km NNE of Ascención on rd. to Guzmán, 107.82°W, 31.25°N, 1450 m, 20 Aug 1972, *F. Chiang et al.* 8739H (TEX); Cerro Grande, 20 Aug 1935, *H. LeSueur Mex 124* (ARIZ, TEX); El Pastor, Sep 1976, *A. Enrique 92* (NY). Coahuila: 11 mi S of Saltillo, 1 Sep 1938, *I. M. Johnston 7280* (GH).

UNITED STATES. Arizona: Apache Co.: 5 miles west of Rock Point, 15 Jun 1938, *H. C. Cutler 2197* (CAS, GH). Cochise Co.: 3 mi S of Tombstone, 1550 m, 4 Aug 1953, *J. L. Gardner & J. E. Fletcher 154* (US); 4 mi E of Dragoon, 24 May 1935, *B. Maguire 11683* (GH, NY). Coconino Co.: between Winslow and Flagstaff, 20 May 1934, *S. D. McKelvey 4503* (GH); Sedona, 4 May 1962, *C. C. Michaels 2255* (ARIZ). Graham Co.: Deer Creek T8S R20E Sec. 10, 9 May 1963, *C. R. Sims 10* (UNM); 9.5 mi S of Mt Turnbell Village, 12 Jun 1983, *D. Atwood 9415* (BRY). Mojave Co.: about 2 mi S of Findlay Tank, 1700 m, 11 May 1987, *R. K. Gierisch 4983* (ARIZ); clay hillside in Juniper-*Bouteloua* association between mileposts 91 & 92 E of Kingman, 29 May 1965, *I. L. Wiggins 20168* (DS). Yavapai Co.: Cornville, 1000 m, 31 May 1962, *D. Demaree 45617* (NY); N of Chino, 3 Jun 1944, *O. M. Clark 11794* (GH); Prescott, 7 Aug 1930, *C. J. King & H.F. Loomis 7273* (ARIZ); ca 2 mi W of Seligman on Hwy. 66, 1070 m, 10 Jul 1981, *E. Neese et al.* 10665 (NY). Colorado: Baca Co.: 3 mi W, 20 mi S of Pritchett, 3 Aug 1970, *S. Stephens & R. Brooks 42549* (KANU). Bent Co.: 9 mi W Las Animas, 8 Jun 1972, *S. Stephens 54370* (KANU). Fremont Co.: 0.8 mi N of junction between Cacklebur Creek and the Arkansas

River near Florence, 1733 m, 11 Jul 1983, *J. S. Peterson & S. Kennedy 83415* (BRY); Canyon City rd. S of Colorado Springs, 1900 m, 13 Jun 1941, *W. T. Penland 1661* (CAS). Las Animas Co.: head of Cottonwood Creek 7 mi S and 16 mi E of Kim, W of Baca Co. line, 8 Aug 1948, *Wm. Weber 4411* (CAS, TEX). Kansas: Meade Co.: Wolf Canyon, 11 Jul 1950, *W. H. Horr 3518* (TEX). New Mexico: Bernalillo Co.: off US 66 at W of Albuquerque city limit, 1833 m, 21 Oct 1967, *G. E. Hall 416* (UNM). Chaves Co.: 20 mi W of Roswell, 1500 m, 17 May 1980, *B. Hutchins 8697* (UNM). Curry Co.: just W of Melrose on Hwy. 60-84, 26 Jun 1973, *L. C. Higgins 7474* (BRY, NMC). De Baca Co.: 10 mi W of Ft. Sumner, 1467 m, 24 Jun 1976, *B. Hutchins 5995* (UNM). Dona Ana Co.: Aden Crater ca 17 mi SW of Las Cruces, 17 Aug 1974, *T. R. Van Devender & P.S. Martin s.n.* (ARIZ). Eddy Co.: vic. of Carlsbad Caverns valley of Pecos, 15 Aug 1955, *B. E. McKechnie 399* (WIS). Grant Co.: Hwy. 81, 3.4 mi N of Hachita, T27S R15W, 1500, 24 May 1984, *J. Grimes & L. Gieschen 2378* (CAS, NY); 8 mi W of Silver City, 1833 m, 4 Jul 1976, *B. Hutchins 6202* (UNM). Guadalupe Co.: 6.5 mi N of Santa Rosa along the Pecos River, 7 Jul 1974, *L. C. Higgins 8968* (BRY, NY). Harding Co.: 2 mi W of Mills from NM Hwy. 39 toward Mills Forest Camp, 2000 m, 1 Jul 1981, *R. Spellenberg et al. s.n.* (NMC). Hidalgo Co.: Animas Mts 7 air mi SE of Animas, R19W T28S, 28 Aug 1986, *R. D. Worthington 14820* (NY). Lea Co.: along roadsides 1 to 11 mi N of Hobbs, 31 Aug 1966, *R. Pearce 2574* (ARIZ). Otero Co.: 2 mi N of Newman on TX border, 12 Aug 1955, *M. C. Johnston 2735* (TEX). Quay Co.: 1.5 mi NW of Experiment Station at Tucumcari, 30 Jun 1936, *A. Lake s.n.* (UNM). Roosevelt Co.: 1 mi E of Chaves-Roosevelt Co. line on Hwy. 70, 13 Jun 1974, *L. C. Higgins 8661* (BRY, NY). Sandoval Co.: N bank of Salado Creek Puerco Dam Quadrangle, 1900 m, 8 Jun 1973, *V. L. Bohrer 1655* (ARIZ). Sierra Co.: 2 mi E of Monticello, 1900 m, 14 Aug 1982, *B. Hutchins 10446* (UNM). Socorro Co.: 12 mi E of San Antonio, 1633 m, 15 Jul 1977, *B. Hutchins 7095* (UNM); arroyo 2 mi S of San Marcial, 18 Jun 1921, *R. S. Ferris & C.D. Duncan 2341* (DS); Hwy. 380, 3 mi E of Bingham, 1906 m, 29 Jun 1970, *B. Hutchins 3077* (RSA). Torrance Co.: 1.3 mi E of Negra, 1950 m, 6 Jun 1977, *W. Wagner & D. Sabo 3052* (UNM). Oklahoma: Cimarron Co.: 5 mi N of Kenton, 7 Jun 1958, *U. T. Waterfall 14914* (GH, US). Texas: Brewster Co.: 23 mi E of Marathon on rte. 90, 6 Jun 1958, *D. S. Correll & I. M. Johnston 19348* (KANU, LL, NY); Alpine, 12 Jun 1935, *T. L. Steiger 911* (NY); Altuda Point, Glass Mtn, 1550 m, 14 Jun 1947, *B. H. Warnock 6002* (SRSC); roadside park on Hwy. 90 near eastern county line, 1500 m, 15 Jun 1952, *L. C. Hinckley 4818* (SRSC). Crane Co.: 3-8 mi S of Crane, 1000 m, 24 May 1957, *B. H. Warnock 14706* (LL, SRSC, TEX). Crockett Co.: Hwy. 190 at Upton City line, 767 m, 22 Oct 1963, *J. Read 494* (SRSC). Culberson Co.: 6 mi W of Kent on rte. 80, 15 May 1959, *D. S. Correll & I. M. Johnston 21978* (LL, NY); on Hwy. 80 about 12 mi E of Van Horn, 1333 m, 13 Jun 1949, *L. C. Hinckley & L. Hinckley 85* (SRSC). El Paso Co.: S of Hueco Tanks SP on FM 2775, 1 mi N of Hwy. 62/180, 27 Aug 1989, *M. H. Mayfield & B. L. Westlund 43* (TEX). Hansford Co.: Carroll Howett Ranch about 15 mi N of Spearman, 30 Aug 1978, *L. C. Higgins 12490* (BRY). Hartley Co.: 8 mi W of Channing near Punta de Agua Creek, Aug 1949, *C. L. York & C. M. Rogers 333* (TEX). Hudspeth Co.: 3 mi E of Sierra Blanca, 18 Aug 1942, *U. T. Waterfall 4023* (ARIZ, GH, MO); Baier Ranch, 30 Jun 1943, *B. C. Tharp 43-616* (MO, NY, TEX, US). Kendall Co.: 5 mi S of Umbarger Buffalo Lake Natl. Wildlife refuge, 31 Aug 1977, *L. C. Higgins 11321* (NY). Loving Co.: 1 mi W of Kermit off Mentone Hwy., 900 m, 12 Aug 1952, *M. McCullough 165* (SRSC); about 10 mi E of Mentone, 467 m, 3 Jun 1949, *B. L. Turner 988* (SRSC). Lubbock Co.: vic of Lubbock canyons of Double Mt, Fork of Brazos, 31 May 1930, *D. Demaree 7734* (KANU, DS, F, GH, MO, TEX, WIS (2)). Nolan Co.: Sweetwater, chaparral dry sandy plain, 27 May 1918, *E. J. Palmer 13715* (MO, US, WIS). Pecos Co.: 48 mi N of Marathon on rte. 385, 30 Jul 1988, *B. B. Simpson 88-VII-31-1* (TEX); hills ca 20 mi W of Sanderson, 930 m, 1 Jun 1957, *B. H. Warnock 14911* (TEX). Presidio Co.: 0.5 mi NW of Tenaja switch on Kerr Mitchell ranch, 1500 m, 11 May 1946, *L. C. Hinckley 3613* (NY); 3 mi S of Marfa toward Shafter, 15 Jul 1952, *B. H. Warnock 10577* (LL, TEX, SRSC). Randall Co.: Palo Duro Canyon, 15 Aug 1989, *L. C. Higgins 18530* (BRY); Scurry Co.: 3-8 mi N of Snyder, 867 m, 22 Apr 1965, *B. Cole 69* (SRSC). Taylor Co.: 5 mi S of Abilene, 30 Jun 1962, *B. L. Turner & T. E. Melchert 4846* (TEX). Terrell Co.: along Hwy. 90, 7 mi E of Longfellow, 933 m, 30 Apr 1949, *B. H. Warnock & B. L. Turner 576* (SRSC). Terry Co.: Brownfield, 20 May 1925, *E. O. Wooton s.n.* (US). Tom Green Co.: San Angelo, 19 May 1899, *W. L. Bray 350* (TEX). Ward Co.: Infrequent and widespread in deep sand between Imperial & Monahans, 900 m, 30 Aug 1955, *B. H. Warnock 13145* (SRSC). Winkler Co.: infrequent perennial along sandy hwy., 6 mi NW of Wink, 967 m, 2 Apr 1949, *J. O. Parks 34* (SRSC).

This small species is often inconspicuous in the grasslands where it occurs. It is easily recognized by its reddish-brown, essentially glabrous, reticulately-veined, very curved fruits with rounded ends. It is one of the few *Hoffmannseggia* species that do not have any glandular trichomes. In flower it is similar to *H. watsonii*, but the latter has shorter, straight fruits. All molecular work to date (cf. Fig. 1) places *H.*

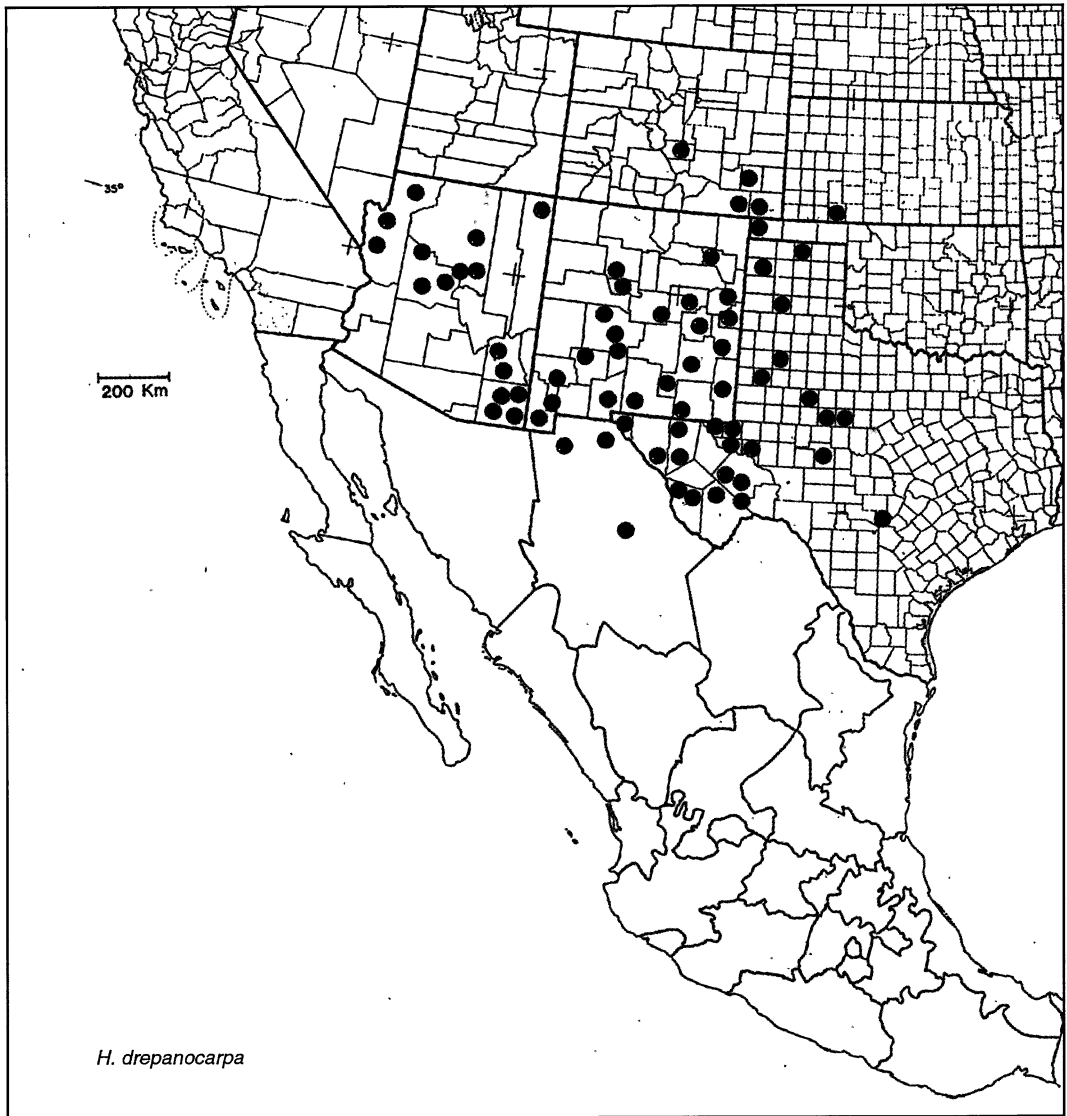


FIG. 2. Distribution of *Hoffmannseggia drepanocarpa*.

*drepanocarpa* and *H. repens* as sister species despite their different morphologies. *Hoffmannseggia repens* has greyish-green foliage, large open flowers, and extremely broad (over 1 cm) fruits. The foliage of *H. drepanocarpa* is dark green, the flowers that never open widely set seed autogamously in the greenhouse, and the fruits are narrower than 8 mm.

2. *HOFFMANNSEGGIA DRUMMONDII* Torr. & A. Gray, Fl. N. Amer. 1 (3): 393. 1840. TYPE: UNITED STATES. Texas. [1834], *T. Drummond s.n.* (HOLOTYPE: NY!; ISOTYPES: GH!, US!) [Isely, (1975, p. 193) claimed that the holotype at NY was a "miserable little fragment, but readily identifiable" but I find the holotype perfectly acceptable.] (Plate 1C)

*Caesalpinia drummondii* (Torr. & A. Gray) Fisher, Bot. Gaz. (Crawfordsville) 18: 123. 1893.

*Larrea drummondii* (Torr. & A. Gray) Britton, N. Amer. fl. 23 (5): 311. 1930.

*Hoffmannseggia texensis* Fisher, Contr. U.S. Natl. Herb. 1: 147. 1892. TYPE: UNITED STATES. Texas. [probably McMullen Co.]: Nueces River, [24 Jul], 1828, *J. L. Berlandier 612* (HOLOTYPE: GH!). Judging from the description of his movement south from San Antonio (Bexar) to Laredo (Ohlendorf, 1980), Berlandier would have crossed the Nueces in McMullen County.

*Caesalpinia texensis* (Fisher) Fisher, Bot. Gaz. (Crawfordsville) 18: 123. 1893.

*Larrea texensis* (Torr. & A. Gray) Britton, N. Amer. fl. 23 (5): 311. 1930.

Very branched LOW SHRUBS, to 30 cm tall, arising from a woody taproot; young stems and leaf rachises with scattered multicellular glandular trichomes. LEAVES consisting of 1 pair of pinnae plus a single terminal one, 10–23 mm long including a petiole 2–10(–20) mm long, 10–15 mm wide; stipules ovate, entire, ca. 1 mm long and 1 mm wide; area on the rachis of pinnae insertion with multicellular glandular processes; leaflets 3–6 per pinna, oblong in outline, 3.0–3.3 long, with glabrous upper and lower surfaces, the latter sometimes with a very few multicellular glandular trichomes. INFLORESCENCES terminal and lateral opposite a leaf, 20–40 mm long, 3–8-flowered; rachis and pedicels with scattered multicellular glandular trichomes; pedicels red, 2–5 mm long. FLOWERS turbinate in side view, 5–8 mm long, 3–8 mm wide; free portion of sepal 0.5–2.0 mm long, 4.5 mm wide, dorsally with a few multicellular glandular trichomes and lightly villous on the margins; banner yellow with red markings, 3–7 mm long with the expanded portion 2.5–5.0 mm wide, with a few trichomes at the base of the inside of the claw and a few multicellular glandular trichomes on the dorsal surface; lateral petals yellow, 3–7 mm long, 2–3 mm wide bearing a few multicellular glandular trichomes at base of the dorsal surface; filaments 2.5–6.0 mm long, with clear retrorse multicellular processes primarily at the base; anthers 0.5–1.5 mm long; ovary 1–3 mm

long, with a slightly glandular surface; style 3–4 mm long, glabrous; stigma terminal. FRUITS lunate, broadest in the center, tapering at the ends, dehiscent with the valves curving outward, 16–20 mm long from tip to tip, 6–8 mm wide, mucronate apically due to persistence of the style; valves thin, more or less glabrous, brown; margins glabrous; seeds 1–2 per fruit, oval in outline, 3 mm long, 1 mm wide (immature), green (seeds are very rare in collections).

COMMON NAME AND USES: Drummond Rush-pea.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 3) AND HABITAT: Confined to southern Texas in sandy-clay soils of Atacosa, Bee, Goliad, Gonzales, McMullen, San Patricio, and Wilson counties and in Tamaulipas, Mexico at elevations below 700 m.

FLOWERING AND FRUITING TIMES: Sporadic throughout the year with flowering in February, March, April, May, July, October, and fruiting as late as December.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Tamaulipas: 11 mi N of Manuel toward Aldama, 10 Dec 1959, *M. C. Johnston 4934* (MEXU, TEX); 12 mi N of Soto la Marina on rd. to Jiménez, 600 m, 12 Dec 1959, *M. C. Johnston & J. Crutchfield 4987* (TEX); 5 mi W of Loreto on overgrazed prairie, sandy loam, 30 m, 8 Feb 1960, *M. C. Johnston & J. Crutchfield 5072* (LL, MEXU, TEX); 7 mi N of Lomas del Real, 7 mi N of main hwy. on dirt rd. which turns off just N of Altamira, 27 Oct 1959, *M. C. Johnston & J. Graham 4535* (MEXU, TEX).

UNITED STATES. Texas: Atacosa Co.: 4.5 mi S of Jourdanton on rocky limestone, 14 Jul 1960, *J. C. Johnson 2064* (TEX). Bee Co.: 12 mi N of Beeville, limey soil in open grassland, 26 May 1946, *G. Wolcott & F. A. Barkley 16T419* (GH, TEX); 4 mi SW of Skidmore, 28 Mar 1948, *V. L. Cory 54135* (LL). Goliad Co.: 10.7 mi W of Goliad on new Hwy. 59, native bluestem grassland, 14 Sep 1955, *M. C. Johnston 2783* (TEX). Gonzales Co.: 5 mi S of Gonzales, 28 Mar 1936, *V. L. Cory 18233* (GH). McMullen Co.: N of Callihan on hwy. toward Karnes City, first cuesta on W side of hwy. going N from Frio river bottom, 1 Sep 1976, *M. C. Johnston & D. Darr 12438* (LL); Rte. 72, E of Tilden, 4.2 mi W of the main turn to Choke Canyon State Park, 15 mi W of Three Rivers on S side of Choke Canyon Reservoir, 22 Jun 1994, *B. B.*

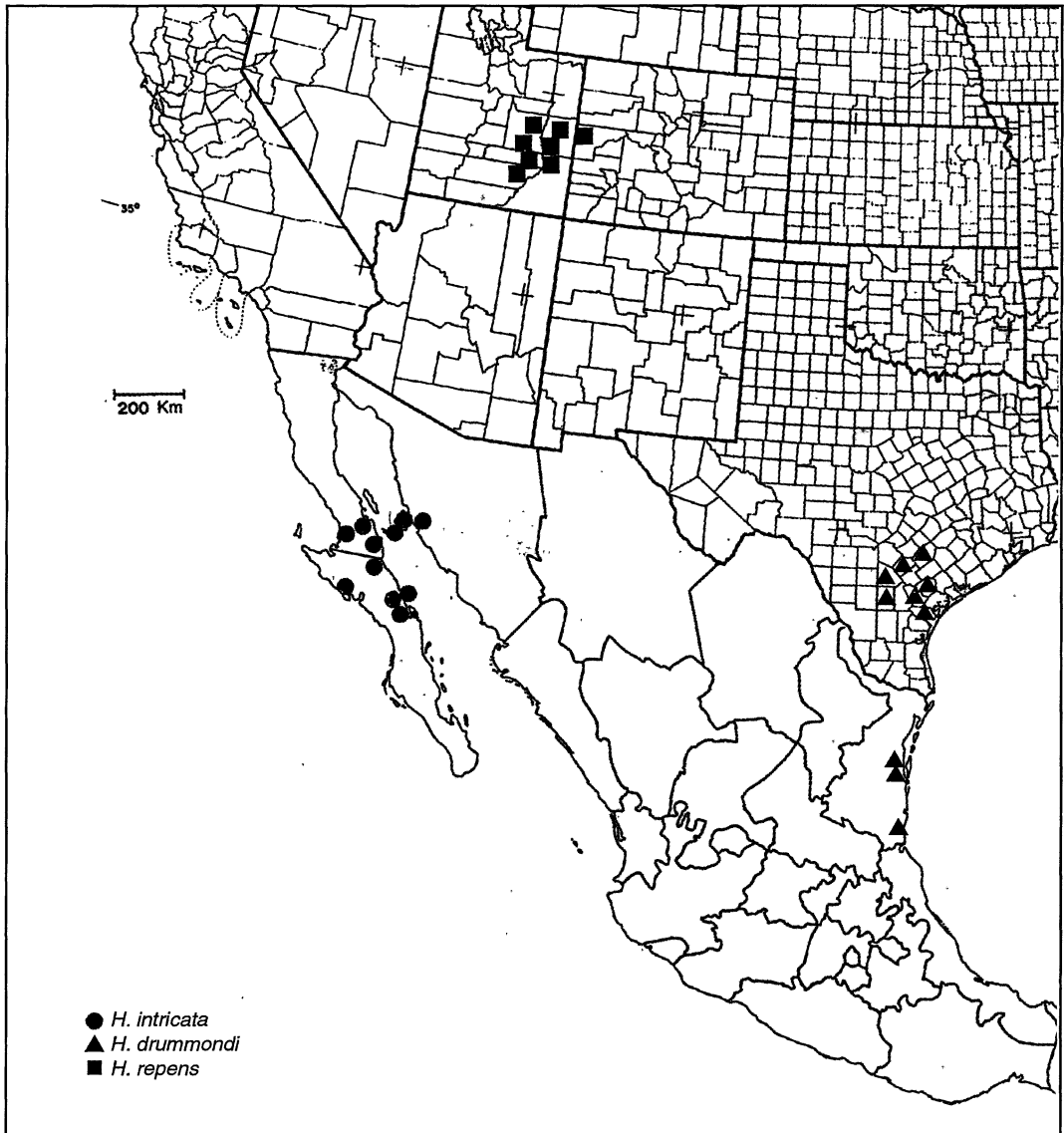


FIG. 3. Distribution of *Hoffmannseggia drummondii*, *H. intricata*, and *H. repens*.

*Simpson 22-VI-94-1* (TEX). San Patricio Co.: NW of Sinton, sandy clay on Dr. Wright's place, in ditches in shade, 9 Apr 1960, G. G. Williges 389 (TEX). Wilson Co.: Sutherland Springs, 2 Apr 1932, M. E. Jones 29338 (POM).

This is among the rarest of *Hoffmannseggia* species probably because of the destruction of its Blackland Prairie habitat in south Texas. The shrubby habit and small lunate, dehiscent pods are remi-

niscient of those of *H. intricata*, *H. microphylla*, and *H. peninsularis* and on morphological grounds, one would expect the four to be related. Isely (1975, p. 163) placed all four in *Caesalpinia* because of their woodiness. However, molecular work to date (Fig. 1) positions *H. drummondii* as sister to a clade of all of the North American species except these three.

There is some doubt as to the dates of Drummond's and Berlandier's collections.



Drummond collected in southeastern Texas in 1833 and 1834, but from Geiser's (1948) accounts of his travels, it appears most likely that the collection of this species was made in the summer of 1834. Likewise, Berlandier crossed the Nueces in July 1828 and 1829, but his own account (cf. Ohlendorf, 1980) and that of Geiser (1948) would indicate that most of his collections from this area were from July 1828.

3. *HOFFMANNSEGGIA GLADIATA* Benth. in A. Gray, Pl. wright. 1: 57. 1852. TYPE. MEXICO. [Hidalgo]: Zimapán. *T. Coulter* 487 (HOLOTYPE: K!; ISOTYPE: TCD!).

*Caesalpinia gladiata* (Benth.) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.

*Larrea gladiata* (Benth.) Britton, N. Amer. fl. 23 (5): 314. 1930.

*Hoffmannseggia platycarpa* Benth. in A. Gray, Pl. wright. 1: 57. 1852. TYPE. MEXICO. *T. Coulter* 486 (HOLOTYPE: K!; ISOTYPE: TCD!).

*Caesalpinia platycarpa* (Benth.) Fisher, Bot. Gaz. (Crawfordsville) 18: 22. 1893.

*Larrea platycarpa* (Benth.) Britton, N. Amer. fl. 23 (5): 314. 1930.

*Pomaria humilis* M. Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 10 (Ser. 1) Par. 2: 303. 1843. TYPE. [MEXICO. Puebla]: calcareous mountains N of Tehuacán, 2000 m, Aug, *H. G. Galeotti* 3228 (HOLOTYPE: W, not seen, photo 32066 at TEX!; ISOTYPE K!).

*Hoffmannseggia humilis* (M. Martens & Galeotti) Hemsley, Biol. cent.-amer., Bot. 1: 326. 1880.

*Larrea humilis* (M. Martens & Galeotti) Britton, N. Amer. fl. 23 (5): 316. 1930.

*Larrea potosina* Britton, N. Amer. fl. 23 (5): 313. 1930. TYPE. [MEXICO]. San Luis Potosí: Villar, dry, calcareous soil, 15 Aug 1890, *C. G. Pringle* 7367 (HOLOTYPE: GHI!).

*Larrea pueblana* Britton, N. Amer. fl. 23 (5): 313. 1930. TYPE. MEXICO. Puebla: Cerro de Coatepec near Oaxaca, Aug 1908, *C. A. Purpus* 3220 (HOLOTYPE: NY!, ISOTYPES: F!, GHI!, MO!).

*Hoffmannseggia pueblana* (Britton) Britton, Publ. Field Mus. Nat. Hist., Bot. Ser. 11 (5): 160. 1936.

*Larrea villosa* Britton, N. Amer. fl. 23 (5): 313. 1930. TYPE. MEXICO. Hidalgo: mountain slopes, Ixmiquilpán, July 1905, *C. A. Purpus* 1369a (HOLOTYPE: NY!).

HERBACEOUS PERENNIALS 60–180 mm tall arising from a thick woody caudex; young stems and leaf rachises striate, pilose

to villous, and with multicellular glandular trichomes. LEAVES consisting of 1–6 pairs of pinnae plus a single terminal one, 20–150 mm long including a petiole 10–80 mm long, 10–35 mm wide; stipules lanceolate, glabrous, 2.5–6.0 mm long, 1–2 mm wide; area on the rachis of pinnae insertion with numerous (a crown of) multicellular processes; leaflets 4–7 per pinna with conspicuous glandular processes at the points of insertion on the rachilla, ovoid-obtuse in outline, 2–6 mm long, 1.0–2.5 mm wide, always strigose on the margins and with upper and lower surfaces sometimes glabrous to strigose or villous, often red on the margins. INFLORESCENCES terminal, 50–140 mm long, 4–17-flowered with the buds clustered terminally, with the internodes lengthening as the flowers open; rachis and pedicels strigose with long (up to 1 mm) capitate multicellular glandular trichomes; pedicels green, 2–4 mm long in flower, increasing to 9 mm with age. FLOWERS broadly turbinate in side view, curving downward with age, 9–10 mm long, 9–16 mm wide; free portion of sepal 6–8 mm long, 2 mm wide, dorsally variously villous with long, capitate multicellular glandular trichomes to 1 mm long, reddish (sometimes pink); banner bright yellow with a few red markings, 7–10 mm long with the blade 6 mm wide, sometimes with a tuft of trichomes at the base of the inside of the claw and few multicellular glandular trichomes on the edges of claw and at base on the dorsal surface; lateral petals yellow sometimes with a central red stripe, 8–9 mm long, 4–5 mm wide with a few multicellular glandular trichomes on the base of the dorsal surface; filaments 6–8 mm long, with a few retrorse clear processes primarily at the base; anthers 1.0–1.2 mm long; ovary 3–4 mm long, glandular, sometimes villous on the margins and at the apex; style 4–5 mm long, glabrous or villous at base; stigma terminal. FRUITS rectangular with parallel margins, slightly undulate, depressed between the seeds, reticulately veined, green to red-

dish, 10–31 mm long, 4–5 mm wide; valves with scattered multicellular glandular trichomes; margins shortly and often densely pubescent; seeds 4–7 per fruit, oval in outline, 3.5–4.5 mm long, 2.5–3.5 mm wide, olive green.

COMMON NAME AND USES: Unknown.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 4) AND HABITAT: Mexico from Nuevo León to Oaxaca in calcareous soils from 1700 to 2300 m elevation.

FLOWERING AND FRUITING: Primarily June and July but flowering specimens collected in April, August, and September.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Hidalgo: 3.5 air km SW of Zimapán on rd. to Estanzuela, 14 Jul 1991, *M. Mayfield et al.* 841 (TEX); San Cristobal, 1 mi NE of San Cristobal on rd. to Grutas de Tolantango, 10 mi after the turn to Cardonal, 1820 m, 21 Jul 1991, *B. B. Simpson 91-VII-18-8* (TEX). Nuevo León: Mpio. Galeana, 7 km N of Galeana, 2400 m, 15 Mar 1981, *G. B. Hinton et al.* 18131 (TEX). Oaxaca: 1 km al N del entronque de la carretera 125 y la terracería rumbo a San Sebastian Frontera, 97.39°W, 18.14°N, 650 m, 9 Apr 1986, *A. Salinas & T. O. Dorado R. F-3192* (RSA); 12 km SW of Tamazulapán, San Isidro El Porvenir, 1999 m, 18 Jul 1979, *M. Sousa 10376* (TEX). Puebla: 10 km NE of Azumbilla by rd. Cañada Morelos, 97.33°W, 18.66°N, 9 Jun 1985, *F. Chiang et al. F-2627* (RSA, TEX, WIS (2)); 4 km E of San Francisco Xochiltepec, 2120 m, 30 Jun 1983, *F. Chiang 2411* (ARIZ); 5 km S of jct. of rd. to Cañada along Esperanza to Tehuacán rd., 21 Jul 1991, *B. B. Simpson 91-VII-19-2* (TEX); 6 km SW of main plaza in Tehuacán on rd. to Huajuápan de León, 21 Jul 1991, *B. B. Simpson 91-VII-20-4* (TEX); vic. San Luis Tultitlanapa near Oaxaca, Aug 1908, *C. A. Purpus 3200* (MO). Querétaro: 5 km S of Vizarrón, Mpio. de Cadereyta, 2300 m, 16 Sep 1989, *J. Rzedowski 48691* (TEX). Tamaulipas: 22 km by rd. SE of Bustamante toward Tula, 4.25 km from jct. of Bustamante rd. with Tula-Palmillas hwy, 1700 m, 23°17'N, 99°40'W, 20 May 1971, *M. C. Johnston et al.* 11147 (TEX).

This species was circumscribed in a footnote to the description of *Hoffmannseggia stricta* by Bentham in *A. Gray's Plantae Wrightianae Texano-Neo-Mexicanae* (1852). Its distinguishing features are the pronounced multicellular glandu-

lar trichomes on the pedicels and sepals, combined with the almost rectangular fruit. The fruit is reminiscent in shape of *H. tenella* fruits, but the vestiture of the rachises and sepals is most similar to that of *H. oxycarpa*. Gray also included Bentham's description of *H. platycarpa* in his footnote. The major differences Bentham noted in these footnote descriptions are in the number of pinnae, 3–6 in *H. gladiata* and 4–6 in *H. platycarpa*, and in the fruit, lanceolate, subcurved, hirtellus, and lightly glandular in *H. gladiata*, and broadly oblong and pubescent to glandular in *H. platycarpa*. I have found that the number of pinnae varies widely from 1–6 pairs. The length and density of the simple trichomes on the leaf and inflorescence rachises as well as those on the pedicels and sepals are very variable in this species, ranging from a few long trichomes to those so dense as to form a villous vestiture. In his treatment for the *Flora de Bajío*, Rzedowski (1997) considered *H. platycarpa* a synonym of *H. gladiata*. He specifically stated, however, that he thought *H. villosa* to be distinct because of its more pronounced pubescence. After examining the type and a large collection of specimens from Puebla, Mexico (e.g., *B. B. Simpson 91-VII-19-2* and *B. B. Simpson 91-VII-20-4*) that vary widely in density of vestiture, I have placed all in the same species.

The types of both *Hoffmannseggia gladiata* and *H. platycarpa* were collected by Thomas Coulter in Mexico, the first in Zimapán and the second in an unspecified locality. According to McVaugh (1943) it is difficult to determine when Coulter was where in Mexico. He was apparently in Zimapán in Feb. 2–7, 11, and 24 and in April from 8–15, probably in 1827.

#### 4. *HOFFMANNSEGGIA* GLAUCA (Ortega) Eifert, *Sida* 5(1): 43. 1972. (Plate 1A)

*Larrea glauca* Ortega, Nov. pl. descr. dec. 15. tab. 2. 1797. [An illegitimate generic name against *Larrea* Cav.] TYPE. Listed as originally from Peru collected by D. Née, but described from a speci-

- men growing in the Madrid Botanical Garden (HOLOTYPE: MA, photo! but the photo from MA #29416 says coll. "by Ruiz and Pavón in Chile").
- Caesalpinia glauca* (Ortega) O. Kuntze, Revis. gen. pl. 3 (2): 52. 1898.
- Hoffmannseggia falcaria* Cav., Icon. descr. pl. 4: 63. Tab 392. 1798. An illegitimate name since it is based on (by citation) *L. glauca* Ortega.
- Hoffmannseggia falcata* Hook., Bot. Misc. 3: 209. 1833. A presumed orthographic variant of "falcaria" since Hooker mentions in the discussion *H. falcaria*  $\beta$  *glandulosa*.
- Hoffmannseggia stricta* Benth. in A. Gray, Pl. wright. 1: 56. 1852. TYPE. MEXICO. Zacatecas. T. Coulter 488 (LECTOTYPE: GH! designated by Fisher 1892; ISOLECTOTYPES: K!, NY!). [Gray specifically stated in the text following the description of *H. stricta* that it came from a manuscript by Bentham.] The only specimen cited was a Coulter collection form Zacatecas, Mexico. In his account of Coulter's travels, McVaugh (1943) stated that it is impossible to determine with certainty the dates that Coulter was in specific localities.
- Hoffmannseggia falcaria* Cav. var. *stricta* (Benth. in A. Gray) Fisher, Contr. U. S. Natl. Herb. 1: 144. 1892.
- Caesalpinia falcaria* (Cav.) Fisher var. *stricta* (Benth. in A. Gray) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.
- Hoffmannseggia stricta* Benth. var. *demissa* A. Gray, Pl. wright. 1: 56. 1852. TYPE. MEXICO. From a dried-up bed of lake W of Parras, 13 Apr 1947, Gregg 268 (HOLOTYPE: GH! designated by Fisher, 1892; ISOTYPES: MO!, NY!). Unlike *H. stricta*, Gray did not attribute this taxon to Bentham (i.e., he did not use the quotes in the description). Gray also noted that Bentham "distinguished" this under the name of *H. demissa*, but that copious material collected by Wright showed this entity and *H. stricta* to be the same.
- Hoffmannseggia falcaria* Cav. var. *demissa* (A. Gray) Fisher, Contr. U.S. Natl. Herb. 1: 145: 1892.
- Hoffmannseggia densiflora* Benth. in A. Gray, Pl. wright. 1: 55. 1852. TYPE. UNITED STATES. Valley of the Pecos, Aug. C. Wright 148 (LECTOTYPE: GH! designated by Rzedowski, 1997; ISOLECTOTYPES: K!, NY!). Typification of this entity is difficult at best. Gray ascribed this species which is numbered 148 in Gray's work to Bentham, but cited no collection name or number that Bentham might have seen. Gray said that Bentham returned a specimen (labeled by Gray as *H. stricta*  $\beta$  *demissa*) numbered 148 with the name "*densiflora*" on a slip inserted on it. Gray stated that he was not sure if *H. densiflora* is distinct from *H. stricta* var. *demissa*. He said that Bentham's unpublished "*H. demissa*" is the same as *H. stricta* and he down ranked *demissa* to a variety.
- It is often difficult to determine with certainty the Wright number that corresponds to the numbers used in Gray's descriptions. In this case, Gray's number 148 seems best to correspond to Wright's actual number 812 collected 14 Aug 1849 in "Valley of the Pecos." This is the only collection from August 1849 that is labeled as a legume. In his notes for 1849, Wright did not provide generic names for his legume collections (Johnston, 1940) although he did give generic names in his notes of 1851 and 1852. In 1851, Wright was in the "Valley of the Pecos" only in May and June.
- Caesalpinia falcaria* var. *densiflora* (Benth.) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893. In his 1892 revision, Fisher treated *H. densiflora* as a synonym of *H. falcaria* var. *demissa*. When he transferred species of *Hoffmannseggia* into *Caesalpinia* in 1893, Fisher, for some unexplained reason, changed the name of *Hoffmannseggia falcaria* var. *demissa* to *C. falcaria* var. *densiflora*.
- Larrea densiflora* (Benth.) Britton, N. Amer. fl. 23 (5): 311. 1930.
- Hoffmannseggia falcaria* var. *capitata* Fisher, Contr. U.S. Natl. Herb. 1: 145. 1892. TYPE. UNITED STATES. Arizona. [Pima Co.]: Santa Cruz Valley near Tucson, 11 May 1881, Pringle s.n. pro parte (HOLOTYPE: GH!; ISOTYPES: F!, NY!). The type of this variety and that of *H. falcaria* var. *pringlei* are on the same sheet at GH.
- Caesalpinia falcaria* var. *capitata* (Fisher) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.
- Hoffmannseggia falcaria* var. *pringlei* Fisher, Contr. U.S. Natl. Herb. 1: 145. 1892. TYPE. UNITED STATES. Arizona. [Pima Co.]: Santa Cruz Valley near Tucson, 29 Jun 1881, Pringle s.n. pro parte (HOLOTYPE: GH!; ISOTYPES: MO!, NY!).
- Caesalpinia falcaria* var. *pringlei* (Fisher) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.
- Hoffmannseggia falcaria* var. *rusbyi* Fisher, Contr. U.S. Natl. Herb. 1: 145. 1892. TYPE. UNITED STATES. New Mexico. [presumably Grant Co., Mangas Springs] Ungus [=Mangus on the specimen] Springs, May 1881, H. H. Rusby 111 (HOLOTYPE: NY!; ISOTYPES: F! MO! US!).
- Caesalpinia falcaria* var. *rusbyi* (Fisher) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.
- Caesalpinia chicamana* Killip & Macbr., Publ. Field Mus. Nat. Hist. Bot. Ser. 13: 3. 1943. TYPE. PERU. La Libertad. Chicama Valley, Smyth 74 (HOLOTYPE: US, not seen, fide Eifert 1972).

HERBACEOUS PERENNIALS with a deep taproot and underground stems producing small (to 2 cm) tubers, 5–30 (50) cm tall; young stems and leaf rachises finely pubescent and bearing multicellular glandular

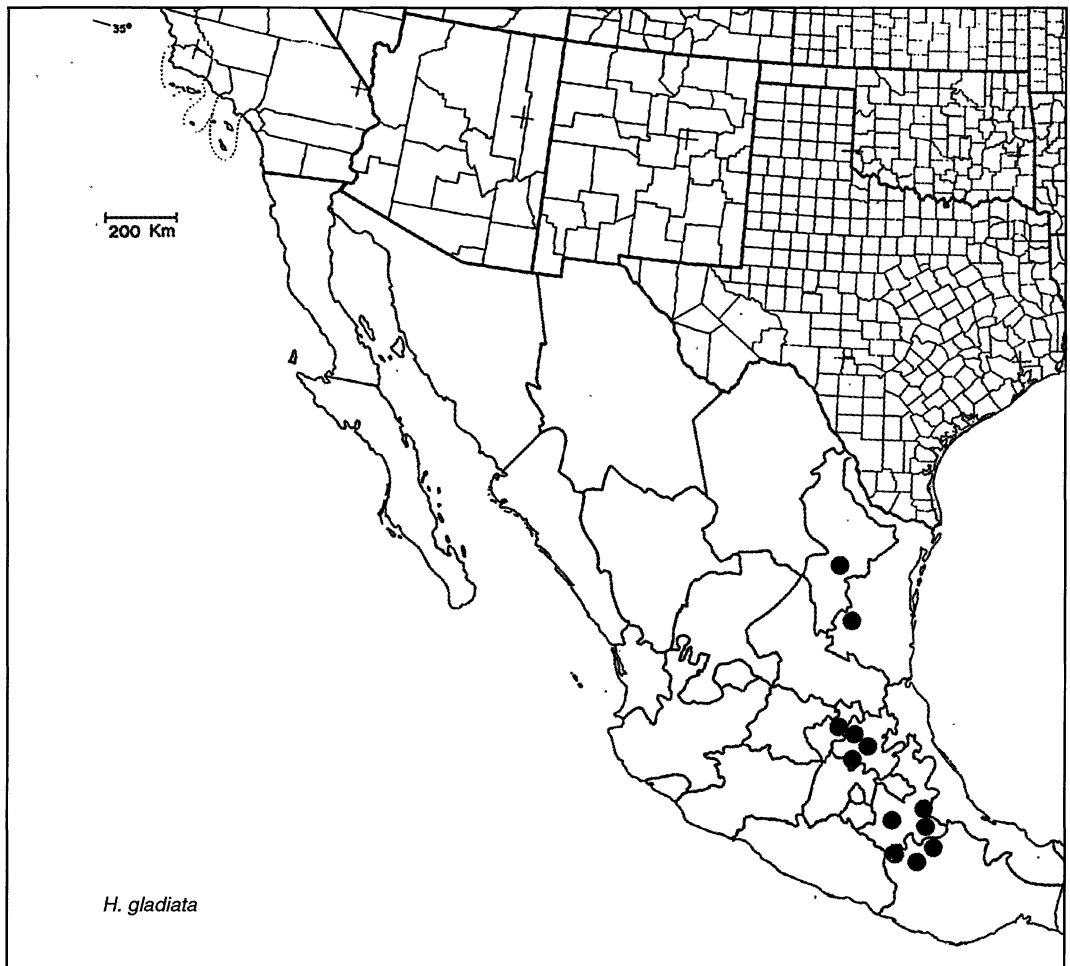


FIG. 4. Distribution of *Hoffmannseggia gladiata*.

trichomes. LEAVES consisting of 3–13 pairs of pinnae plus a single terminal one one, 3.8–15.0 cm long including a petiole 1–7 cm long, 1.3–4.2 cm wide; stipules ovate, ciliate, 1.5–4.0 mm long, 1.5–3.0 mm wide; area on the rachis of pinnae insertion strigose with few to several multicellular glandular trichomes; leaflets 4–13 per pinna, ovoid obtuse in outline, 2–6 mm long, 1.0–4.5 mm, with glabrous upper surfaces and strigose lower surfaces. INFLORESCENCES terminal, 5–23 cm long, 4–15-flowered, the rachis and pedicels puberulent to strigose mixed with multicellular glandular trichomes; pedicels green, 2–5

mm long, lengthening with age. FLOWERS broadly flaring, bending down with age, 10–16 mm long, 10–18 mm wide; free portion of sepal 7.0–9.5 mm long, 2–3 mm wide, dorsally pubescent and very densely covered with multicellular glandular trichomes; banner yellow with red markings, 5–14 mm long with the expanded portion 5 mm wide, with few hairs at the base of the inside of the folded claw and conspicuous multicellular glandular trichomes on claw and on the dorsal surface; lateral petals bright yellow, 13 mm long, 6 mm wide, with multicellular glandular trichomes on claw margins and base of the

dorsal surface; filaments 9 mm long, with retrorse flat processes for half the length; anthers 1.5 mm long; ovary 5 mm long, glandular; style 6 mm long, glabrous; stigma obliquely terminal. FRUITS indehiscent, rectangular to arcuate or even expanded at the tip, margins more or less parallel, 2–4 cm long, 5–8 mm wide; tip obtuse; valves lightly tomentose with a few scattered multicellular glandular trichomes, tan; margins obscure; seeds up to 10 per fruit, oval in outline, 3 mm long, 2 mm wide, brown.

**COMMON NAMES AND USES:** In Mexico, "cocos" fide *I. M. Johnston & C. H. Muller 1112* (GH, LL); "coquito," *Aguirre Reko 59* (NY); "camote de ratón," *S. Braem 735* (ARIZ, DH); "coco" or "papilla" *Gregg 268*. In the United States, Indian Rush-pea and Hog Potato. As summarized in Moerman (1998), the Apache, Pima, and Pueblo, ate the tubers roasted or boiled and the Chiricahua, Mescalero, and Cocopa ate the tubers either cooked or raw. Castetter (1935) said Palmer reported that the tubers taste like Irish potatoes when roasted. In many parts of its range (Parker, 1972), *H. glauca* is a weed that readily invades disturbed sites and agricultural fields.

**CHROMOSOME NUMBER:**  $2n=24$ , as *H. densiflora* (Turner, 1956) and as *H. falcaria* (Covas and Schnack, 1946).

**DISTRIBUTION (FIG. 5) AND HABITAT:** The species is widespread and weedy in the central and southwestern United States (Kansas and Colorado south to southwestern Texas and California) and in Mexico south to Puebla. It also occurs disjunctly in South America (Peru, Argentina, and Chile). Plants of this species spread readily by underground stems.

**FLOWERING AND FRUITING:** April and March with one flowering specimen collected in December.

**REPRESENTATIVE SPECIMENS EXAMINED:** MEXICO. Aguascalientes: Near Aguascalientes, 20 Aug 1901, *J. N. Rose & R. Hay 6236* (GH, US). Baja California: 6 mi W of San Agustín,

666 m, 17 Apr 1949, *R. L. Dressler 647* (GH, MO); locally common on gentle S slope barren shallow arroyo, 1 km SW of Ojos Negros, 116.45°W, 31.85°N, 690 m, 16 Aug 1980, *R. Moran 29135* (ARIZ, NY, TEX); 4 mi SE of Santa María, 115.9°W, 30.3°N, 10 m, 20 Apr 1975, *R. Moran 21780* (MO); sandy flat 15 mi S of El Arco, 27°46' N, 113°20' W, 23 Oct 1959, *I. L. Wiggins 15154* (ARIZ). Chihuahua: 0.5 km S of Rancho El Llano, 105.03°W, 30.03°N, 1185 m, 14 Jun 1973, *M. C. Johnston et al. 11317E* (TEX); 3.5 mi S of Samalayuca along Hwy. 45 ca 35 mi S of Cd. Juárez, 106.5°W, 31.33°N, 1390 m, 19 Aug 1971, *J. Henrickson 5770* (TEX); 44 mi S of Cd Juárez, 2 Jun 1968, *C. D. Johnson 15-68* (MO); 6 mi W of Guimbalete rd. to Escalón, 24 Jul 1939, *S. White 2032a* (GH); ca 46 (air) mi NE of Cd Chihuahua, RR crossing along Hwy. 16 towards Ojinaga, 1306 m, 27 Apr 1977, *J. Henrickson & E. Lee 15852* (LL, TEX); Cd Camargo, Río Conchos, 1200 m, 4 Aug 1939, *S. White 2254* (GH); near Cd Juárez, 1911, *E. Stearns s.n.* (NY); vic. Aldama, 16 May 1908, *E. Palmer 251* (F, GH, MO, NY, US). Coahuila: 12 mi N of Hipólito rd. to Monclova, 3 Jul 1939, *S. White 1690* (GH); 13 mi NW of La Rosa on rte. 60, 3 May 1959, *D. S. Correll & I. M. Johnston 21409* (NY, TEX); 22–27 leagues SW of Parras, May 1880, *E. Palmer 268* (NY (2)); 3 km E of Guimbalete, 17 Sep 1942, *R. M. Stewart 2640* (GH); 3 mi E of Torreón, 1240 m, 14 Jul 1944, *G. L. Fisher 44134* (GH); ca 10 km NE of Las Delicias on rd. toward Margaritas, 102.83°W, 26.33°N, 810 m, 24 Mar 1973, *M. C. Johnston et al. 10373* (TEX); ca 47 mi (air) W of Cuatro Ciénegas, 9.6 mi (rd.) SW of Hacienda Zacatecas, 102.8°W, 27°N, 1300 m, 7 Aug 1973, *J. Henrickson 1209b* (TEX); La Ventura, 25 Aug 1896, *E. W. Nelson 3910* (GH); Monclova, 20 May 1939, *E. G. Marsh 1815* (F GH); near Santa Rosa, 1300 m, 7 Sep 1940, *F. Shreve & E. R. Tinkham 9901* (GH); Río Grande Valley near Diaz, 700 m, 25 Apr 1900, *C. G. Pringle 9028* (GH, US); Sierra de la Paila in the Mina la Abundancia area, 101.52°W, 25.9°N, 1750 m, 31 Mar 1973, *M. C. Johnston et al. 10509* (NY, TEX). Durango: 10 km N of Ceballos 8.5 km S of Chihuahua line, 102.2°W, 26.5°N, 1200 m, 23 Aug 1973, *M. C. Johnston et al. 12293* (MO, NY, TEX); 7 mi W of Mapimi Rte. 30, 26 Jul 1958, *D. S. Correll I. M. Johnston 20214* (NY, TEX). Guanajuato: 12 mi N of Dolores del Hidalgo, 2200 m, 25 Jul 1977, *W. Bennett & T. Dunn 21* (MO, NY); rd. from Querétaro to SLP near "La Jaula", 6 Oct 1972, *J. García et al. s.n.* (MO). Hidalgo: Pachuca Santa Julia near Venta Prienta, 17 Jun 1947, *H. E. Moore Jr. 3078* (GH). Nuevo León: 15 mi S of San Roberto Jct., 24 Oct 1970, *B. L. Turner & J. Crutchfield 6292* (TEX); 48 km S of Nuevo Laredo rd. to Monterrey, 18 Apr 1939, *T. C. Frye & E. M. Frye 2349* (GH, NY, MO); 5 km S of Rancho El Mortero, 101.03°W, 26.25°N, 805 m, 17 Mar 1973, *M. C. Johnston et al. 10266* (TEX); Galeana, Rancho Aguillilla, 22 Jun 1969, *G. B. Hinton 17131* (WIS); Hwy. 53, 46.3 mi S of jct. with Hwy. 57,



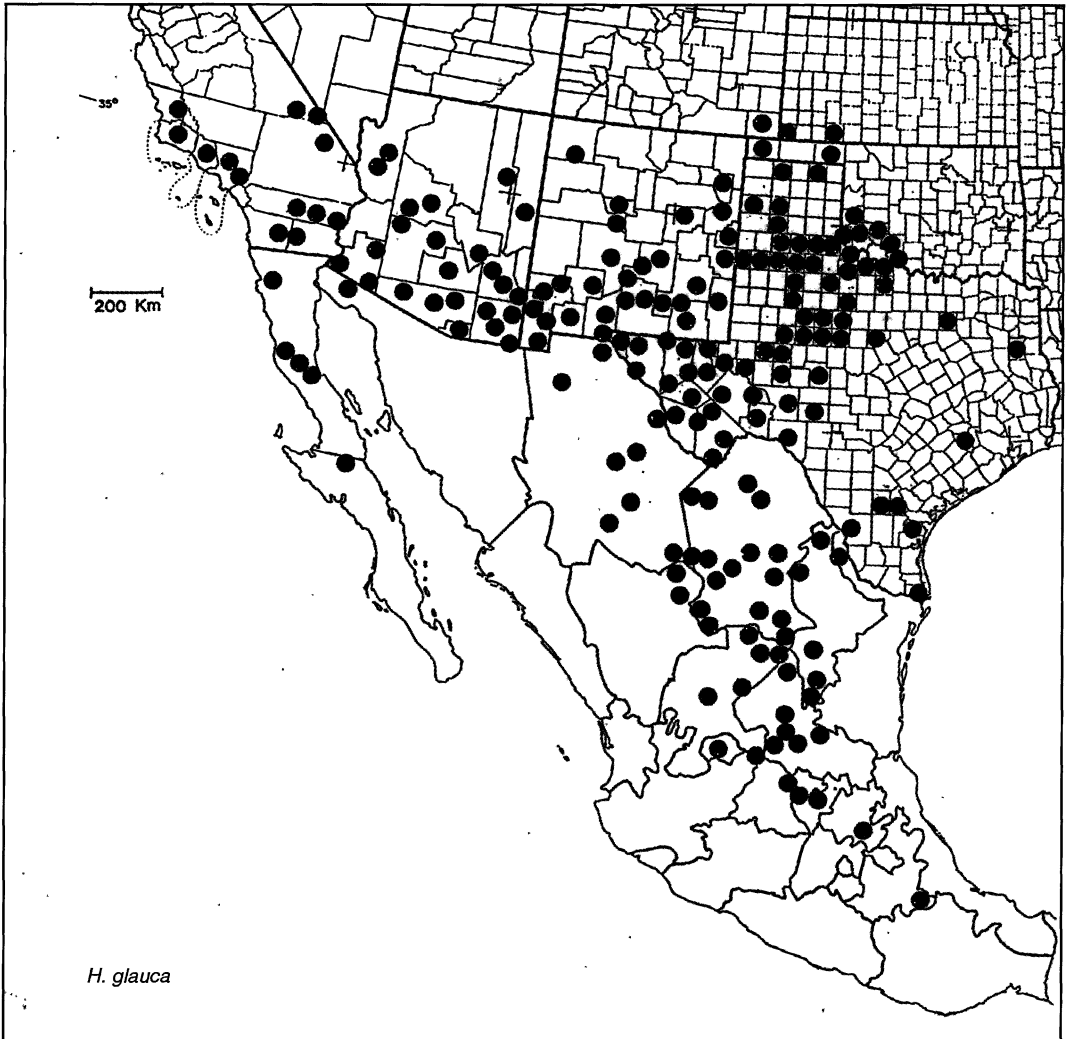


Fig. 5. Distribution of *Hoffmannseggia glauca*.

9 Apr 1970, *M. W. Bierner & W. Dement* 177 (TEX); Villa Aldama, 1.4 km N of jct. with Hwy. 34 to Bustamante, 1000 m, 13 Mar 1983, *C. P. Cowan & K. C. Nixon* 3819 (TEX). Puebla: San Bartolo, Tehuacán, 1600 m, 23 Sep 1977, *F. Ventura* 14500 (MO); San Nicolás, Tehuacán, 22 Jun 1908, *C. Conzatti* 2179 (F). Querétaro: between Vizarrón and Higuierillas, 23 Aug 1905, *J. N. Rose et al.* 9770 (GH); Querétaro, 2000 m, Jul 1904, *O. Kuntze* 23488 (NY). San Luis Potosí: 4 mi NE of San Luis Potosí, 29 Aug 1947, *F. A. Barkley et al.* 797 (TEX); 15 mi NE of Villa Hidalgo on Rte. 57, 1550 m, 21 Aug 1968, *B. A. Birdsong & B. L. Turner* 160 (TEX); 2 mi W of Zacatecas-San Luis line on Hwy. 80, 23 Jul 1969, *M. Bierner & B. L. Turner* 114 (F); Peñasco, 1850 m, 13 Aug 1954, *J. Rzedows-*

*ki* 3482 (US); S of La Paz, 80 mi S of Saltillo, 2100 m, 20 Nov 1958, *R. C. Rollins & R.M. Tryon* 58174 (LL, TEX); Guadalcazar, 2 mi SE of jct with Hwy. 57 on rd. to Cerritos just W of Palos Altos, 100.5°W, 22.5°N, 11 Sep 1988, *G. Nesom* 6614 (TEX); Zaragoza, ca 9 mi E of SLP on Hwy. 86, 2.9 mi W of jct. with rd. to Valle de Zaragoza, 5 Jul 1985, *M. Luckow* 2685 (NY, TEX). Sonora: NW side of Sonoyta, Calle 16 de Sep, 4 Oct 1985, *R. S. Felger & K. van Houten* 85-934 (ARIZ, TEX). Tamaulipas: S side of Nuevo Laredo behind Galaxy Motel, 24 May 1969, *D. Siegler & E. Rodríguez* 1286 (TEX). Zacatecas: 2 mi SW of Zacatecas-SLP line E of Ojuelos, Hwy. 80, 23 Jul 1969, *M. Bierner & B. L. Turner* 114 (F, MO, NY, TEX, WIS); 7 air mi NW of Primero de Mayo,

101.75°W, 23.83°N, 2030 m, 27 Mar 1973, *M. C. Johnston et al. 10432F* (F, TEX); 8 mi from Rancho Grande, 27 Jun 1977, *J. D. Dwyer 14274* (MO); ca 30 air mi WNW of Concepción del Oro, 5.4 mi W of Cedros 1400 m, 2 Sep 1971, *J. Henrickson 6306* (TEX).

**UNITED STATES: Arizona:** Apache Co.: 20 mi N of St. John's, 8 Aug 1937, *R. P. Allen 4285* (ARIZ). Chochoise Co.: Bisbee, 12 Jun 1912, *L. N. Goodding 1034* (NY, US); Douglas, 24 May 1928, *H. F. Loomis & R. H. Peebles 5366* (ARIZ); 6 mi S of Benson, 20 Jun 1930, *G. J. Goodman & C. L. Hitchcock 1233* (CAS, DS, GH, MO, NY); W of Wilcox, 28 Jul 1975, *C. S. Keller & M. Adney 588* (WIS). Gila Co.: 3 mi W of San Carlos, 18 Jun 1935, *B. Maguire 13029* (GH, NY). Graham Co.: 10 mi W of Fort Grant on disturbed soil, 16 Jun 1935, *B. Maguire 13019* (NY); few mi SE of Bylas, 17 Apr 1938, *R. C. Foster & J. F. Arnold 232* (DH, GH, MO); Greenline, Hwy. 70, 8.6 mi E of Salmonville on rd. to Duncan, 1000 m, 8 Oct 1942, *C. B. Wolf & P. C. Everett 11412* (NY). Maricopa Co.: Phoenix, 16 Jun 1892, *J. W. Toumey 563* (DH); a few mi N of Aguila, 740 m, 6 Jun 1979, *P. C. Fischer 6657* (ARIZ). Mohave Co.: 1.2 mi S of State Hwy. 93 on Hualapai Mt. Park Rd., 1250 m, 7 Sep 1961, *D. E. Breedlove 1152* (DH); 15 mi W of Hackberry on Rte. 66, 16 Jun 1965, *J. Strother 359* (CAS, GH, F, NY, US, TEX, WIS); Hwy. 66 E of Kingman, 27 May 1940, *S. Braem 735* (ARIZ, DH). Navajo Co.: Woodruff, 31 Jul 1936, *L. A. Brinkerhoff* (ARIZ). Pima Co.: near Tempe, 2 Oct 1925, *G. J. Harrison & T. H. Kearney 231* (ARIZ); Santa Rita Mts. vic of Helvetia, Sahuarita 15' Quad. T18S R15E Sec. 15 SE1/4 14 SW1/4, 1333 m, 9 Sep 1982, *M. Mittleman 355* (ARIZ). Pinal Co.: alkali roadsides between Casa Grande ruins and the Gila River, 27 Apr 1935, *A. Nelson & R. A. Nelson 1660* (GH, MO, NY, US, WIS). Santa Cruz Co.: SE corner of monument, Tumacacori Natl. Monument, 1087 m, 8 May 1951, *A. G. Henson 81* (ARIZ). Yavapai Co.: 7 mi SW of Hwy. 93 - 71 jct. on Hwy. 71, 11 Nov 1960, *R. H. Hevly R.E. Cameron & P. C. Fischer s.n.* (ARIZ); near Dewey on Hwy. 69, 1667 m, 28 Aug 1963, *C. P. Pase 1381* (ARIZ); Old Woods Rd. near Prescott, 3 Jun 1929, *A. Eastwood 17680* (CAS). Yuma Co.: 3 mi W of Yuma on a ditch bank, 16 Mar 1976, *S. D. Watkins* (ARIZ); Somerton, 5 May 1938, *R. H. Thielmann* (ARIZ). **California:** Imperial Co.: 11.5 mi W of Signal Mt. P.O. between the P.O. and Coyote Wells, 3 Jun 1956, *E. M. Wilson s.n.* (DS). Inyo Co.: ca 10 mi N of Kingston, 1500 m, 15 May 1941, *L. R. Abrams s.n. 14270* (DH, GH); Pahrump Valley, Jecopa rd., 12.6 mi WSW of jct. of Hwy. 160, 890 m, 15 Apr 1986, *K. Thorne & D. Atwoods 4359* (NY (2)). Kern Co.: Snow Road 0.25 mi W of Kern County Land Company's Rosedale Ranch, 133 m, 3 Sep 1958, *E. C. Twisselmann 4796* (CAS). Los Angeles Co.: Glendale Mountains, 133 m, 17 May 1960, *D. McNally 9* (CAS); Los Angeles, Ballona Creek, 2 Jul 1956, *P. H.*

*Snow & S. R. s.n.* (CAS); near Santa Monica, 13 Aug 1910, *S. F. Blake 728* (GH). Riverside Co.: ca 25 mi W of Blythe on Rte. 10, 280 m, 10 Apr 1979, *E. Neese 7078* (NY); E end of Chuckawalla Valley, 4 Apr 1931, *J. Ewan 4148* (MO); Palo Verde Valley, 19 Jun 1918, *R. S. Ferris 1011* (CAS, DS); Palowalla, 30 mi E of Desert Center Sandy desert, 133 m, 1 Feb 1938, *L. S. Rose 38014* (CAS). San Bernadino Co.: ca 50 mi E of Baker, 5 mi E of Barnwell along Hart Mine rd., 1500 m, 12 May 1874, *J. Hendrickson 13960* (NY). San Diego Co.: in alkaline area valley above Sentenac Canyon on the Julian-Kane Springs Hwy., 28 Mar 1939, *R. S. Ferris 9741* (DS); Mesa S of Coyote Wells, 17 Jun 1890, *C. R. Orcutt 2019* (US); San Felipe, Jun 1882, *S. B. Parish & W. F. Parish 1410* (DS, F, GH, MO, US). San Luis Obispo Co.: Chris Twisselmann Ranch, E San Luis Obispo Co., 733 m, 23 Aug 1957, *E. C. Twisselmann 4014* (CAS). Santa Barbara Co.: Southern Pacific R.R., Dos Pueblos Ranch, 6 Jul 1954, *H. M. Pollard s.n.* (CAS). Ventura Co.: Southern Pacific R.R. near mouth of Ventura River, 20 Oct 1945, *H. M. Pollard s.n.* (ARIZ, CAS). **Colorado:** Baca Co.: ca 13 mi S, 3 mi E of Stonington on Turner Ranch, 16 May 1981, *R. L. McGregor 32276* (KANU). **Kansas:** Meade Co.: 17 mi S, 5 mi E of Plains, 24 Aug 1984, *R. L. McGregor 35757* (KANU). Morton Co.: Morton Cimarron Natl. Grassland, N side of Cimarron River, along Forest Rd. 620, ca 200 yds E of jct with KS 27, ca 8.5 mi N of Elkhart, 1135, 22 Jun 1988, *C. C. Freeman 2535* (KANU). **New Mexico:** Bernadillo Co.: Albuquerque, 1900, *W. Howard s.n.* (NY). Chaves Co.: 9 mi E of Roswell, 2 mi W of Bottomless Lakes Rd. on Hwy. 380, Commanche Bluffs, 1167 m, 17 Apr 1978, *Sears 1292* (BRY); 10.4 mi E of Elk, 15 Jun 1975, *W. G. Spaulding & T. R. Van Devender s.n.* (ARIZ). Curry Co.: 1.5 mi E Grady prairie pasture low area, 17 May 1974, *S. Stephens 75816* (KANU, NY). Dona Ana Co.: 3 mi W of Mesilla Dam, 1300, 14 Aug 1930, *F. R. Fosberg S3602* (GH MO WIS); Las Cruces, 20 May 1893, *E. O. Wooton s.n.* (DS, MO, US); Pyramid (Bishop's Cap) Peak, 15 Apr 1948, *F. R. Fosberg 30026* (NY). Eddy Co.: 15 mi NW of Carlsbad Caverns, 1033 m, 17 Apr 1962, *C. L. Porter 8981* (DS, GH); alongside Hwy. 82, 10 mi W of Artesia, 23 May 1982, *D. M. Brandenburg & J. W. Thieret 52952* (ARIZ); center line sec 11 T16S R24E, lush vegetation in swale, 1233, 13 Aug 1977, *A. B. Leonard 4477* (KANU). Grant Co.: 5 mi W of Gila, gravelly loam, 14 Jun 1935, *B. Maguire 13000* (ARIZ, GH, NY); cattle tank ca 3 mi N of Howell's Ridge Little Hatchet Mts, 11 Aug 1973, *T. R. Van Devender & W. G. Spaulding s.n.* (ARIZ); Hwy. 81, 3.4 mi N of Hachita, T27S R15W, 24 May 1984, *J. Grimes & L. Gieschen 2378* (NY, TEX). Guadalupe Co.: on Hwy. 84 near mi marker 149, N of I-40, 12 Aug 1982, *D. Walter & V. Walter 8217* (MO (2)); ca 25 mi S of Santa Rosa on Hwy. 84, 29 May 1973, *L. C. Higgins 6974* (BRY). Harding Co.: 5 mi W of Bueyeros, 15 May 1974, *S. Stephens 75625* (KANU, NY (2)). Hidalgo

Co.: frontage rd. on N side of I 10, 33.1 mi E of Lordsburg, 14 Jul 1990, *M. B. Johnson et al.* 90-169 (ARIZ); Animas Mts, 7 air mi SE of Animas, SE 0.25 12 R19W T28S, 1200 m, 28 Aug 1986, *R. D. Worthington* 14820 (NY). Lea Co.: 55 mi E of Roswell plains, 27 May 1938, *N. A. Palmer* 61 (F). Lincoln Co.: 13 mi N of Carrizozo on Hwy. 54, 6 Jun 1974, *L. C. Higgins* 8626 (BRY); 5 mi W of Lincoln, 2300 m, 26 Jul 1938, *C. L. Hitchcock et al.* 4291 (DS, WIS). Luna Co.: Deming, 2 Oct 1907, *H. T. Heuson s.n.* (NMC); Victorio Mts, 3 mi S of Gage on I-10 NW, 0.25 sec 33 T24S R12W, 1340, 25 Aug 1984, *R. D. Worthington* 12428 (NY (2)). Otero Co.: 5 mi S of Tularosa, 22 Aug 1890, *E. O. Wooton s.n.* (US); 0.5 mi E of Valmont, 4 Jun 1938, *H. C. Cutler* 2000 (CAS, MO); Alamogordo, expedition of 1909, 1902, *J. A. G. Rehn & H. L. Viereck s. n.* (NY, WIS). Quay Co.: 3 mi E of Tucumcari, 19 Aug 1939, *J. Lambert & B. Lambert s.n.* (GH); in San Jon prairie area in San Jon City park, 16 May 1974, *S. Stephens* 75774 (KANU, NY). Roosevelt Co.: 15 mi E of Portales on road to Arch near salt lake, 15 Jun 1962, *W. A. Weber* 11468 (DS); 2 mi W Floyd, prairie roadside right of way, 18 May 1974, *S. Stephens* 75886 (KANU). San Juan Co.: Lake Valley, 20 Sep 1907, *D. S. Miller s.n.* (NMC). Sierra Co.: San Andres Mts, just S of Rhodes Canyon, *T. K. Todson* 552617 (NY). Socorro Co.: 8 mi S of Socorro, 1500 m, 28 Jul 1966, *J. Barrell & S. Spongberg* 66-211 (GH, US); San Antonio, 21 Jun 1921, *R. S. Ferris & C. D. Duncan* 2297 (CAS, DS, MO). Valencia Co.: Las Lunas, 16 Jul 1880, *H. H. Rusby* 9948 (WIS); Belen, 1898, *T. D. A. Cockerell s.n.* (NMC); 3.5 mi SW on Alamo Day School Rd. from Swanee on Hwy. 6, 21 Jul 1977, *J. Edwards & R. Edwards* 4726 (NY (2)). Oklahoma: Beaver Co.: Clear Lake, 27 Aug 1903, *R. G. Dunlop s.n.* (US). Beckham Co.: 6 mi N of Elk City, 17 Oct 1936, *C. J. Eskew* 1517 (GH). Cimarron Co.: 3 mi S of Kenton, 7 Jun 1948, *C. M. Rogers* 5918 (US); Cimarron 10 mi N Boise City, prairie pasture gentle slope, 10 Jul 1974, *S. Stephens* 79493 (KANU); 37 mi W of Guymon, 21 Aug 1927, *R. Stratton* 422 (MO). Comanche Co.: Lawton, Aug 1903, *J. F. Duncan s.n.* (MO). Cotton Co.: central part, 10 Jun 1940, *C. Smith* 1007 (MO). Greer Co.: 2 mi S Mangum, upland prairie pasture hillside, 16 May 1968, *S. Stephens* 20838 (KANU); E of Granite, 17 Jun 1913, *G. W. Stevens* 1030 (GH); W of Granite, 17 Jun 1913, *G. W. Stevens* 1041 (DH, GH (2), MO). Harmon Co.: 12 mi E of Hollis, 9 Jun 1941, *R. R. Innes & B. R. Moon* 1000 (GH); 14 mi S of Erick, flood plain of Elm Fork, 25 May 1940, *U. T. Waterfall* 2000 (GH). Kiowa Co.: 0.5 mi NW of Mountain Park, 14 Jun 1969, *D. Seigler* 1450 (NY, TEX); 3 mi W of Snyder, 5 Aug 1927, *R. Stratton* 302 (MO). Texas: Archer Co.: near Archer City, 24 Apr 1954, *H. Gentry* 1842 (ARIZ). Austin Co.: Industry, *E. H. Boyd s.n.* (F). Bailey Co.: 22 mi S of Muleshoe, Muleshoe Wildlife Refuge, East unit Prairie, 18 Jul 1974, *S. Stephens* 80246 (KANU); 3 mi W Goodland roadside right of

way along field, 19 May 1974, *S. Stephens* 75932 (KANU, NY). Brewster Co.: 10 mi N of Marathon on Rte. 385, 9 mi N of the jct. with Rte. 90, 31 Jul 1988, *B. B. Simpson* 88-VII-31-2 (SRSC, TEX); 10 mi NE of Alpine, 1500 m, 24 Jun 1959, *B. H. Warnock* 20077 (SRSC); 3 mi S of Persimmon flats, 29°3'N, 103°09'W, 5 Apr 1947, *R. McVaugh* 7830 (DS, F, GH, SR); Kokernot Springs area, 15 May 1939, *O. E. Sperry* T750 (GH, US). Briscoe Co.: 24 mi ENE Silverton sandy soil in mesquite flat scattered, 5 May 1980, *R. E. Brooks & R. L. McGregor* 14540 (KANU). Cameron Co.: Brownsville, *R. Runyon s.n.* (CAS); 0.5 mi E of Boca Chica shoot preserve, 29 Apr 1959, *A. Traverse* 1158 (F); Point Isabel, 12 May 1936, *H. B. Parks* 17898 (GH). Childress Co.: ca 8 mi E of Memphis along Hwy. 256, area near Jonah & Salt Creek, 5 Jun 1973, *L. C. Higgins* 7137 (BRY). Crane Co.: along Hwy. 51, 5 mi N of Crane, 867 m, 15 Jun 1952, *M. McCullough* 21 (SRSC). Crockett Co.: Hwy. 865, 11.5 mi NW of Ozona, 767 m, 21 Sep 1963, *J. Read* 430 (SRSC). Crosby Co.: 21 mi SE of Crosbyton White River Lake area, 16 May 1968, *C. Morris s. n.* (NY). Culberson Co.: 12.75 mi SE of Van Horn, 15 May 1946, *V. L. Cory* 53035 (DS, NY); 9 mi E of Delaware Springs on Pasotex pipeline rd. to Orla, 26 Jul 1957, *D. S. Correll & I. M. Johnston* 18542 (GH); Apache Mtns, 4 mi N of Kent, 1237 m, 27 Jul 1960, *B. H. Warnock* 19789 (SRSC). Dallas Co.: 1 mi SE Texline Railroad right of way, 5 Aug 1974, *S. Stephens* 82312 (KANU). Eastland Co.: prairies W of Cromptimberly, Aug 1877, *J. Reverchon s.n.* (F). El Paso Co.: 3 mi SE of San Elizario, 5 Jul 1958, *D. S. Correll & I. M. Johnston* 19270 (GH, MO); Belm, 19 Jun 1893, *E. A. Mearns* 1501 (DS); El Paso, 19 Apr 1884, *M. E. Jones* 3728 (ARIZ, F, NMC, NY (2), WIS); Franklin Mts. base of McKelligon Canyon, 19 Jun 1963, *D. S. Correll & D. C. Wasshausen* 27926 (BRY, NY); Fabens, 4 Jul 1995, *A. I. Mulford* 258 (GH, MO, NY). Fisher Co.: E edge of Longworth, 14 May 1957, *D. S. Correll* 16375 (NY). Floyd Co.: plains E of Floydade, 30 Apr 1925, *J. K. Small & E. T. Wherry* 12166 (NY (2)). Foard Co.: 4.5 mi N Crowell Brushy ravine few trees, 24 Jul 1974, *S. Stephens* 80775 (KANU). Garza Co.: 1 mi W of Post, 7 Jun 1964, *C. M. Powell* 10167 (GH). Glasscock Co.: 10 mi W of Garden City, 26 Apr 1964, *B. L. Turner* 5011 (TEX). Goliad Co.: between Melo and Harris Siding, 3 Jul 1921, *R. S. Ferris & C. D. Duncan* 2461 (CAS, DS, MO, NY). Hall Co.: 4.5 mi E of Lesley, weedy flat roadside right of way, 29 Aug 1973, *S. Stephens* 72089 (KANU); Estelline, 25 May 1904, *J. Reverchon* 4290 (GH, MO). Hardeman Co.: 9.5 mi S Quanah, 24 Jul 1974, *S. Stephens* 80829 (KANU). Haskell Co.: Haskell, 1898, *K. T. Weston* (MO). Howard Co.: Big Springs, Jul 1881, *G. W. Letterman s.n.* (MO (3)). Hudspeth Co.: 2 mi SE of McNary, 18 Aug 1942, *U. T. Waterfall* 3963 (ARIZ, GH); 35 mi E of El Paso on US 62-180, 28 May 1982, *R. Walter & J. Ricketson* 400-21C (MO). Jeff Davis Co.: 5 mi S of Kent, 1500 m, 16 Jun 1959, *A. Sims &*

G. McKenzie 119 (SRSC); 6 mi NW of Fort Davis on Rte. 17, just S of Wild Rose Pass in high grassland area, 31 Jul 1988, B. B. Simpson 88-VII-31-3 (SRSC, TEX); 8.33 mi W of Toyahvale, 9 May 1946, V. L. Cory 52247 (NY). Jones Co.: 8 mi W of Anson, 12 May 1957, D. S. Correll 16317 (NY). King Co.: 7 mi E of Guthrie along the South Fork of the Wichita River, 1 Sep 1972, L. C. Higgins 6231 (BRY). Lamb Co.: 13 mi W of Littlefield prairie roadside right of way, 8 Sep 1973, S. Stephens 73051 (KANU). Live Oak Co.: Ray Point Uranium Tailings site 8 mi NE of Three Rivers, 267 m, 6 May 1978, R. Foster 5991 (BRY). Loving Co.: along highway between Wink and Mentone, 900 m, 13 Jul 1952, B. H. Warnock 10673 (SRSC). Lubbock Co.: Caprock ledges, limestone & sandy loam 5 mi E and 3 S of Lubbock, 15 Jun 1965, I. Wilkins 18 (KANU). McMullen Co.: 11 mi W of Loma Alta, 9 Oct 1935, V. L. Cory 17153 (GH). Midland Co.: Midland, 23 May 1934, V. L. Cory 8705 (ARIZ, GH). Mitchell Co.: vic Colorado City, 29 May 1883, J. H. Oyster s.n. (CAS, MO, NY). Motley Co.: 3 mi S of Matador, 6 Sep 1934, G. J. Goodman 2335 (CAS, GH, MO, NY). Nolan Co.: Sweetwater, 27 May 1918, E. J. Palmer 13713 (MO, WIS). Nueces Co.: Along Corpus Christi Bay, 10 m, Apr 1894, A. Heller 1554 (NY). Ochiltree Co.: on secondary rd. ca 4 mi E of US 83, 17 mi S of Perryton, 5 Jun 1971, R. L. Headlee 552 (BRY). Oldham Co.: 20 mi N of Vega Prairie roadside right of way, 21 May 1974, S. Stephens 76175 (KANU). Pecos Co.: 10 mi SE of Iraan, W side of Pecos River, 8 Apr 1972, F. S. Hendricks & L. J. Folse 160 (ARIZ); fontage rd. to Hwy. 10, 5 mi from turn to Bakersfield, 102°17.47'W, 30°53.08'N, 690 m, 24 Jun 1992, B. B. Simpson 92-06-24-2 (TEX). Potter Co.: 10 mi S of Canadian River Bridge on Hwy. 287, 1133 m, 3 Jun 1945, B. Jespersen & H. Jespersen 2697 (DS, F, MO, NY); 26 mi NW Amarillo prairie roadside right of way, 29 Jul 1974, S. Stephens 81432 (KANU). Presidio Co.: Marfa, Jun 1936, L. C. Hinckley 661 (F, GH, NY (2), SR, TEX); near Porvenir, 27 Jun 1943, U. T. Waterfall 4783 (GH). Randall Co.: 1 mi S of Canyon along creek bottom and breaks, 16 Aug 1989, L. Higgins 18582 (BRY); in patches along roadsides Palo Duro Canyon, 13 Jun 1955, D. Isely 6406 (CAS, GH). Reagan Co.: railroad at Big Lake, 29 May 1940, H. C. Cutler 3277 (F). Reeves Co.: along hwy. about 10 mi S of Pecos toward Saragosa, 1167 m, 9 Sep 1951, B. H. Warnock 10156 (SRSC); frequent and widespread along hwy., 2 mi S of Toyahvale, 1233 m, 27 Apr 1947, B. H. Warnock 5275 (SRSC). Rusk Co.: Big Springs, 11 Jun 1900, H. Eggert (MO). Scurry Co.: 1-4 mi W of Snyder, 833 m, 14 May 1965, B. Cole 163 (SRSC). Sherman Co.: rt 119, 7 mi N of jct. with rt 289, 8 Jul 1963, D. S. Correll & E. C. Ogden 28366 (BRY, NY). Sutton Co.: SE Sonora, 28 Oct 1945, V. L. Cory 50547 (GH, DS, NY). Swisher Co.: Tulia, 3 Aug 1942, J. W. Palmore R1289 (MO). Taylor Co.: Abilene, 20 May 1902, S. M. Tracy 8005 (F, GH, MO, NY (2)).

Terrell Co.: 2 to 10 mi N of Sanderson, 933 m, 1 Jun 1957, B. H. Warnock 14843 (SRSC). Tom Green Co.: San Angelo, 3 Jul 1917, E. J. Palmer 12391 (MO, NY, US). Val Verde Co.: 40 mi N of Del Rio, 20 Apr 1940, H. J. Hamby 993 (LL). Ward Co.: 1.5 mi N of the junction of rte. 1927 with Rte. 1776 on Rte. 1927 in gravel and light sand, 30 Jul 1988, B. B. Simpson 88-VII-30-1 (SRSC, TEX); Barstow, 4 May 1902, S. M. Tracy & F. S. Earle 436 (F, GH, MO, NY). Webb Co.: 20 mi N of Bruni, 24 Apr 1960, W. L. McCart 7404 (GH); just E of Laredo, 19 Sep 1943, F. A. Berkeley 13807 (F, GH, MO, NY). Wichita Co.: 6 mi S of Electra roadside shoulder, 15 May 1968, S. Stephens 20688 (KANU). Wilbarger Co.: 11.8 mi W of Electra W 0.6 mi S on Hwy. 25, 12 May 1945, E. Whitehouse 9806 (NY).

The circumscription by previous authors of a large number of taxa that obviously fall within this species reflects the variation that exists in *Hoffmannseggia glauca*. The species spreads by underground stems that occasionally produce small tubers up to 3 cm in diameter called potatoes in English and "camotes" in Spanish. The extensive vegetative reproduction of this species leads to clonal differences among populations that were early perceived as specific or varietal differences.

The species is unmistakable, however. It is the showiest of the herbaceous species with robust inflorescences of bright yellow flowers and characteristic dense glandular trichomes on the claw margins of all the petals (Plate 1A). The fruits of the species are also easy to distinguish because they are comparatively large (2-4 cm long) and tend to reflex. The flowers open upright, but the pedicels curve downward as the flowers fade and the fruits begin to form. In full fruit, the pedicels hang downward and the fruits themselves have an upward curve. The fruits have more or less parallel margins, obtuse tips, and do not dehisce at maturity. Flowering plants of *Hoffmannseggia oxycarpa* are occasionally confused with *H. glauca* because they have glandular sepals and pedicels in common. However, the former has no glandular processes on the petal claw edges and has pointed glandularly pubescent valves that twist around themselves vertically following dehiscence.

5. *HOFFMANNSEGGIA INTRICATA* Brandege, Proc. Calif. Acad. Sci., ser. 2, 2: 151. 1889. TYPE. MEXICO. Baja California: at El Campo Alemán, 24 Apr 1889, T. S. Brandege 1889 (LECTOTYPE: GH! designated by Fisher (1892)).

*Caesalpinia intricata* (Brandegee) Fisher, Bot. Gaz. (Crawfordsville) 18: 123. 1893.

*Larrea intricata* (Brandegee) Britton, N. Amer. fl. 23 (5): 311. 1930.

*Hoffmannseggia microphylla* Torr. var. *glabra* S. Watson, Proc. Amer. Acad. Arts 24: 47. 1889. TYPE. MEXICO. [Baja California]: stony ridges at Los Angeles Bay, E. Palmer 543 (LECTOTYPE: GH! designated by Fisher (1892)).

*Hoffmannseggia glabra* (S. Watson) Fisher, Contr. U.S. Natl. Herb. 1: 147. 1892.

*Hoffmannseggia glabra* (S. Watson) Fisher var. *intricata* (Brandegee) Fisher, Contr. U.S. Natl. Herb. 1: 147. 1892.

*Caesalpinia intricata* (Brandegee) Fisher var. *glabra* (S. Watson) Fisher, Bot. Gaz. (Crawfordsville) 18: 123. 1893.

SMALL, DIVARICATE SHRUBS, upright to decumbent, occasionally with very short internodes and appearing almost fasciculate, sometimes almost aphyllous, the branch tips spinescent, 30 cm to 1 m tall, arising from a woody tap root; young stems and leaf rachises striate, glabrous to glaucous, often blueish or reddish. LEAVES consisting of 1 pair of pinnae plus a single terminal one, 7–25 mm long including a petiole 3–8 mm long, 6–16 mm wide; stipules broadly ovate, ciliate, 0.5–2.0 mm long, 0.2–1.0 mm wide; area on the rachis of pinnae insertion glabrous; leaflets 3–5 per pinna, ovoid obtuse in outline, 2–4 mm long, 1–2 mm, glabrous, sometimes with a glandular process at the tip and occasional glands on the margins. INFLORESCENCES terminal, 11–12 cm long, 5–14-flowered, the rachis and pedicels glabrous or with a few scattered glandular trichomes; pedicels red, 2 mm long. FLOWERS turbinate, 5–9 mm long, 3–8 mm wide; free portion of sepal 3–7 mm long, 1–2 mm wide, dorsally glabrous, sometimes with scattered glandular or strigose trichomes on the margins, often reddish or

purple marginally; banner bright yellow-orange with red markings, 4–7 mm long with the expanded portion 2–5 mm wide, the claw folded, glabrous or pubescent at the base of the inside of the claw and with small multicellular glandular trichomes on the dorsal surface and at the base of the claw; lateral petals yellow sometimes with red markings, 3–7 mm long, 2–4 mm wide, with multicellular glandular trichomes on the dorsal surface; filaments 3–10 mm long, with long non-glandular trichomes mixed glandular trichomes and clear retrorse processes for over half the length; anthers 0.5–1.0 mm long; ovary 2–4 mm long, bearing multicellular glandular trichomes; style 3–5 mm long, glabrous; stigma obliquely terminal. FRUITS dehiscent with the valves curling outward and each sometimes twisting vertically, lunate, expanded in the center, brown to red-brown, usually with sepals dehiscent at maturity, acute to mucronate apically, 8–25 mm long, 4–7 mm wide; valves with scattered yellow or red multicellular glandular trichomes; margins obscure, glabrous; seeds 4–6 per fruit, oval in outline, 2.5 mm long, 1.0 mm wide, brown.

COMMON NAME AND USES: The Seri Indians of Sonora, Mexico call this *haxz iztim* (dog's hipbone) and they mash and boil the roots to make a reddish brown dye that can be used alone or mixed with root extracts of *Krameria grayi* (*cósahui*) to enhance the color of the latter (Felger and Moser, 1985).

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 3) AND HABITAT: Locally common in the deserts of western Sonora, Mexico and central Baja California from sea level to 600 m.

FLOWERING AND FRUITING: Primarily in April and March with a second flowering possible from September to November.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Baja California: 10 mi S of Mulegé, 18 Oct 1962, I. L. Wiggins & D. S. Wiggins 18002 (US); San Francisquito Bay, 9 Apr 1911, J. N. Rose 16732



(NY); Isla San Marcos, 11 Mar 1934, *R. Ferris 8642* (NY, POM); Santa Rosalía, 15 Mar 1934, *R. Ferris 8690* (NY, POM); 0.25 mi inland from Punta Santo Domingo, E slope of Bahía de la Concepción, 17 Apr 1962, *I. L. Wiggins & D. B. Wiggins 18271* (MEXU); 16 mi N of Punta Prieta, *Idria-cordón* forest, 600 m, 30 Mar 1950, *H. S. Gentry & F. Cech 8894* (ARIZ, MEXU, RSA, US); 21.0 miles W of Bahía de los Angeles on rd. to San Borja, 400 m, 19 Oct 1967, *J. R. Hastings & R. M. Turner 67-72* (ARIZ); 39.4 mi E-NE of Pozo Alemán, 112.9°W, 28.4°N, 145 m, 15 Oct 1971, *J. R. Hastings & R. M. Turner 71-120* (ARIZ); 4 km S of Bahía Los Angeles, 113°32.52'W, 28°54.44'N, 17 Mar 1993, *B. B. Simpson 03-17-93-10* (TEX); 7 mi W of San Francisquito Bay, 5 Apr 1947, *C. F. Harbison 4185* (RSA); 8.2 mi S of Rosarito, 114.1°W, 28.5°N, 100 m, 29 Oct 1977, *M. H. Ames et al. 77-101* (ARIZ); 8.3 mi NW of Santa Rosalía, 116 m, 29 Oct 1963, *J. R. Hastings & R. M. Turner 63-304* (ARIZ); Aguja Point south shore of Bahía de la Concepción, 26 Mar 1949, *E. Y. Dawson 6353* (RSA); arroyo 2 mi N of Las Venecas, 28°42'N, 113°27'W, 225 m, 10 Mar 1966, *R. Moran 12467* (RSA); Isla Guapa, Isla San Estebán, 15 Aug 1985, *A. Valiente B. 668* (MEXU); Isla San Marcos, 112.1°W, 27.2°N, 20 m, 19 Mar 1971, *J. R. Hastings 71-76* (ARIZ); Minas Desengana, ca 16 mi N of Punta Prieta, 533 m, 30 Mar 1950, *H. S. Gentry & F. Cech 8880* (ARIZ, RSA); Isla Tiburón, 25 Jan w/o year, *E. Y. Dawson 1017* (RSA); W end of Isla San Marcos, 27°15'N, 112°07'W, 28 Mar 1962, *I. L. Wiggins 17314* (MEXU). Sonora: canyon mouth SE corner of San Esteban Island, 5 m, 21 Mar 1962, *R. Moran 8824* (RSA); Puerto Kino, 3 Mar 1966, *H. D. Ripley 14326* (NY); rd. to Punta Chueca from Kino Bay, 111°59.59'W, 28°53.24'N, 16 m, 25 Sep 1995, *B. B. Simpson 25-IX-95-3* (TEX).

This species is locally common but restricted in distribution. Some plants can have the aphyllous, twiggy look of *Hoffmannseggia microphylla* and the flowers and fruits of the two are similar but *H. intricata* is generally much more branched than *H. microphylla* and its fruits are more lunate. The terminal pinna of the leaves is also not much longer than the lateral pinnae in contrast to that of *H. microphylla* where the terminal pinna is much longer than the laterals. The flowers of *H. intricata* are also smaller (5–9 mm long) than those of *H. microphylla* (12–15 mm long). It differs from *H. peninsularis*, the other member of its clade (Fig. 1), in having less zig-zagged stems and in lacking sticky, stipitate-glandular trichomes on the stems,

rachises, and pedicels.

In his treatment of the Brandegees' collecting localities, Ewan (1942) listed "El Paso Aleman" for 24-IV-1889. The type specimen with the same date clearly states, however, El Campo Alemán.

6. *HOFFMANNSEGGIA MICROPHYLLA* Torr., Rep. U.S. Mex. bound. 2: 58. 1859. TYPE. UNITED STATES. California: sandy desert of the Colorado, [without date], *A. Schott 279* (HOLOTYPE: NY!).

*Caesalpinia virgata* Fisher, Bot. Gaz. (Crawfordsville) 18: 123. 1893. A superfluous substitute name required when transferred to *Caesalpinia* because of the preoccupation of the epithet *microphylla* in *Caesalpinia microphylla* Mart. ex D. Don (1832). *Larrea microphylla* (Torr.) Britton, N. Amer. fl. 23 (5): 310. 1930.

Upright, almost aphyllous SHRUBS 50 cm –2.5 m tall, arising from a woody taproot; young stems and leaf rachises sometimes fasciculate, striate, green, puberulent to densely villous. LEAVES always consisting of 1 pair of pinnae plus one single terminal pinna conspicuously longer than the lateral pinnae, 20–50 mm long including the petiole 5–16 mm long, 9–26 mm wide; stipules linear-lanceolate, fringed, 0.5–1.5 mm long, 0.2–0.5 mm wide; area on the rachis of pinnae insertion glabrous, strigose, or with a few multicellular projections; leaflets 3–7 per pinna, oblong obtuse to oval in outline, 1.5–3.5 mm long, 1–2 mm wide, with glabrous to lightly villous upper surfaces and sparsely to densely villous or strigose lower surfaces. INFLORESCENCES terminal or lateral racemes, 90–160 long, 10–27-flowered, the rachis and pedicels strigose, occasionally with a few glandular trichomes; pedicels brown, 2–7 mm long. FLOWERS openly flared, remaining upright, 12–15 mm long, 6–12 mm wide; free portion of sepal 4–12 mm long, 5–8 mm wide, dorsally strigose or strigose mixed with multicellular glandular trichomes, red on the margins; banner yellow with red markings at the base, 5–10 mm

long with the expanded portion 4–7 mm wide, bearing a tuft of trichomes at the base of the inside of the claw and with short, round glandular trichomes on the dorsal surface; lateral petals yellow, 5–10 mm long, 3–5 mm wide, with short, round, glandular trichomes dorsally; filaments 5–6 mm long, with clear retrorse processes on the lower half mixed with yellow-brown multicellular glandular trichomes or strigose non-glandular trichomes; anthers 1 mm long; ovary 2–4 mm long, lateral surfaces densely glandular, margins densely tomentose; style 3–6 mm long, glabrous or strigose at base; stigma obliquely terminal. FRUITS dehiscent with the valves flaring and often twisting around themselves, falcate to lunate, widest in the center, bearing a jagged ring at the base where sepals have dehisced, tapering at both ends, sometimes widest near distal end, brown, 18–23 mm long, 5–8 mm wide; tip acute to mucronate; valves puberulent with scattered multicellular glandular trichomes; margins slightly raised, shortly villous; seeds 3–6 per fruit, oval in outline, 3–4 mm long, 2.0–2.5 mm wide, dark brown.

COMMON NAME AND USES: Unknown.

CHROMOSOME NUMBER:  $2n=24$  (Bell 1965).

DISTRIBUTION (FIG. 6) AND HABITAT: Common in the deserts of western Arizona, southern California, and Mexico in Baja California and Sonora, in sandy soils from sea level to 1000 m.

FLOWERING AND FRUITING: April with sporadic flowering in December.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Baja California: 16 mi S of San Felipe, 23 Mar 1970, A. M. Powell & B. L. Turner 1733 (US); Calamajué, 330 m, 15 Sep 1905, N. Goldman 7146 (NY); rt 1 ca 30 mi S of Santa Rosalía, 27 May 1974, D. Pinkava & E. Lehto P12241 (NY); 12.7 mi S of La Ventana via Hwy. 5, Llanos del Río Colorado, 115.04°W, 31.34°N, 40 m, 19 Mar 1979, T. L. Burgess et al. 5622 (ARIZ); 2.5 mi N of Bahía de Los Angeles, 113°34.47'W, 25°58.42'N, 18 Mar 1993, B. B. Simpson 03-18-93-1 (TEX); Isla Angel de la Guardia, SE of

Ensenada, 29°04'N, 113°10'W, 18 Feb 1986, P. Tenorio L. 10940 (MEXU, WIS); Puerto Refugio, 29°33'N, 113°34'W, 1 Aug 1985, P. Tenorio L. 9469 (MEXU); sandy desert 25 mi S of Puertocitos, 8 Mar 1979, S. P. McLaughlin & J. E. Bowers 2017 (ARIZ); 65 mi S of Mexicali, 22 Mar 1970, A. M. Powell & B. L. Turner 1713 (TEX); San Francisco Bay, 10 Apr 1911, J. N. Rose 16757 (NY); Isla San Luis (Isla Coloradita), 114.5°W, 30.1°N, 25 m, 22 Apr 1983, R. M. Turner 83-56 (ARIZ). Sonora: New Kino, Kino Bay, 13 Apr 1970, F. Mahler 6071 (NY); 5 mi NE of Puerto Lobos, 1 May 1960, C. H. Lowe Jr. & R. M. Turner 60-55 3334 (ARIZ); Sierra Bacha (Sierra Cirio) near coast S of Libertad, 29°50'N, 112°38'W, 150 m, 23 Nov 1979, T. L. Burgess 5716 (ARIZ); Sierra del Rosario, Gran Desierto, 9 Mar 1975, R. S. Felger et al. 75-20 (ARIZ); Tepoca Bay, 25 Apr 1921, I. M. Johnston 3281 (NY).

UNITED STATES. Arizona: Yuma Co.: around Fortuna Mts, 11 Oct 1927, R. H. Peebles et al. 4964 (NY); ca. 15 mi E of Yuma, 2 Apr 1970, N. D. Alexander 2323 (NY); Gila Mts at Telegraph Pass, 166 m, 16 Apr 1941, R. A. Darrow s.n. (CAS); near Dome, 10 Mar 1928, R. H. Peebles & G. J. Harrison 5050 (ARIZ). California: Imperial Co.: along Palo Verde Rd., 5.1 mi N of Milpitas Wash Rd., Palo Verde Mts, 114.47°W, 33.21°N, 200 m, 7 Mar 1985, S. P. McLaughlin & J. E. Bowers 2909 (ARIZ); near Carrizo on rd. to El Centro, 8 May 1932, V. Duran 3193 (BRY, DS, NY, WIS); 2.5 mi W of Carrizo Station, 27 Jan 1940, P. A. Munz 15828 (CAS). Riverside Co.: Palm Springs, 1899, L. T. Chamberlain s.n. (NY); 1 mi E of Mecca, 29 Jan 1977, M. O. Dillon & E. Rodriguez 798 (MO); 10 miles west of Coachella, 100 m, Apr 1905, H. M. Hall 5779 (DS); 5 mi E of Indio, 130 m, 14 Oct 1940, J. F. Macbride & F. Drouet 4460 (F); rd. leading from Hwy. 60–70 to Salton Sea, 6 Apr 1952, G. R. Campbell 18418 (NY (2)). San Diego Co.: Anza Borego State Park, Carrizo Badlands area, 2.3 mi E of Hwy. S2 in canyon, 200 m, 18 Mar 1986, S. McLaughlin & J. E. Bowers 3254 (ARIZ).

The persistence of the sepals in fruit clearly distinguishes all *Hoffmannseggia* species from those of *Pomaria* or *Caesalpinia*, with this most conspicuous exception. However, the sepals in *Hoffmannseggia microphylla* break off tardily and jaggedly whereas in the other two genera, there is a clean break forming a ring at the base of the fruit. This species is also different from other *Hoffmannseggia* species because its terminal pinna is markedly longer than the lateral pinnae and it is almost aphyllous with straight stems. It is

these autapomorphous characters that caused different authors to be equivocal as to whether the species should be placed in *Hoffmannseggia* or *Caesalpinia* (Isely, 1975). Molecular data (Fig. 1) place it in a strongly supported clade with *H. intricata* and *H. peninsularis*.

7. *HOFFMANNSEGGIA OXYCARPA* Benth. in A. Gray, *Pl. Wright*. 1: 55. 1852. (Plate 1 F)

Suffructescent PERENNIAL HERBS, 10–50 cm tall, arising from a woody tap root; young stems and leaf rachises reddish, villous mixed with capitate multicellular glandular trichomes. LEAVES consisting of (1–)2–13 pairs of pinnae plus one a single terminal one, (7–)11–70(–250) mm long including petioles 3–120 mm long, 9–30 mm wide; stipules lanceolate, villous, glandular on the margins, 2–5 mm long, 1–1.5 mm wide; area on the rachis of pinnae insertion villous and with cluster of multicellular, often red, trichomes; leaflets 4–9 per pinna, ovate to oblong in outline, 2–12 mm long, 1–6 mm wide, with glabrous upper and lower surfaces, often with a linear process at the point of insertion; rachilla villous. INFLORESCENCES terminal, 6–30 mm long, 3–27-flowered with flowers often congested at the end of the flowering stalk; rachis and pedicels villous mixed with numerous capitate multicellular glandular trichomes; pedicel red or green, 2–7 mm long. FLOWERS broadly turbinate in side view, turning downward with age, 8–10 mm long, 8 mm wide; free portion of sepal 5–8 mm long, 1.5–2 mm wide, dorsally villous mixed with capitate, multicellular glandular trichomes, red on the edges; banner yellow dotted with red, fading to pinkish-red, 6–13 mm long with the expanded portion 3–6 mm wide, with a few trichomes at the base of the inside of the claw and glabrous on the dorsal surface; lateral petals yellow, 6–10 mm long, 3–4 mm wide, glabrous dorsally; filaments 5–9 mm long, with sparse retrorse process-

es on the basal portion; anthers 1–1.2 mm long; ovary 2–4 mm long, covered with glandular protuberances; style 2–6(–8) mm long, glabrous; stigma very obliquely terminal. FRUITS dehiscent, decumbent when mature, sword-shaped, often slightly curved, tapering apically, red-brown, 8–36 mm long, 4–7 mm wide; valves with obscure veins, pubescent to lightly villous mixed with capitate multicellular glandular trichomes less than 0.75 mm long, twisting around themselves after dehiscence; tip acute to mucronate; margins pubescent or with a few glandular trichomes. Seeds 4–12 per fruit, oval in outline, 4–6 mm long, 3.0–3.5 mm wide, light green to brown.

Inflorescences of *Hoffmannseggia oxycarpa* are reminiscent of *H. glauca* from which it can be distinguished because its flowers lack the glandular protuberances on all of the petal claw margins that are so obvious in *H. glauca* (Plate 1A). The fruits of the two species are very different: those of *H. glauca* slightly arcuate, round at the apex, almost glabrous, and indehiscent; those of *H. oxycarpa* taper toward the apex and are dehiscent and distinctly glandular-pubescent.

Two subspecies (*Hoffmannseggia oxycarpa* subsp. *oxycarpa* and subsp. *arida*) are recognized here. Rzedowski (1997) treated *H. arida* as a distinct species and did not mention its similarities to *H. oxycarpa*. The long, slender, only slightly curved or straight legume of this species with valves that bear numerous long, multicellular capitate glandular trichomes (Plate 1F) and that each tightly curl vertically at maturity is unique in the genus.

7a. *HOFFMANNSEGGIA OXYCARPA* Benth. in A. Gray subsp. *OXYCARPA*, *Pl. Wright*. 1: 55. 1852. TYPE. MEXICO. [Nuevo León]: Monterrey, *Eaton and Edwards* 12, (LECTOTYPE: K! here designated; ISOTYPES: GH!, NY!). It is clear from the protologue that Gray considered that Bentham

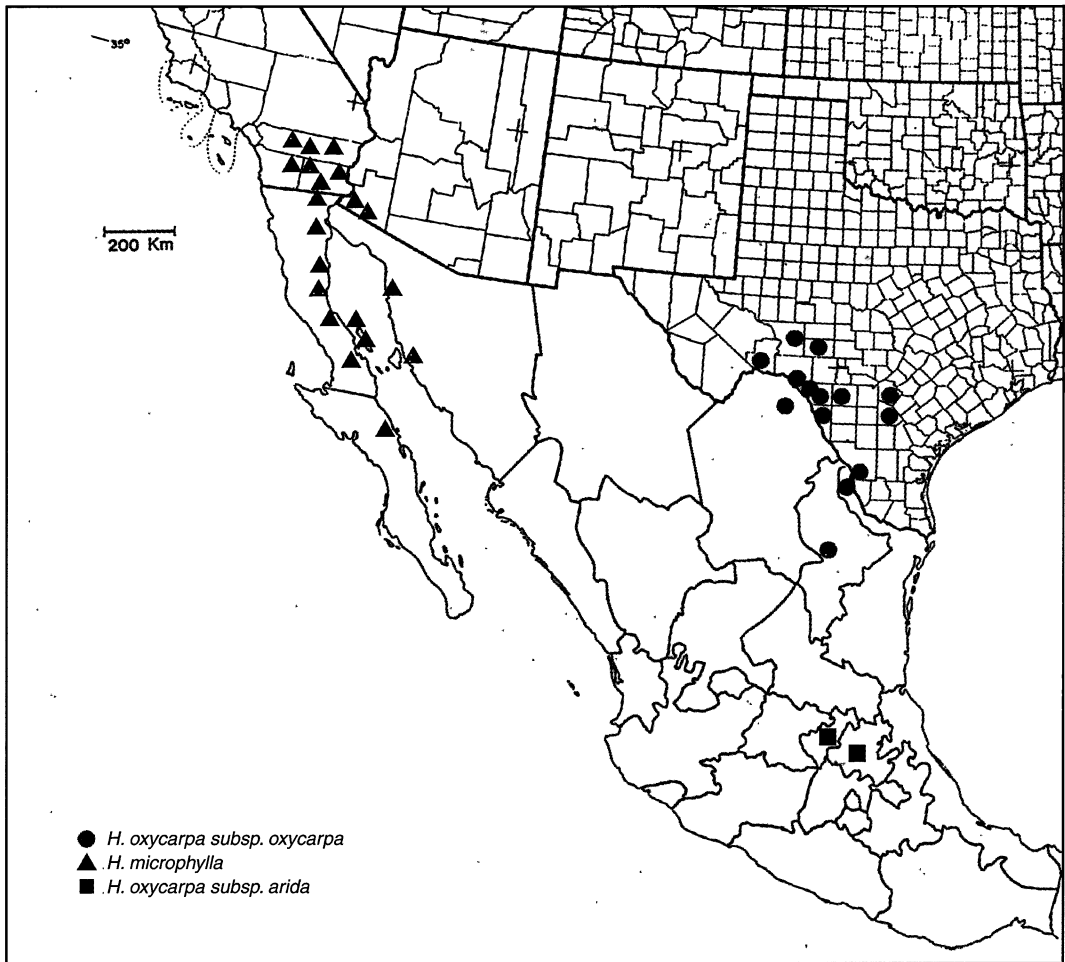


FIG. 6. Distribution of *Hoffmannseggia oxycarpa* var. *arida*, *H. oxycarpa* var. *oxycarpa*, and *H. microphylla*.

had described this taxon (c.f., International Code of Botanical Nomenclature, 1994: 46.2). The description including the name are in quotation marks and attributed to Bentham. The specimens Gray cited that Bentham would have seen are "Gregg" and "Edwards and Eaton." Fisher (1892) designated the Gregg and the Edwards and Eaton specimens at GH as cotypes. Sprigs from both these collections appear on the K, GH, and NY sheets. The protologue of the species includes a description of the fruit. The only fruiting sprig is the Eaton and Edwards plant on the K specimen which I have designated as lectotype. Isely (1975) cited the authorship of *H. oxycarpa* as Benth. ex Gray, rather than Benth. in Gray, so he sought, but was unable to specify, a Wright

collection as "isotype." It appears that Bentham sent both the description and duplicate material of the Gregg and Edwards and Eaton collections to Gray. Gray merely listed the Wright specimens as conspecific.

*Caesalpinia oxycarpa* (Benth.) Fisher, Bot. Gaz. (Crawfordsville) 18: 122. 1893.

*Larrea oxycarpa* (Benth.) Britton, N. Amer. fl. 23 (5): 312. 1930.

PLANTS 10–34(–40) cm tall; young stems and rachises bearing yellow or red multicellular glandular trichomes. LEAVES consisting of (1–)2–4 pairs of pinnae plus a

single terminal one, (7–)11–70(–93) mm long including petioles 3–52 mm long. INFLORESCENCES 6–21 mm long, 4–18-flowered; rachis and pedicel red, 2–5 mm long. BANNER yellow dotted with red, fading to pinkish-red, glabrous on the dorsal surface; lateral petals yellow, glabrous dorsally. FRUITS 8–36 mm long, 4–7 mm wide; valves with obscure veins, pubescent to lightly villous mixed with yellow or orange capitate multicellular glandular trichomes less than 0.75 mm long; margins pubescent; seeds 4–6 per fruit, oval in outline, 4.5–6.0 mm long.

COMMON NAMES AND USES: Unknown.

CHROMOSOME NUMBER:  $2n=24$  (Turner and Fearing, 1960).

DISTRIBUTION (FIG. 6) AND HABITAT: In rocky limestone soils in southern Texas and New Mexico and in Mexico in northern Coahuila, Nuevo León, and Tamaulipas from 600–2300 m in elevation.

FLOWERING AND FRUITING: Primarily in March and April with occasional flowering in June, July, October, and December.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Coahuila: Sierra de la Madera NW of Cuatro Ciénegas in Cañada Charretera along the logging rd., 27°08'N, 102°32'W, 1840–2250 m, *M. Mayfield* 1336 (TEX); 47 km N of the Río Sabinas crossing on Múzquiz-Boquillas hwy., 101.61°W, 28.25°N, 600 m, 6 Jun 1972, *F. Chiang et al.* 7532 (TEX); Sierra de la Ruta, 27°05'N, 101°02'–101°05'W, 550–1700 m, 14 Mar 1973, *M. C. Johnston et al.* 10164B (MEXU); Sierra de la Madera, 102°42'W, 27°12'N, 1700–1900 m, 15 Sep 1993, *J. A. Villarreal* 7381 (MEXU). Hidalgo: Ixmiquilpán, Jul 1905, *J. N. Rose et al.* 9002 (NY); Sierra de la Madera, 102°92'W, 27°12'N, 1750–1900 m, 15 Sep 1993, *J. A. Villarreal* 7381 (MEXU). Nuevo León: ca 31 mi N of Monterrey on Hwy. 85, 22 Mar 1970, *N. D. Atwood* 2078 (BRY, NY); El Fraile Peak 3 mi W of Grutas de García, Dec 1962, *R. F. Smith* 665M (TEX); Mpio. Linares, 4 km W of La Petaca, 1 Oct 1986, *A. E. Estrada C.* 701 (MEXU). Tamaulipas: 40 km S of Nuevo Laredo on Monterrey hwy., 7 Apr 1962, *M. Domínguez & M. W. McCart* 8226 (TEX).

UNITED STATES. Texas: Atascosa Co.: 2.5 mi S of Campbellton on rocky brushy hills, 15 Apr 1964, *D. S. Correll* 29237 (BRY, NY). Bexar Co.: Leon Springs, *G. Jeremy* 8 (US). Crockett Co.: 15 mi W of Ozona, 750 m, 7 Jun 1957, *B. H. Warnock* 15211

(TEX). Kinney Co.: 2 mi. S of intersection of Hwy. 277 and 693, 14 Jun 1963, *D. S. Correll & D. C. Wasshausen* 27759 (NY, TEX); 8.7 mi S of Kinney Co. line and 1.8 mi N of Maverick Co. line, ca 110 mi W of San Antonio on Hwy. 277, 19 Mar 1983, *L. C. Barnett & L. J. Dorr* 41 (TEX); Strickland Springs, 1 Apr 1893, *E. A. Mearns* 1358 (DS, US). Maverick Co.: 1 mi N of Quemado, 21 Apr 1966, *D. S. Correll & R. C. Rollins* 32584 (BRY, NY, TEX); 9 mi N of Quemado, 17 Apr 1966, *G. F. Ledingham* 4673 (BRY). Sutton Co.: SE of Sonora, 28 Oct 1945, *V. L. Cory* 50547 (DS). Terrell Co.: 20 mi E of Dryden, 10 Apr 1949, *J. O. Parks et al.* 101 (SRSC, TEX); limestone hills 20 mi W of Langtry, 627 m, 30 Mar 1947, *B. H. Warnock & G. W. Brown* 47326 (SRSC). Uvalde Co.: near Blewett, 2 Oct 1962, *D. S. Correll & H. S. Correll* 26146A (TEX). Val Verde Co.: 0.5 mi W of bridge over Pecos River on rte. 90, 1 Aug 1988, *B. B. Simpson* 88-VIII-1-1 (TEX); 5 mi S of Comstock on Rte. 90, 14 Oct 1990, *B. B. Simpson* 14-10-90-1 (TEX); NE of Del Rio on Rte. 2523 on the way to Carta Valley, before jct. with Rte. 3008, 14 Oct 1990, *B. B. Simpson* 14-10-90-4 (TEX); near Devil's River, 19 Apr 1931, *S. D. McKelvey* 1899 (GH). Webb Co.: 11 mi S of Laredo, Rte. 83, 19 Apr 1959, *D. S. Correll & R. C. Rollins* 20934 (BRY).

Both subspecies of *Hoffmannseggia oxycarpa* have the unique sword-shaped fruits with valves tightly twisting lengthwise in dehiscence, but those of subsp. *oxycarpa* tend to be smaller (8–36 mm, but rarely 36 mm) than those of subsp. *arida* (30–35 mm), and the trichomes are shorter and not black-tipped. Populations of *H. oxycarpa* subsp. *oxycarpa* are relatively rare and never large.

#### 7b. *Hoffmannseggia oxycarpa* subsp. *arida* (Rose) B. B. Simpson comb. nov.

*Hoffmannseggia arida* Rose, Contr. U. S. Natl. Herb. 10: 98, pl. 29. 1906. TYPE. MEXICO. [Querétaro:] Between San Juan del Río and Cadereyta, 19 Aug 1905, *J. N. Rose & J. H. Painter* 9619 (HOLOTYPE: US!; ISOTYPE: GH!).

*Larrea arida* (Rose) Britton, N. Amer. fl. 23 (5): 313. 1930.

*Larrea hidalgensis* Britton, N. Amer. fl. 23 (5): 313. 1930. TYPE. MEXICO. Hidalgo: Ixmiquilpán, Jul 1905, *C. A. Purpus* 1369 (HOLOTYPE: NY!; ISOTYPE: GH!).

PLANTS with very short internodes, to 50 cm tall; young stems and leaf rachises



bearing black-tipped multicellular glandular trichomes. LEAVES consisting of 3–13 pairs of pinnae plus a single terminal one, 1.4–25.0 cm long including a petiole 5–120 mm long. INFLORESCENCES 8–30 cm long, 3–27-flowered; rachis and pedicels bearing black-tipped multicellular glandular trichomes; flower pedicels green, BANNER yellow, red basally, 5–10 mm long with the expanded portion 3.0–3.5 mm wide, with multicellular glandular trichomes on the claw margins and on the dorsal surface; lateral petals yellow with red lines on the ventral surface and multicellular glandular trichomes on the dorsal surface. FRUITS 30–35 mm long, 5.0–5.6 mm wide; valves covered with long (to 0.75 mm) black-tipped multicellular glandular trichomes swollen at the base, brown or red; margins obscure with a few multicellular glandular trichomes; seeds 6–12 per fruit, oval in outline, 4 mm long.

COMMON NAME AND USES: Unknown.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG 6) AND HABITAT: Mexico in the states of Querétaro and Hidalgo at elevations up to 2100 m in rocky, calcareous soils.

FLOWERING AND FRUITING: June to August.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Hidalgo: Ixmiquilpán, Jul 1905, *J. N. Rose et al.* 9002 (GH). Querétaro: Near Higuierillas, 23 Aug 1905, *J. N. Rose et al.* 9770 (GH, US); 15 km from Higuierillas, 25 Jun 1972, *F. Chiang et al.* 8089 (TEX); from Cierro to Cerro de la Mesa, 20 Aug 1905, *F. Altamirano* 1509 (MEXU, US); 14 km NW of Tolimán on the rd. to El Deramadero, 2220 m, 9 Sep 1990, *J. Rzedowski* 50162 (TEX); Mpio. de Colón, camino a Colón, ca 3 km from Hacienda Santa Maria, 1850 m, 14 Jul 1993, *J. Rzedowski* 2767 (TEX).

This subspecies is extremely similar morphologically to *Hoffmannseggia oxycarpa* subsp. *oxycarpa* with plants tending to be more robust with more pronounced, longer, black-tipped multicellular glandular trichomes on the valves of the pods.

Unfortunately, the subspecies is extremely rare, seldom collected, and no molecular work has been done to date.

8. *HOFFMANNSEGGIA PENINSULARIS* (Britton) Wiggins, Contr. Dudley Herb. 4: 18. 1950. (Plate 1D)

*Larrea peninsularis* Britton, N. Amer. fl. 23 (5): 311. 1930. TYPE: MEXICO. Baja California: Cucopa Mts, gravel slopes, 4 Apr 1905, *D. T. MacDougal* 114 (HOLOTYPE: NY!).

*Caesalpinia peninsularis* (Britton) Eifert, Sida 5: 43. 1972.

Highly branched, low, almost prostrate SHRUBS, 14–40 cm tall, arising from a woody caudex; young stems and leaf rachises light red-brown, slightly pubescent and with dense yellow capitate multicellular glandular trichomes. LEAVES consisting of 1 pair of pinnae plus one terminal one that is only slightly longer than the lateral pinnae, 17–30 mm long including a petiole 9–20 mm long, 9–22 mm wide; stipules lanceolate, pubescent, 1.0–1.5 mm long, 0.2–0.5 mm wide; area on the rachis of pinnae insertion with a crown of multicellular glandular processes; leaflets 4–5 per pinna, ovate-obtuse in outline, sometimes emarginate with a glandular trichome at the apex, 2–5 mm long, 1–2 mm wide, with glabrous upper surfaces and pubescent to villous lower surfaces bearing glandular trichomes on the margins. INFLORESCENCES terminal and opposite leaves along branches, 20–30 mm long, 8–20-flowered, the rachis and pedicels lightly strigose or villous and bearing with numerous sticky, capitate, yellow, multicellular glandular trichomes; pedicels red-brown to tan, 1–2 mm long. FLOWERS turbinate in side view, 3–7 mm long, 3–8 mm wide; free portion of sepals 3–5 mm long, 1–2 mm wide, dorsally shortly strigose mixed with numerous capitate, yellow, multicellular glandular trichomes; banner yellow with red markings on the claw, 3–5 mm long with the expanded portion 2–3 mm wide, lacking a tuft at the

base of the inside of the claw and with capitate glandular trichomes on the claw margin and on the dorsal surface; lateral petals yellow often red-tipped, 3–4 mm long, 2.0–2.5 mm wide, with capitate glandular trichomes dorsally; filaments 2–3 mm long, with clear retrorse processes on the basal portion; anthers 0.5–0.7 mm long; ovary 1.5–2.0 mm long, bearing glandular protuberances; style 1.5–2.0 mm long, glabrous; stigma obliquely terminal. FRUITS lunate, dehiscent with the valves curling outward and often twisting, light yellow-brown to red, 10–15 mm long, 3.5–5.0 mm wide; valves glabrous and shiny or lightly strigulose with evenly scattered yellow or red capitate multicellular glandular trichomes; tip acute; margins obvious, lightly pilose; seeds 3 per fruit, oval in outline, 3 mm long, 2 mm wide, olive green.

COMMON NAMES AND USES: Unknown.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 7) AND HABITAT: Endemic to the northeastern part of Baja California, Mexico in gravel soils at sea level.

FLOWERING AND FRUITING: April and March with one flowering specimen collected in December.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Baja California: 6 mi S of Puertocitos on Rte. 5, 114°39.26' W, 30°16.3' N, 15 Mar 1993, B. B. Simpson 03-15-93-6 (TEX); bajada 5 mi S of La Ventana near hwy. from Mexicali to San Felipe, 17 Mar 1960, I. L. Wiggins & D. B. Wiggins 15763 (ARIZ, TEX); E base of the Sierra de los Cucapas, 2 mi NE of El Major, 115°19' W, 32°08' S, 1 Mar 1966, R. Moran 12351 (MEXU).

There is no doubt that *Hoffmannseggia peninsularis* is related to *H. intricata* and *H. microphylla*. All share the same dehiscent, lunate pods and all are small shrubs. Eifert (1972) moved this species to *Caesalpinia* because he said that lunate pods were unknown in *Hoffmannseggia*. Molecular data show the three to form a well-

supported clade that is unquestionably part of a larger *Hoffmannseggia* clade (Fig. 1). The features that distinguish this species from the others in its clade are the presence of many sticky glandular trichomes on the young branches, rachises, pedicels, and sepals. The flowers (3–4 mm long) are also smaller than those of either *H. microphylla* (12–15 mm long) or *H. intricata* (5–9 mm long).

9. HOFFMANNSEGGIA REPENS (Eastw.) Cockerell, *Muhlenbergia* 4: 68. 1908.

*Caesalpinia repens* Eastw., *Zoe* 4: 116. pl. 26. 1893. TYPE: UNITED STATES. UTAH: Grande Co.: Court House Wash, SE Utah, 25 May 1892 [given as 26 May in the protologue], A. Eastwood s.n. (HOLOTYPE: CAS!; ISOTYPES: CAS!, GH!, MO!, POM!, RSA!)

*Moparia repens* (Eastw.) Britton & Rose, *N. Am. fl.* 23 (5): 317. 1930.

HERBACEOUS PERENNIALS with spreading underground rhizomes, 9–15 cm tall, arising from a woody caudex; young stems and leaf rachises puberulent to pubescent. LEAVES consisting of 2–4 pairs of pinnae plus a terminal one, 2–10 cm long including the petioles 10–40 mm long, 24–30 mm wide; stipules ovate, pubescent, 3.0–5.5 mm long, 1.5–4.0 mm wide; area on the rachis of pinnae insertion usually with a cluster of multicellular glandular processes; leaflets 5–7 per pinna, obtuse-oblong in outline, usually with a glandular process at the point of attachment, 5–9 mm long, 2–4 mm wide with puberulent to lightly pubescent upper surfaces and pubescent lower surfaces. INFLORESCENCES terminal, 97–140 mm long, 10–15-flowered, the rachis and pedicels puberulent; pedicels light brown, 2.5–6 mm long. FLOWERS broadly opening, arching downward with senescence, 12–15 mm long, 8–13 mm wide; free portion of sepals 7–11 mm long, 2–5 mm wide, dorsally densely tomentose; banner bright yellow or orange-yellow with numerous red markings, fading pink to pale orange, 13–15 mm long with the

expanded portion 6 mm wide, bearing a tuft of trichomes at the base of the inside of the claw and glabrous on the dorsal surface; lateral petals yellow fading pinkish, 12–13 mm long, 3–6 mm wide, glabrous dorsally; filaments 10–13 mm long, with retrorse flat processes along the basal portion; anthers 1.5–2.5 mm long; ovary 3.5–4.0 mm long, glabrous, containing 4–10 ovules; style 10–12 mm long, glabrous; stigma obliquely terminal. FRUITS indehiscent, broadly oblong, or almost orbicular, often undulate, green turning red, 20–54 mm long, 10–20 mm wide; valves thin, reticulately veined, lightly puberulent, compressed between seeds, green to red; margins raised, puberulent; seeds 1–4(–6) per fruit, oval in outline 6–7 mm long, 4–6 mm wide, brown.

COMMON NAMES AND USES: Creeping Rush-pea.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 3) AND HABITAT: Restricted to the dunes and sandy to rocky soils of eastern Utah and once collected in neighboring Colorado, at elevations from 900 to 1900 m.

FLOWERING AND FRUITING: Primarily in April and June with sporadic flowering at other times in wet years.

REPRESENTATIVE SPECIMENS EXAMINED: UNITED STATES. Colorado: Between Fruita and Utah state line along US Hwy. 50, 31 May 1978, *R. Foster* 6350 (BRY). Utah: Emery Co.: 10 mi N of Hanksville, 110.84°W, 38.3°N, 1600 m, 5 Jun 1985, *D. Atwood & B. Thompson* 11156 (BYR, GH, NY); 15 mi S of Green River, sandy soil, 1600 m, Jun 1975, *L. Mason s.n.* (NY); 7 mi S of the turn to Goblin State Park off Rte. 24, 110°43'W, 38°25'N, 1500 m, 26 May 1989, *B. B. Simpson* 26-V-89-6 (TEX); ca 1.5 mi N of jct. of Hwy. 24 and old main hwy. W of Jesses Twist, 20 May 1985, *S. L. Welsh* 23437 (BYR, GH, NY); ca 7 mi S of Temple, sandy soil, 26 May 1968, *N. D. Atwood* 1369 (NY). Garfield Co.: 2 mi E of Hwy. 276 on Ticaboo Mesa, T36S R11E, SE of Henry Mts, 1500 m, 30 May 1978, *E. Neese* 5165 (NY); SE of Henry Mts, 2 mi E of Hwy. 276 on Ticaboo Mesa, 1500 m, 30 May 1978, *E. Neese* 5165 (BRY). Grand Co.: 25.8 mi NNE of Wayne Co. line, open sandy soil, 19 May 1983, *C. C. Freeman & M. A. Wetter*

1828 (NY); 3 mi. N of Moab on Hwy. 163 & Hwy. 9, 109.7°W, 38.5°N, 24 May 1985, *B. Franklin* 1648 (BYR, NY); 6.5 mi ENE of Green River below Book Cliffs, 1493 m, 28 May 1988, *M. A. Franklin* 6122 (BRY). Kane Co.: Henry Mts, near Lake Powell, 2 mi W from Utah Hwy. 276 on Notom Rd., 1267 m, 30 May 1976, *E. Neese* 1820 (BRY). San Juan Co.: due S of Moab, Colorado River Canyon, 1333 m, 21 Apr 1986, *B. Franklin* 2762 (BRY); Lockhart Basin ca 11 mi due NNE of Canyonland National Park, Needles entrance, 109.91°W, 38.12°N, 1440 m, 12 May 1982, *S. L. Welsh* 21111 (BRY, NY). Wayne Co.: Burr Desert near Pool Spring, 3 mi E of Hwy. 95, 11 mi S of Hanksville, 25 May 1980, *E. Neese* 8725 (BRY, NY); stable dune area ca 15 mi E of Utah Hwy. 24 along road to Flint Trail, 30 May 1970, *S. L. Welsh & N. D. Atwood* 9855 (BRY).

The distinctive appearance of this species undoubtedly led Britton and Rose (1930) to place it in the monotypic genus *Moparia* but molecular data place it securely within *Hoffmannseggia* (Fig. 1). Populations occur in a very restricted area of Utah and adjacent Colorado in deep red sands or rocky soils but they are locally very common and occur as large mats indicating vegetative reproduction. The flowers are large and, at least when dry, are paler yellow than those of other species. It is the broad, reddish fruits, however, that are particularly striking. The fruits, which can be oblong or orbicular in outline, are 10–20 mm wide, almost twice as wide as any other North American species and they are more or less glabrous and red or reddish brown when mature.

10. *HOFFMANNSEGGIA TENELLA* Tharp & L. O. Williams, Ann. Missouri Bot. Gard. 23: 451. 1936. TYPE: UNITED STATES. Texas: Nueces Co: Robstown to Alice, 22 Nov 1931, *F. E. Clements* 128b (HOLOTYPE: TEX!; ISOTYPES: TEX (2)!, MO!). (Plate 1E)

Spreading, decumbent HERBACEOUS PERENNIALS, to 20 cm tall, arising from a woody tap root; young stems and leaf rachises striate, puberulent. LEAVES consisting of 2–3 pairs of pinnae plus a single terminal one, 53–120 mm long including

petioles 33–70 mm long, 17–40 mm wide; stipules ovate, entire, 1.5–2.0 mm long, 1.0–1.5 mm wide; area on the rachis of pinnae insertion swollen, pubescent, occasionally with a few multicellular trichomes; leaflets 5–6 per pinna, oblong in outline, 3.5–5.5 mm long, 1.5–2.0 mm, with glabrous upper surfaces and puberulent to slightly tomentose (especially on the margins) lower surfaces. INFLORESCENCES terminal, 13–100 long, 3–7-flowered in a very open array, the rachis and pedicels lightly pubescent; pedicels red, 2–3 mm long. FLOWERS narrowly conical in side view, 6–10 mm long, 3–4 mm wide; free portion of sepals 4–5 mm long, 1 mm wide, shortly pubescent on the dorsal face and the margins, reddish on the margins; banner yellow-pink to rose, 6 mm long with the expanded portion 4 mm wide, folded, glabrous at the base of the inside of the claw and on the dorsal surface; lateral petals rose, 4 mm long, 2.5 mm wide, glabrous dorsally; filaments 3 mm long, with a few trichomes; anthers 0.5 mm long; ovary 1.5 mm long, pubescent on margins and apically; style 2.5 mm long, glabrous; stigma terminal. FRUITS upright, straight, retangular, pointed at both ends, slightly undulate, 8–19 mm long, 5–6 mm wide; valves thin, reticulate, very lightly pubescent (puberulent), often red on edges, margins pronounced, puberulent to pubescent; seeds 2–4 per fruit, pear-shaped in outline, 3–5 mm long, 3–5 mm wide, green-black.

COMMON NAMES AND USES: Slender Rush-pea.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 7) AND HABITAT: Endemic to Nueces and Kleberg Counties in south Texas in clay soils at elevations slightly above sea level.

FLOWERING AND FRUITING: April and May with one fruiting specimen collected in June and one in November.

REPRESENTATIVE SPECIMENS EXAMINED: UNITED STATES. Texas: Kleberg Co.: Lau-

reles Division of King Ranch, ca 4 mi S of headquarters, 20 Apr 1964, *F. B. Jones 6146* (TEX). Nueces Co.: 1 mi S of Bishop in St. James Cemetery, 15 May 1992, *B. B. Simpson 05-15-92-1* (TEX); bank of Petronila inlet between Bishop (10 mi) & Chapman Ranch on FM 70, 7 Jun 1970, *D. S. Correll & H. B. Correll 38906* (GH, NY, MO, TEX (2)).

*Hoffmannseggia tenella* is found today in the clay soils of two counties in south Texas and it is the only species of the genus federally listed as endangered. Its current geographic restriction is probably due to the loss of habitat to agriculture. In habit and flower morphology it is similar to *H. drepanocarpa* but the fruits of the two differ, with those of *H. tenella* short (8–19 mm long) and straight and those of *H. drepanocarpa* strongly falcate (sometimes through almost a complete circle) and longer (23–40 mm). The habit and fruits of *H. watsonii* from Mexico are very similar to those of *H. tenella*. The fruits differ only in being larger (16–30 vs. 8–19 mm long) in *H. watsonii* and occasionally having glandular trichomes on the valves. It is possible that *H. tenella* is only the U.S. extension of *H. watsonii*, but the differences cited above, the disjunction in geographical distribution, and a difference in soil preferences (black clay soils versus calcareous soils) leads me to treat them as distinct.

11. HOFFMANNSEGGIA WATSONII (Fisher) Rose, *Contr. U.S. Natl. Herb.* 10: 98. 1906. (Plate 1B)

*Hoffmannseggia gracilis* S. Watson, *nom illeg.* *Proc. Amer. Acad. Arts* 17: 347. 1882. TYPE: MEXICO. Coahuila: Sierra Madre, south of Saltillo, [1880], *E. Palmer 275* (LECTOTYPE: GH, designated by Fisher (1882); ISOLECTOTYPES: K!, NY (2)!). Later homonym of *H. gracilis*, Hook. & Arn., *Bot. Misc.* 3: 209. 1833. According to McVaugh (1956), Edward Palmer collected at Sierra Madre south of Saltillo between 22–20 March and 26 Jul–1 Aug 1880.

*Caesalpinia watsonii* Fisher, *Bot. Gaz.* (Crawfordsville) 18: 122. 1892.

*Larrea watsonii* (Fisher) Britton, *N. Amer. fl.* 23 (5) 312. 1930.

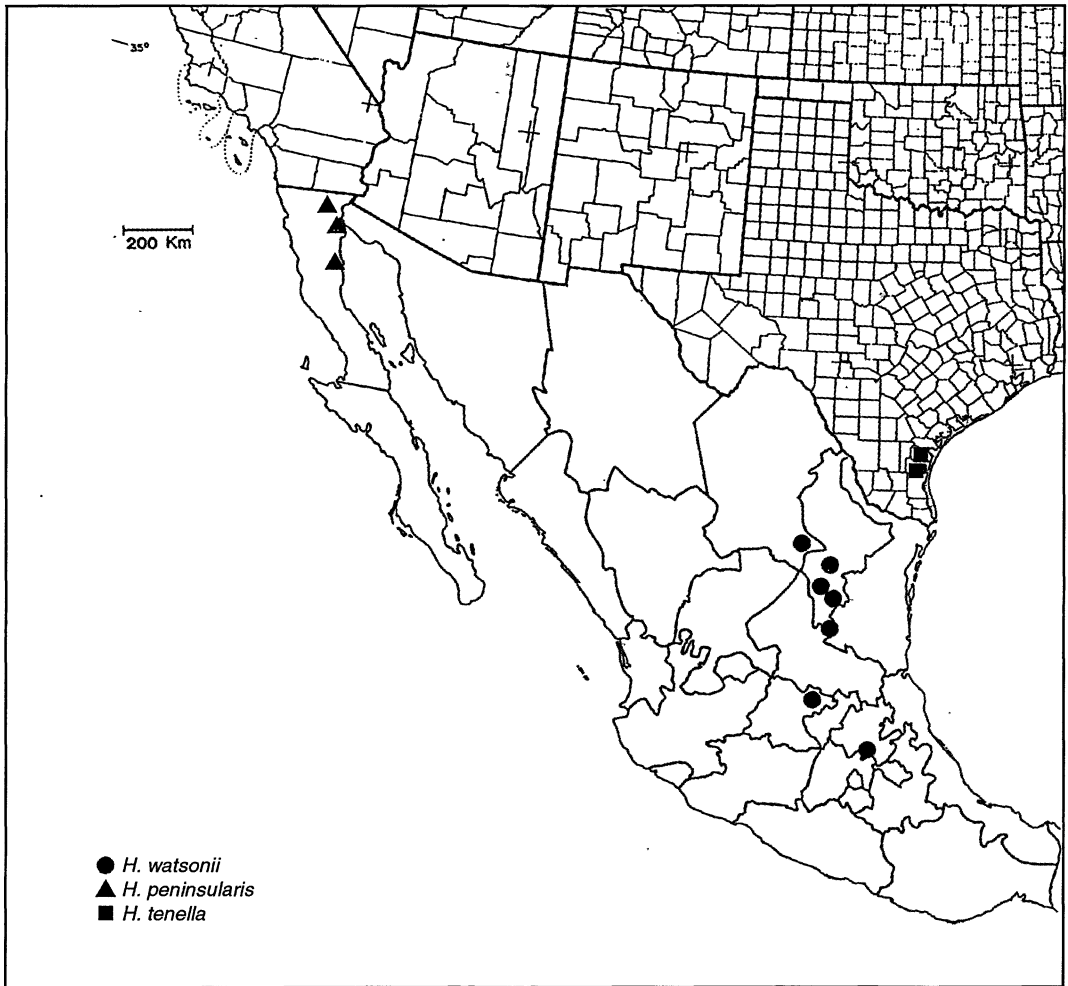


FIG. 7. Distribution of *Hoffmannseggia peninsularis*, *H. tenella*, and *H. watsonii*.

HERBACEOUS PERENNIALS with very short internodes, 10–24 cm tall, arising from a woody tap root; young stems and leaf rachises striate, puberulent to pubescent, often reddish. LEAVES consisting of 1–9 pairs of pinnae plus a single terminal one, 28–90 mm long including a petiole 15–45 mm long, 10–25 mm wide; stipules ovate, pubescent, 1.5–3.0 mm long, 1.0–1.5 mm wide; area on the rachis of pinnae insertion sometimes swollen and glabrous or swollen and pubescent or flat and pubescent, often with a cluster of multicellular glandular trichomes; leaflets 5–7 per

pinna, oblong in outline, sometimes with a glandular process at the point of attachment, 1.5–3.0 mm long, 1.0–1.3 mm wide, with glabrous upper surfaces and glabrous to puberulent or pubescent lower surfaces and margins. INFLORESCENCES terminal, 7–15 cm long, 3–14-flowered, the rachis and pedicels pubescent; pedicels brown to red-brown, 2–3 mm long. FLOWERS conical in side view, 7–20 mm long, 3–10 mm wide; free portion of sepals 3–5 mm long, 1.0–1.2 mm wide, with many short white slightly curly trichomes on the dorsal surface, often red especially along the margins;

banner petal orange to red-orange with lighter yellow center, 6 mm long with the expanded portion 3 mm wide, lacking a tuft of trichomes at the base of the inside of the claw and glabrous on the dorsal surface; lateral petals red-orange, 7.0–7.5 mm long, 5–6 mm wide, glabrous dorsally; filaments 4–5 mm long, with clear retrorse processes along most of their length; anthers 0.75–1.0 mm long; ovary 2.5–3.0 mm long, glabrous; style 4 mm long, glabrous; stigma terminal. FRUITS indehiscent, reddish brown, oblong with margins parallel or tapering slightly toward the tip and sometimes curved slightly upwards, 16–30 mm long, 4–6 mm wide; valves puberulent, sometimes bearing a few scattered multicellular glandular trichomes, reticulately veined, usually with indentations between seeds; tip acute; margins raised and puberulent; seeds 3–9 per fruit, pear-shaped in outline, 2.5–3.0 mm long, 1.5 mm wide, brown.

COMMON NAMES AND USES: Unknown.

CHROMOSOME NUMBER: Unknown.

DISTRIBUTION (FIG. 7) AND HABITAT: Mexico in the states of Coahuila and Nuevo León to Guanajuato and Hidalgo in calcareous, rocky soils from 1900 to 2700 m elevation.

FLOWERING AND FRUITING: June and July extending into September.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Coahuila: 17.9 mi S of Agua Nueva on rd. leading S from Saltillo, 2000 m, 25 Jun 1955, *M. C. Johnston 2607* (TEX); at Fraile, 59 km S of Saltillo, 101.25°W, 25°N, 1967 m, 10 Jul 1941, *L. R. Stanford et al. 261* (GH, MEXU, MO, NY). Guanajuato: Mpio. de San Luis de la Paz, La Misión de Abajo, rd. to Victoria, 1950 m, 3 Aug 1991, *E. Ventura & E. López 9404* (TEX). Hidalgo: near Tula, 2600 m, 21 Sep 1901, *C. G. Pringle 9451* (GH, NY, US). Nuevo León: 2 mi N of Pablillo on the rd. from Galeana to Dr. Arroyo, 1970 m, 23 Jul 1991, *B. B. Simpson 91-VII-23-2* (TEX); Aramberri, Cerro Grande, 2020 m, 6 Jul 1986, *G. B. Hinton 18987* (MEXU, TEX).

*Hoffmannseggia watsonii* is extremely similar to *H. tenella*, a species endemic to

southern Texas; both lack glandular trichomes on the sepals and both have flowers that do not open broadly (Plate 1B). They also both have short, rectangular fruits with parallel margins, acute apices, and puberulent valves with reticulate veins. The two differ in the size of the pods (16–30 mm long in *H. watsonii* and 8–19 mm long in *H. tenella*) and apparently in habitat, *H. tenella* growing in heavy black clay and *H. watsonii* in calcareous, rocky soils. They are also disjunct geographically (Fig. 7).

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#### LITERATURE CITED

- Baillon, H. 1869. Sur la valeur du genre *Hoffmannseggia*, *Adansonia* 9: 220–221.  
 Baillon, H. *The Natural History of Plants*. Vol. II. London: Reeve and Co.  
 Bell, C. R. 1965. Documented chromosome numbers of plants. 65. *Sida* 2: 168–170.

- Bentham, G., and J. D. Hooker. 1865. *Eucaesalpinieae*. *Genera plantarum* 1: 565–566.
- Britton, N. L. and J. N. Rose. 1930. *Caesalpinieaceae*. *N. Am. fl.* 23 (5): 201–349.
- Candolle, A. P. de. 1825. *Prodromus systematis naturalis regni vegetabilis*. Paris: Treuttel and Würtz.
- Castetter, E. F. 1935. Uncultivated native plants used as sources of food. *Univ. New Mexico Bull.* 266 (4): 1–62.
- Cavanilles, J. 1798. *Icones et descriptiones plantarum*. Vol. 4. Madrid: Typographia regia. Reprint, Lehre, Germany: J. Cramer, 1965.
- Cavanilles, J. 1799. *Icones et descriptiones plantarum*. Vol. 5. Madrid: Typographia regia. Reprint, Lehre, Germany: J. Cramer, 1965.
- Covas, G., and B. Schnack. 1946. Número de cromosomas en antófitas de la región de Cuyo (República Argentina). *Rev. Argentina Agron.* 13: 153–166.
- Eifert, I. 1972. New combinations in *Hoffmannseggia* Cav. and *Caesalpinia* L. *Sida* 5: 43–44.
- Ewan, J. 1942. Bibliographical miscellany IV. A bibliogeographical guide to the Brandegee botanical collections. *Amer. Midl. Nat.* 27: 772–788.
- Felger, R. S., and M. B. Moser. 1985. *People of the desert and sea. Ethnobotany of the Seri Indians*. Tucson: The University of Arizona Press.
- Fisher, E. M. 1892. Revision of the North American species of *Hoffmannseggia*. *Contr. U. S. Natl. Herb.* 1: 143–150.
- Fisher, E. M. 1893. The genus *Caesalpinia*. *Bot. Gaz.* (Crawfordsville) 18: 121–123.
- Geiser, S. W. 1948. *Naturalists of the Frontier*. 2nd ed. Dallas: Southern Methodist University.
- Gray, A. 1852. *Plantae wrightianae Texano-Neo-Mexicanae: an account of a collection of plants made by Charles Wright, A. M., in an expedition from Texas to New Mexico, in the summer and autumn of 1849, with critical notices and characters of other new and interesting plants from adjacent regions etc.* Washington, D.C.: Smithsonian Institution.
- Isely, D. 1975. Leguminosae of the United States: II. subfamily Caesalpinioideae. *Mem. New York Bot. Gard.* 25: 1–228.
- Isley, D. 1998. *Native and naturalized Leguminosae (Fabaceae) of the United States (exclusive of Alaska and Hawaii)*. Provo, Utah: Brigham Young University, Monte L. Bean Life Science Museum.
- Johnston, I. M. 1940. *Field Notes of Charles Wright for 1849, 1851–52*. Typescript, Harvard University Herbaria, Cambridge, MA, copy at The University of Texas.
- Lewis, G. P. 1998. *Caesalpinia*. A revision of the *Poincianella-Erythrostemon* group. Kew, England: Royal Botanic Gardens.
- Lewis, G. P., and B. D. Schrire. 1995. A reappraisal of the *Caesalpinia* group (Caesalpinioideae: Caesalpinieae) using phylogenetic analysis. Pp. 41–52 in *Advances in Legume Systematics 7: Phylogeny*. eds. M. D. Crisp and J. J. Doyle. Kew, England: Royal Botanic Gardens.
- McVaugh, R. 1943. The travels of Thomas Coulter 1824–1827. *J. Wash. Acad. Sci.* 33: 65–70.
- McVaugh, R. 1956. *Edward Palmer. Plant Explorer of the American West*. Norman: University of Oklahoma Press.
- Moerman, D. E. 1998. *Native American Ethnobotany*. Portland, Oregon: Timber Press.
- Ohlendorf, S. M. 1980 (translator). *J. L. Berlandier. Journey to Mexico during the years 1826–1834*. 2 vols. Austin: Texas State Historical Association.
- Ortega, C. G. de. 1797. *Novarum, aut rariorum plantarum horti reg. botan. matrit. descriptionum decades*. 15, t. 2. Madrid: Typographia Ibarriana.
- Parker, K. F. 1972. *An Illustrated Guide to Arizona Weeds*. Tucson: University of Arizona Press.
- Polhill, R. M., and J. E. Vidal. 1981. *Caesalpinieae*. Pp. 81–95 in *Advances in Legume Systematics*, Part 1, eds. R. M. Polhill and P. H. Raven. Kew, England: Royal Botanic Gardens.
- Rzedowski, J. 1997. Flora del Bajío y de regiones adyacentes. 51. Familia Leguminosae subfamilia Caesalpinioideae. Pátzcuaro, Michoacán: Instituto de Ecología.
- Simpson, B. B. 1998. A revision of *Pomaria* (Fabaceae) in North America. *Lundellia* 1: 46–71.
- Simpson, B. B., and B.-M. Miao. 1997. The circumscription of *Hoffmannseggia* (Fabaceae, Caesalpinioideae, Caesalpinieae) and its allies using morphological and cpDNA restriction site data. *Pl. Syst. Evol.* 205: 157–178.
- Taubert, P. 1894. *Caesalpinioideae*. Pp. 125–184 in *Die natürlichen Pflanzenfamilien*. III (3). eds. A. Engler and K. Prantl. Leipzig: Englemann.
- Torrey, J., and A. Gray. 1840. *Hoffmannseggia*. *A Flora of North America* 1(3): 392–393. New York: Wiley and Sons.
- Turner, B. L. 1956. Chromosome numbers in the Leguminosae. *Amer. J. Bot.* 43: 577–582.
- Turner, B. L., and O. S. Fearing. 1960. Chromosome numbers in the Leguminosae. III. Species of the southwestern United States and Mexico. *Amer. J. Bot.* 47: 603–608.
- Ulibarri, E. A. 1979. Las especies argentinas del género *Hoffmannseggia* Cav. (Leguminosae - Caesalpinioideae). *Darwiniana* 22: 135–158.
- Ulibarri, E. A. 1996. Sinopsis de *Caesalpinia* y *Hoffmannseggia* (Leguminosae-Caesalpinioideae) de Sudamérica. *Darwiniana* 34: 299–348.



## NUMERICAL LIST OF SPECIES

1. *H. drepanocarpa* A. Gray
2. *H. drummondii* Torr. & A. Gray
3. *H. gladiata* Benth.
4. *H. glauca* (Ortega) Eifert
5. *H. intricata* Brandegee
6. *H. microphylla* Torr.
- 7a. *H. oxycarpa* Benth. subsp. *oxycarpa*
- 7b. *H. oxycarpa* subsp. *arida* (Rose) B. B. Simpson
8. *H. peninsularis* (Britton) Wiggins
9. *H. repens* (Eastw.) Cockerell
10. *H. tenella* Tharp & L. O. Williams
11. *H. watsonii* (Fisher) Rose

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