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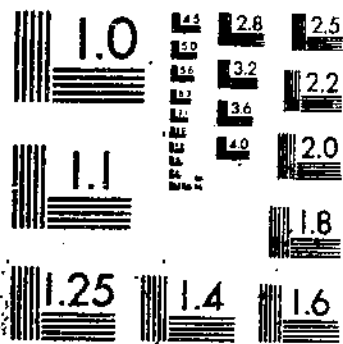
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A REVISION OF THE AMERICAN SPECIES OF HIBISCUS SECTION BOMBICELLA (MALVACEAE)

FRYXELL, P. A.

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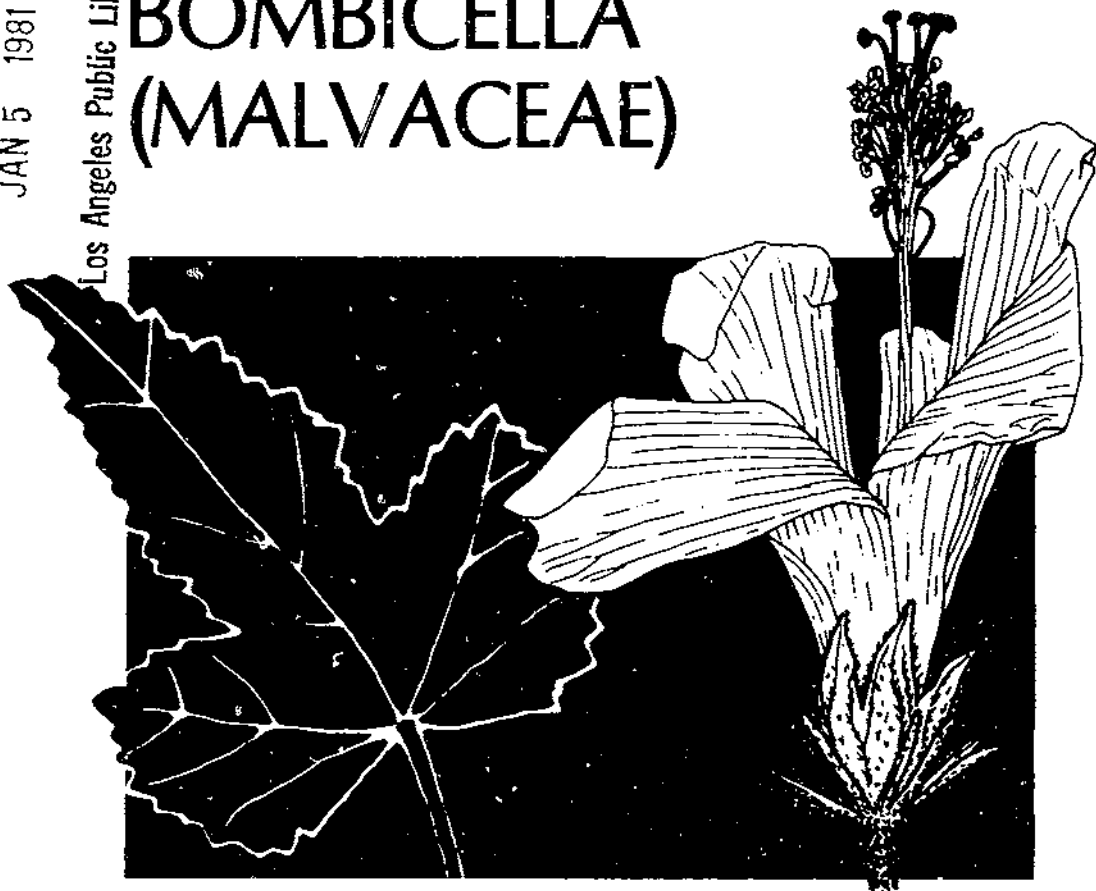
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# A REVISION OF THE AMERICAN SPECIES OF HIBISCUS SECTION BOMBICELLA (MALVACEAE)

By  
PAUL A. FRYXELL



UNITED STATES  
DEPARTMENT OF  
AGRICULTURE

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The research reported in this publication was done in cooperation with the Texas Agricultural Experiment Station.

## ABSTRACT

A REVISION OF THE AMERICAN SPECIES OF HIBISCUS SECTION BOMBICELLA (MALVACEAE), by Paul A. Fryxell. U.S. Dep. Agric. Tech. Bull. 1624.

Twenty-one species of *Hibiscus*, seven of them newly described, are treated. They range in distribution from the southern United States (Florida, Texas, New Mexico, Arizona) to northwestern South America (Venezuela to Peru), including the West Indies and Central America. All but one of the species occur in Mexico, which is the area of principal development of the section. Chromosome counts ( $2n=22$ ) are known for six of the species. Most of the species are subshrubs of relatively arid habitats, and most have showy (though sometimes small) flowers. The colors may be bright yellow, scarlet, lavender, or sometimes white. One lavender-flowered species (*H. lavateroides*) has been cultivated as a garden ornamental to a limited extent. Some of the scarlet-flowered species have exerted genitalia similar to *Malva viscus* and *Periptera*, three groups that well may have common pollinators. Other species of section *Bombicella* from beyond the Americas (Africa, Asia, Australia) are not treated in the present work. Keywords: *Bombicella*, Central America, *Hibiscus* spp., Malvaceae, North America, South America, systematic botany, West Indies.

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Issued November 1980

# A Revision of the American Species of *Hibiscus* Section *Bombicella* (Malvaceae)

By Paul A. Fryxell<sup>1</sup>

The genus *Hibiscus* L. is pantropical and subtropical in distribution, with some species extending into the Temperate Zones, especially those of section *Muenchhusia* (Fabr.) Blanchard. The genus was treated comprehensively by Willdenow (1800) and de Candolle (1824) and was monographed by Hochreutiner (1900), but these treatments are now obsolete in many respects. Subsequent treatments have been largely regional (Rakshit & Kundu, 1970; Roe, 1961; Rodrigo, 1948) or have dealt only with a segment of the genus (e.g., Wilson, 1974; Blan-

chard, 1976). Keys to the North and South American species of *Hibiscus* have been published (Kearney, 1955, 1957), and various floras are available that include the genus as represented in the areas covered by those floras (e.g., Gürke, 1892; Standley, 1923; Hauman, 1963; Correll & Johnston, 1970). But I am aware of no revisionary study subsequent to Hochreutiner's of 1900 that has dealt with the group reported here. Of the 21 species included here, 12 are new since Hochreutiner's revision, including 7 proposed in the present treatment.

HIBISCUS sect. BOMBICELLA de Candolle, Prodr. 1: 452. 1824.

Based on: *Bombix* Medikus, Malv.-Fam. 44. 1787. Type species: *Hibiscus phoeniceus* Jacquin. *Bombycella* (DC.) Lindley, Veg. Kingd. ed. ii. 370. 1847.

Synonym: *Hibiscus* sect. *Cremonia* Commerson ex de Candolle, Prodr. 1: 446. 1824. Lectotype species (here designated): *Hibiscus spiralis* Cavanilles. *H. spiralis* is chosen as the lectotype of *Hibiscus* section *Cremonia* because the description of the section given by de Candolle emphasizes the malvaviscoid corolla, which, of those species included by him, is best expressed by *H. spiralis*.

Small perennial shrubs 0.5-2 m tall, heterotrichous, often with grayish bark on older stems. Stems often green, terete, glabrate or with sparse to dense pubescence, the hairs simple and sometimes scabrid, stellate and few to many-armed (tufted or appressed, the appressed hairs in certain species 4-armed, the arms oriented 2-by-2 parallel with the stem axis), or simple, minute, and recurved, the recurved hairs, when present, occurring in 2 narrow

lines decurrent on the stems from the base of the stipules. Leaf blades simple, lobed, or deeply parted (often trifoliate in *H. coulteri*), glabrate or stellate-pubescent, the hairs on the upper surface often sparser and fewer-armed (sometimes simple) than those on the lower surface, concolorous or discolorous, with an obscure nectary or nectariferous zone at the base of the midrib beneath, coarsely to finely serrate to crenate or subentire, cordate, truncate, or cuneate, acuminate, acute or obtuse, palmately 3-7-nerved. Petioles approximately equaling lamina to much shorter than lamina, usually with pubescence like that of stem, sometimes in addition with zone of minute, simple, recurved hairs on

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adaxial side. Stipules subulate to linear, pubescent or glabrous, sometimes erect, persistent, and spiniform, often with a condyloid base. Peduncles in the axils of the leaves, solitary (except in sessile glomerules in *H. purpusii*), up to 18 cm long, usually with pubescence like that of stem, sometimes in addition with a row of minute, simple, recurved hairs on adaxial side, generally articulated 0.4–2.5 cm below flower, the pedicel often more densely pubescent above the articulation. Bracts of the involucrel (6–)8–10(–20), usually distinct but sometimes connate at base, persistent, often arcuate, variously pubescent, sometimes prominently ciliate-hispid, linear, lanceolate, or spatulate, shorter than to longer than calyx (in *H. denudatus* much shorter than calyx or wholly suppressed). Calyx gamosepalous, deeply to shallowly 5-lobed, campanulate to cylindrical or even slightly urceolate; lobes short-triangular to long-acuminate, shorter to much longer than the tube, more or less prominently 3–5-nerved, variously pubescent, sometimes prominently ciliate with pungent hairs, sometimes brownish, sometimes yellowish toward base of tube, greenish otherwise, rarely with reddish pigmentation on tips of lobes. Petals yellow, white, lavender, rose, or scarlet, with or without a dark spot at base, usually showy and exceeding the calyx, the corolla rotate, campanuliform, or cylindrical (malvaviscoid), usually ciliate or bearded on claw, internally glabrous, externally glabrous or somewhat pubescent, especially where exposed in bud. Androecium included or exserted, the column glabrous or pubescent, usually pallid (rarely purplish), surmounted by 5 sterile teeth, antheriferous in upper portion or nearly throughout; filaments often paired or otherwise associated, glabrous, 1–5 mm long (except 10–18 mm in *H. longifilus*); anthers usually numerous, pallid (sometimes lavender or reddish); pollen yellow-orange or red-orange, spheroidal, echinate. Styles 5, more or less exserted from staminal column, free distally, connate proximally (within staminal column), usually pallid, glabrous or pilose, ultimately recurving; stigmas capitate, often purplish, short-pubescent. Fruits capsular, ovoid to oblong, 5-loculed, when immature pale green with 5 longitudinal dark-green stripes opposite the septa (alternate with the sutures of dehiscence) becoming straw-colored at maturity, glabrous or pubescent, the hairs stellate or simple and antrorsely strigose, completely dehiscent loculicidally, the carpel walls often flaring widely. Seeds numerous, reniform, sericeous, the hairs equaling or longer than the diameter of the seed, sordid white, tan, or brownish

(or the seed hairs suppressed in *H. cardiophyllus*). Cotyledons cordate, ovate, obtuse or sometimes retuse, the margins ciliate. Chromosome number (where known):  $2n = 22$ .

Section *Bombicella* may be distinguished from other sections of *Hibiscus* by several characters. As the name suggests, the silky-haired seeds are distinctive for their vestiture; however, one species of the section (*H. cardiophyllus*) has the seed hairs suppressed. Species representing other sections sometimes have hairy seeds (e.g., *H. mutabilis* L.), but the hairs are shorter and otherwise different in character.

Most of the species of section *Bombicella* have longitudinally striped immature fruits, 5 dark-green stripes on a paler green background, a pattern that appears to be confined to this group.

Foliar nectaries apparently occur in most or all representatives of this section at the base of the midrib, either as discrete structures or as poorly differentiated nectariferous zones. These nectaries are often obscure in dried specimens because of their weak differentiation, however, and are sometimes further hidden by pubescence. They are more readily demonstrable in living specimens, where the actual exudation of nectar may be observed. The nectaries nevertheless appear to be characteristic of this group, although they also occur in other sections of *Hibiscus*, in other genera of the Malvaceae, and indeed in other families.

The narrow rows of minute recurved hairs that are sometimes found on the stems and on the adaxial sides of the petioles and peduncles of many species of section *Bombicella* are distinctive and are generally not found in other sections of *Hibiscus*. However, they are known to occur in such other genera as *Pavonia*, *Malvaviscus*, and *Kostletzkya* (and also in other families) and so are not unique to section *Bombicella*, simply characteristic of it. These rows of specialized hairs are most strongly expressed in *H. biseptus*, in *H. poeppigii*, and (at least on the petioles and pedicels) in *H. acicularis*. They are weakly or variably expressed in *H. lavateroides*, *H. phoeniceus*, *H. purpusii*, *H. spiralis*, *H. citrinus*, *H. peripteroides*, and *H. ribifolius* and are rarely if at all expressed in the other species.

The distinctive and specialized stellate hairs found on the stems of *H. coulteri*, *H. acicularis*, and *H. elegans* are predominantly appressed and 4-armed with the arms oriented 2-by-2 longitudinally with the axis of the stem. Tendencies toward this specialization occur in a few other species of section

*Bombicella*. Similar hairs are also found, for example, in *Malvastrum coromandelianum* (L.) Garcke and *Sida ciliaris* L. Although they are distinctively specialized, such hairs have not been given a descriptive name as far as I am aware (see Payne, 1978).

A preliminary evaluation suggested that the group of species treated here as a single taxon, section *Bombicella*, in fact represents two or more constituent taxa: one comprising the yellow-flowered species with linear involuellar bracts; another the red-flowered species with tubular corollas and exerted genitalia; and perhaps a third including the lavender- to red-flowered species with open corollas, included genitalia, and broader involuellar bracts. These patterns do tend to be three modal expressions, exemplified by *H. coulteri*, *H. poeppigii*, and *H. longifolius*, respectively. But a consideration of all of the species and all of the characters shows that the variation is not discontinuous. Most of the characters studied bridge these three "groups" in such a way that it is impossible to distinguish them clearly. Therefore, they are not distinguished but are merged into a single broad taxon, treated here as section *Bombicella*.

In addition to the American species that are the subject of this paper, *Hibiscus* sect. *Bombicella* apparently includes some Australian species (e.g., *H. brachysiphonius* F. Muell.) and a number of African species (see Exell, 1961, species treated as Series *Bombycella*, and Hauman, 1963, species treated as Group V), of which the polymorphic *H. micranthus* Linn. fil. is perhaps the best known. Many of these species have the number of bracts in the involuellar reduced to 5-8 (as they are in the Mexican *H. purpusii*); nearly all of the species have the distinctive

long silky hairs on the seeds and other characters of the section. Chromosome numbers have been reported (Skovsted, 1941; Bates, 1976) for four of the American species (*H. biseptus*; *H. phoeniceus*, as *H. brasiliensis*; *H. cardiophyllus*; and *H. denudatus*), all of which have  $2n = 22$ . The same number has also been found in *H. lavateroides* and *H. poeppigii* (O. J. Blanchard, Jr., in a letter to me, 1977). Chromosome numbers have been reported for four of the African species (Skovsted, 1941), one of which (*H. pusillus* Thunberg) also has  $2n = 22$ . The others, however, have been reported as  $2n = 32$  (*H. mutatus* N. E. Brown, *H. ferrugineus* Cavanilles) or  $2n = 64$  (*H. micranthus*). Moreover, Blanchard reports (in the same letter) that the Australian *H. brachysiphonius* has  $2n = 54$ . This karyological polymorphism indicates the need for additional chromosome counts in the section and for the correlating of this karyological data with morphological and other information to determine natural species groupings.

The American species of *Hibiscus* sect. *Bombicella* have become adapted principally to two habitats. Although these two habitats are distinct in their extreme expressions, ecological intergradations exist between them. On the one hand, certain species (e.g., *H. ribifolius*, *H. denudatus*, *H. coulteri*) are adapted to desert habitats of extreme aridity and generally grow in fully exposed localities. On the other hand, other species (e.g., *H. phoeniceus*, *H. peripteroides*, *H. kochii*) tend to occur in shady habitats, usually in seasonally dry woodlands. The plants are often low, sparingly branched, and few-leaved; they are thus often inconspicuous, especially as understory shrubs in the woodland habitat, except when their brightly colored flowers are visible.

#### Key to the American Species of *Hibiscus* sect. *Bombicella*

See figure 1 for pubescence characteristics.

- A. Corolla yellow (Mexico, Arizona, and Texas) . . . . . B.
- A. Corolla rose, lavender, pink, red, or sometimes white (West Indies, Florida, Texas, and Mexico to South America) . . . . . I.
  - B. Petals yellow-green, less than 1 cm long; capsules 5-7 mm long, sessile in axillary glomerules (Veracruz and Oaxaca) . . . . . 2. *H. purpusii*, p. 10.
  - B. Petals bright-yellow, at least 1.5 cm long; capsules 6-16 mm long, solitary, pedunculate . . . . . C.
- C. Calyx 6-8(-9) mm long; petals ca. 2 cm long, lacking dark basal spot; capsules antrorsely strigose (western Mexico) . . . . . D.
- C. Calyx 8-28 mm long; petals 2-4.5 cm long, basal spot sometimes present . . . . . E.

- D. Involucellar bracts exceeding the calyx; peduncles 1-8 cm long; petioles up to 25 mm long (Sinaloa and Sonora) . . . . . 5. *H. citrinus*, p. 14.
- D. Involucellar bracts subequal to calyx; peduncles 0.5-1.8 cm long; petioles no more than 5 mm long (Jalisco and Edo. México) . . . . . 3. *H. jaliscensis*, p. 10.
- E. Calyx usually less than 2 cm long; capsules often antrorsely strigose at least at apex . . . . . F.
- E. Calyx more than 2 cm long; simple hairs on calyx and involucl often more than 2 mm long; capsules usually glabrous. . . . . H.
- F. Stem hairs stellate, 3-6-armed; calyx with stellate hairs; capsule densely strigose throughout, 9-16 mm long (Baja California) . . . . . 4. *H. ribifolius*, p. 12.
- F. Stem hairs appressed, 4-armed; calyx with simple hairs (1.0-)1.5-2 mm long or subglabrous; capsule sparsely strigose at apex (rarely glabrous), 7-12 mm long . . . . . G.
- G. Stigmas 1.2-1.7-mm diam., with villi to 1 mm long; filaments 2.5-3 mm long; stem hairs yellowish; petals 2.5-4.5 cm long; corolla in bud externally stellate-pubescent (central Mexico)<sup>2</sup> . . . . . 8. *H. elegans*, p. 22.
- G. Stigmas to 1-mm diam., with villi less than 0.5 mm long; filaments 1.5-2 mm long; stem hairs silvery white; petals 2-4 cm long; corolla in bud externally glabrous (northern Mexico and southwestern U.S.)<sup>3</sup> . . . . . 9. *H. coulteri*, p. 23.
- H. Bracts of the involucl 9-11; stem hairs spreading, dimorphic, sometimes pungent; leaves usually palmately parted; petioles up to 6 cm long (northwestern Mexico and Arizona) . . . . . 7. *H. biseptus*, p. 19.
- H. Bracts of the involucl 10-15(-20); stem hairs appressed, 4-armed; leaves lanceolate to hastately 3-lobed; petioles up to 2 cm long (northern Mexico) . . . . . 6. *H. acicularis*, p. 16.
- I. Androecium and stigmas notably exserted<sup>4</sup> at anthesis; corolla more or less tubular; calyx lobes usually shorter than the calyx tube . . . . . J.
- I. Androecium and stigmas included or approximately equaling the petals; corolla campanuliform or rotate; calyx lobes as long as the calyx tube or longer . . . . . P.
- J. Capsule stellate-hispid throughout (Florida, West Indies, eastern Mexico, and Guatemala) . . . . . 10. *H. poeppigii*, p. 27.
- J. Capsule glabrous or antrorsely strigose, at least at apex (Mexico) . . . . . K.
- K. Bracts of the involucl markedly stipitate-spatulate, 2-4.5 mm wide; calyx lobes rounded to obtuse, densely hispid . . . . . 11. *H. nelsonii*, p. 30.
- K. Bracts of the involucl linear to weakly spatulate, 0.5-3 mm wide; calyx lobes acute . . . . . L.
- L. Involucl basally condyloid; styles with long (1-mm) white hairs; stigmas prominent (more than twice the diameter of the style); bractlets narrowly lanceolate to weakly spatulate; petioles more than 10 mm long (Edo. México and Distrito Federal) . . . . . 12. *H. spiralis*, p. 32.
- L. Involucl basally rounded; styles glabrous; stigmas inconspicuous (only twice the diameter of the style); bractlets linear; petioles 3-7 mm long . . . . . M.

<sup>2</sup>See discussion of leaf shape under *H. elegans*.

<sup>3</sup>See discussion of leaf shape under *H. elegans*.

<sup>4</sup>Several of these species are apparently protogynous, with the styles and stigmas being first exserted and the staminal column elongating subsequently.



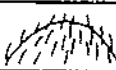







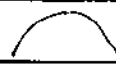
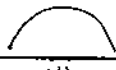


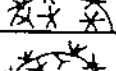




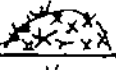


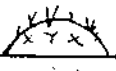
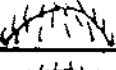

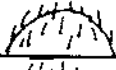



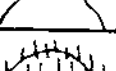
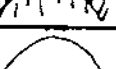
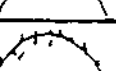
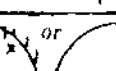
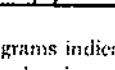
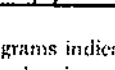

	STEMS	UPPER LEAF SURFACE	LOWER LEAF SURFACE	FRUITS
<i>H. phoeniceus</i>	X X X X 		Y L X	
<i>H. jaliscensis</i>	X X X		X X L	
<i>H. ribifolius</i>	Y X X	L X	L X X	
<i>H. citrinus</i>	L X X		L Y	
<i>H. biseptus</i>	L Y X 		Y L	
<i>H. acicularis</i>	X X	L Y	L Y	
<i>H. coulteri</i>	X X	X X L	X X Y	
<i>H. elegans</i>	X X	Y L X	L X	
<i>H. purpusii</i>	X X	L X X	Y X	
<i>H. poeppigii</i>	L X 		L Y	
<i>H. lavateroides</i>	L X X X		L X	
<i>H. escobariae</i>	Y X X 	 Y X	L Y X	
<i>H. nelsonii</i>	X X	X X X	+ X X	
<i>H. spiralis</i>	L X X X		L X	
<i>H. peripteroides</i>	Y X X		L X	
<i>H. colimensis</i>	Y X X	L X X	Y + X	
<i>H. acapulcensis</i>	L X X X	X +	+ X	
<i>H. kochii</i>	+ X	X X	X +	
<i>H. longifolius</i>	* *	* * *	* *	
<i>H. cardiophyllus</i>	* *	* *	* *	
<i>H. denudatus</i>	*	*	*	 or 

FIGURE 1. — Pubescence characters in neotropical species of *Hibiscus* sect. *Bombicella*. The diagrams indicate the kinds of hairs present and their orientation or lack of it, but not their size or density, or whether they may be lost in age, the tissue becoming glabrate. The minute lines of curved hairs (symbolized as ) present on the stems (and petioles and peduncles) are indicated only in those species where they are prominent or reliably present; they are also variably present in several other species. In all cases, consult the extended descriptions for details.

- M. Involucel 13-17 mm long; calyx slightly urceolate with dark-tipped lobes . . . N.
- M. Involucel 9-14 mm long; calyx cylindrical with green lobes . . . O.
- N. Capsule glabrous, 10 mm long, included in urceolate calyx; peduncles 1-3 cm long, articulated 8-14 mm below flower; petals glabrous; stipules 4-7 mm long; involucellar bracts connate basally for 1-1.5 mm (Guerrero) . . . 15. *H. acapulcensis*, p. 35.
- N. Capsules antrorsely strigose, 12 mm long; peduncles 0.5-2 cm long, articulated 4-7 mm below flower; petals stellate-pubescent externally; stipules 5-13 mm long; involucellar bracts nearly distinct (Oaxaca) . . . 16. *H. kochii*, p. 38.
- O. Bracts of the involucel basally connate for 2-4 mm, 1-3 mm broad; leaves finely dentate, ca. 4-5 teeth per cm (Oaxaca) . . . 13. *H. peripteroides*, p. 32.
- O. Bracts of the involucel distinct, 1-1.5 mm broad; leaves coarsely dentate, 1-2 teeth per cm (Colima) . . . 14. *H. colimensis*, p. 35.
- P. Capsules stellate-pubescent apically; calyx 9-12 mm long; petals 3-4 cm long, lavender to nearly white . . . Q.
- P. Capsules glabrous or antrorsely strigose; calyx 6-30 mm long; petals 1-4 cm long, whitish, lavender, or red . . . R.
- Q. Calyx 16-19 mm long; peduncles 2-8 cm long; involucellar bracts spatulate, 3 mm broad in flower to 5.5 mm broad in fruit; anthers yellowish, the filaments 2-4 mm long; styles with scattered hairs . . . 17. *H. lavateroides*, p. 40.
- Q. Calyx 12-16 mm long; peduncles 0.5-2 cm long; involucellar bracts linear, 0.5-0.8 mm broad; anthers dark-red, the filaments 1 mm long; styles glabrous (Ecuador) . . . 18. *H. escobariae*, p. 42.
- R. Bracts of the involucel linear and subulate, sometimes absent; corolla rose or lavender (sometimes white); calyx 6-15 mm long . . . S.
- R. Bracts of the involucel lanceolate, oblanceolate, or spatulate; corolla bright-red; calyx 15-30 mm long . . . T.
- S. Stems and foliage moderately pubescent to glabrate, the stellate hairs with fewer than 6 radii; bracts of the involucel well-developed but variable, often exceeding the calyx (West Indies and Mexico to northern South America) . . . 1. *H. phoeniceus*, p. 6.
- S. Stems and foliage densely yellow-pubescent, the stellate hairs with 6-10 radii; bracts of the involucel suppressed, much shorter than the calyx or sometimes absent (northwestern Mexico, southwestern United States) . . . 21. *H. denudatus*, p. 47.
- T. Peduncles less than 3.5 cm long at anthesis; petioles less than 1/2 the length of lamina; involucellar bracts often 1/2 the length of calyx or less at anthesis; androecium equaling corolla, the filaments 10-18 mm long; seeds sericeous (central Mexico) . . . 19. *H. longifolius*, p. 42.
- T. Peduncles 4-11 cm long; petioles more than 1/2 the length of lamina; involucellar bracts more than 1/2 the length of calyx at anthesis; androecium included, the filaments 2-5 mm long; seeds subglabrous (northern Mexico and Texas) . . . 20. *H. cardiophyllus*, p. 45.

1. *Hibiscus phoeniceus* Jacquin, Hort. Vindob. 3: 11. t. 14. 1776. Type: *Jacquin s.n.* (BM). *Bombix phoenicea* Medikus, Malv. Fam. 44. 1787.

*Hibiscus betulifolius* H.B.K., Nov. Gen. Sp. 5: 292. 1823.  
Type: prope Cumaná, *Humboldt & Bonpland* 1125 (B).

Herb. Willd. as IDC microfiche; P, as IDC microfiche).  
*Hibiscus phoeniceus* var. *albiflorus* Gürke, Mart. Fl. Bras. 12(3): 567. 1892.

*Hibiscus cavanillesianus* H.B.K., Gen. Sp. Nov. 5: 290. 1823.  
Type: in ripa fluminis amazonam, prope Tomependa, *Humboldt & Bonpland* 3609 (P, as microfiche).

*Hibiscus columbinus* Moc. & Sessé ex de Candolle, Prodr. 1:

452. 1824. Type: Fl. Mex. Icon. Inedit. No. 78, as IDC microfiche.

*Hibiscus sylvaticus* Bentham, Pl. Hartw. 114. 1843. Type: ECUADOR: in sylvis prope Guayaquil, Hartweg 639 (K, 2 sheets). *Hibiscus brasiliensis* var. *sylvaticus* (Benth.) Hochr., Annuaire Conserv. Jard. Bot. Genève 4: 88. 1900.

*Hibiscus neglectus* Wright in Sauvalle, Anal. Acad. Ci. Méd. Habana 5: 240. 1868. Type: CUBA: al lado del río en Santa Catalina Guantanamo, Wright s.n. (K).

*Hibiscus rigidus* Moc. & Sessé, Pl. Nov. Hisp. ed. ii. 105. 1893 (non Linn. fil., 1781).

*Hibiscus violaceus* Brandegee, Zoe 5: 211. 1905. Type: MEXICO: SINALOA: Culiacán, 1 Oct 1904, Brandegee s.n. (holotype: UC; isotype: US).

*Hibiscus iochromus* Brandegee, Univ. Calif. Publ. Bot. 3: 385. 1909. Type: MEXICO: PUEBLA, Purpus 3527 (holotype: UC; isotypes: BM, MO, US).

*Kosteletzkya bracteosa* M. E. Jones, Contr. W. Bot. 15: 147. 1929. Type: MEXICO: SINALOA, Jones 22863 (POM).

Distribution: West Indies and Mexico to northern South America, from near sea level to 1,000 m. *Hibiscus phoeniceus* has not been reported from Brazil, except for a probably cultivated specimen from Porto Alegre, Brazil: Jan 1898, Reinecke s.n. (O).

Shrub 1–1.5 m tall. Stems green, sparsely pubescent (to glabrate), the hairs stellate, 3–5(–7)-armed, appressed, small (the arms 0.5 mm long), sometimes also with narrow lines of simple curved hairs decurrent from the stipules. Leaf lamina lanceolate to ovate, sometimes 3-lobed or 3-parted, subcordate to truncate, serrate or crenate, acute or sometimes acuminate, up to 10 cm long, 6 cm broad (usually much smaller), palmately 3–5-nerved, with a nectariferous zone at base of midrib, on lower surface sparsely stellate-pubescent, the hairs predominantly 3-armed (sometimes 4–5-armed), minutely scabridulous on veins, the upper surface sparsely stellate-pubescent to glabrate, the hairs tending to be smaller, fewer-armed, and preferentially (antrorsely) oriented but sometimes with simple antrorse hairs 1 mm long predominating. Petioles 0.5–3 cm long, usually  $\frac{1}{2}$  (to  $\frac{1}{2}$ ) the length of lamina, on adaxial side with prominent row of simple curved hairs, otherwise sparsely stellate-pubescent. Stipules linear, 4–8 mm long, erect and rigid, with a condyloid base, more or less persistent, sparsely pubescent to glabrate. Peduncles solitary in the axils, 0.5–6(–9) cm long, often articulated below the middle (4–25 mm below the flower), sparsely stellate-pubescent or scabridulous to glabrate. Involucel of 8–9 bracts, equaling or exceeding (rarely shorter than) the calyx, 8–15(–20) mm long; bracts linear 0.5–1(–2) mm broad, acute, green, 1(–3)-nerved, minutely scabridulous to glabrate, distinct, persistent. Calyx 6–10 mm long, green, ca.  $\frac{2}{3}$ -

divided; lobes acute or acuminate, 1–3-veined, minutely stellate-pubescent or hispidulous to glabrate, with ciliate margins. Corolla lavender (sometimes white), rotate; petals (0.6–)1–2 cm long, glabrous within, sparsely stellate-pubescent without where exposed in bud, ciliate on claw. Staminal column glabrous, 4–12 mm long (shorter than petals), pallid, staminiferous through most of length, the filaments 1–2(–4) mm long, rarely secund; anthers yellowish; pollen yellowish to yellow-orange. Styles 5, exceeding staminal column by 1–5 mm (slightly exceeding petals), slender, often reddish, glabrous; stigmas capitate, 0.5–0.9-mm diam., purplish, usually villous. Capsule 9–13 mm long, ovoid to globose, sparsely to densely strigose, the hairs antrorse, dehiscent to the base, the carpel walls spreading widely. Seeds reniform, 2.5 mm long, brownish, densely sericeous, the hairs to 4 mm long, brownish. (Fig. 2.)

*Hibiscus phoeniceus* is relatively variable in such characters as pubescence, leaf form (fig. 2) corolla size, and relative length of calyx and involucl. Its small lavender corollas are characteristic, but variants with pure white corollas are known, for which Gürke published the name *H. phoeniceus* var. *albiflorus*. Such plants do not appear to differ in any character other than corolla color, however, and so are not given taxonomic recognition here. Cleistogamic flowers are occasionally produced, presumably in response to adverse growing conditions.

This species is frequently referred to in the literature as *Hibiscus brasiliensis* Linnaeus (Sp. Pl. ed. ii. 977. 1763, upon which is based *Pavonia brasiliensis* (L.) Spreng. Syst. 3: 100. 1826). This Linnaean name has been rejected by numerous authors in application to this species, a view with which I agree. Linnaeus provides a description and cites Plumier "Spec. 1 ic. 169. f. 1. ?". The absence of a specimen in the Linnaean herbarium and the "?" added by Linnaeus to the Plumier reference make the typification of *H. brasiliensis* problematical. The Linnaean description is too generalized to be helpful in determining the identity of *H. brasiliensis*. Thus, although the Plumier plate appears to represent the species here discussed, it cannot enter into the typification of the species, and the Linnaean name must therefore be considered a nomen dubium because of an inability to typify it satisfactorily. The next oldest name is *H. phoeniceus*, which has been applied to this species by a number of authors, and which can be satisfactorily typified.



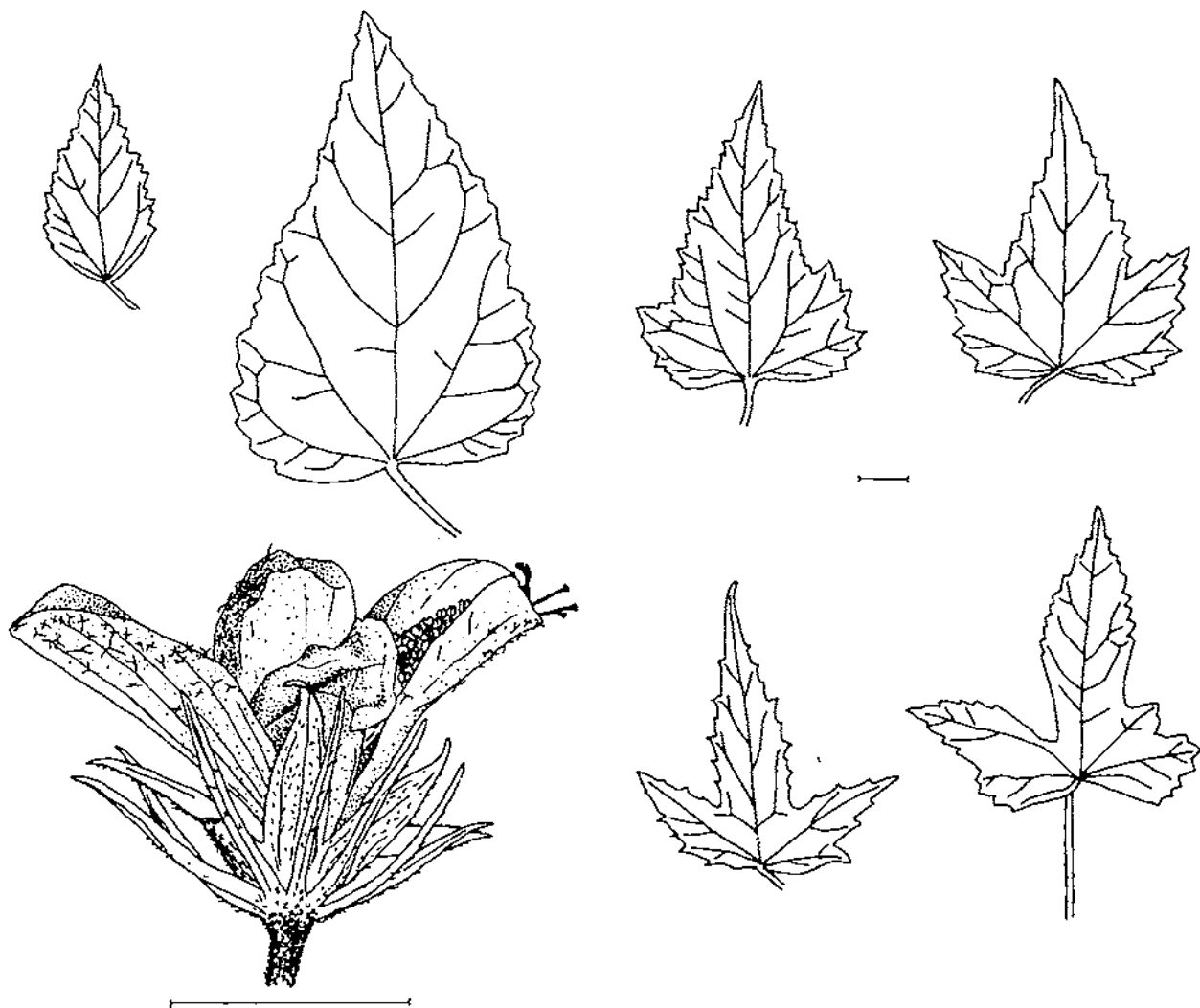


FIGURE 2.—*Hibiscus phoeniceus*. Flower, Ventura 10483. Leaves (above, left to right), Ventura 10483, Fryxell et al. 1594, Koch et al. 78300, Koch & Fryxell 78348; (below, left to right), Koch & Fryxell 78339, Fryxell & Bates 2190. Scale: 1 cm.

Moreover, *H. phoeniceus* is a more happily chosen name than *H. brasiliensis* inasmuch as this species does not occur in Brazil.

Additional specimens examined:

CUBA: WITHOUT LOCALITY: *de la Sagra s.n.* (K). ORIENTE: Wright 1574 (K, MO); 3 km S of Baitiquiri, Guantanamo region, Webster 4043 (MICH); Guantanamo Bay, Britton 1903 (BM, US); Renté, Santiago Ba., Bro. Clemente 5870 (US); vicinity of Daiquiri, Berraea, Britton & Cowell 12669 (MO, US); Sierra Santa María de Loreto, Lopez F. 3024 (US). SANTIAGO: Gibara, Pollard s.n. (US). LAS VILLAS: Fallones de Guajimico, E of Cienfuegos, Morton 10498 (US) 10517 (US). LA HABANA: Cojimar, Bro. Alain 2386 (US).

HAITI: Gonave Isld., Raquette, Eyerdam 137 (US), Etroite, Leonard 3336 (US), Anse Galette, Leonard 3114 (US); Etang Saumatre, Fond Parisien, Leonard 4157 (US), Holdridge 1168 (LL, MICH, US); near Mon Repos, Miller 221 (US); near l'Archahaie, Miller 268 (US); vic. St. Marc, Leonard 2878 (US) 2995 (US); vic. Port-au-Prince, Leonard 2837 (US); W of Cabaret, Baie des Moustiques, Leonard & Leonard 12019 (US) 12031 (US); vic. Port de Paix, Leonard & Leonard 11045 (US); Massif des Matheux, Ekman 9159 (K, LL, US); Dept. du Nord, vic. St. Michel de l'Atalaye, Leonard 7322 (UC, US); Tortue Isld., vic. La Vallée, Leonard & Leonard 11410 (US) 15613 (US).

DOMINICAN REPUBLIC: PROV. SANTIAGO: Valle de Cibao, Ekman 15986 (US); Mao, Abbott 1062 (US); Pastor, Jiménez 1793 (US); Lanos de Rafael ad Santiago, Eggers 1791 (US). PROV. MONTECRISTI: Distr. Moncion, Valeur 159 (US); Manzanilla Bay near Puerto Libertador, Howard & Howard 9643 (BM, US); Guayubín, Abbott 973 (US) 1208 (US). PROV. BARAHONA: Trujín, Abbott 1728 (US); Montaña Nueva, SE of Polo, Howard & Howard 8527 (BM, MICH, US); Barahona, von Türckheim 671 (BR); Azua, Rose et al. 4032 (US).

UNITED STATES: PUERTO RICO: Coamo, near Río Salinas, Sintenis 2981 (BM, K, MO, UC, US); 3 miles W of Ponce, 20 Dec 1902, Heller s.n. (US) 6066 (MO, US); Salinas de Cabo Rojo, Sintenis 613 (K, US), Otero M-2 (MICH); La Vigía, Ponce, Britton et al. 5377 (US); Punta Melones to Punta Casabe, Britton et al. 4666 (US); La Parquera, Sargent 149 (US); Guanica Natl. Forest, Duke 7470 (MO); Guanica, ad Montalba, Sintenis 3548 (BR, K, O); Guanica ad Punta de los Pescadores, Sintenis 3531 (BM, K), ST. CROIX: East-end roadside, Ricksecker 75 (MO) 404 (CAS, MO, UC, US), 8 May 1876, Eggers s.n. (MO). ST. THOMAS: 6 Nov 1882, Eggers s.n. (US), Eggers 731 (BR).

JAMAICA: Kingston, on parade ground, Harris 11873 (BM, CAS, K, MO, US).

MARTINIQUE: Fort-de-France, Hospital Militaire, Stehlé & Stehlé 5717 (US).

BAHAMAS: New Providence, Brace s.n. (K).

MEXICO: TAMAULIPAS: between San Fernando and Tres Pinos, Fryxell & Bates 955 (BH, pf); between Cd. Mante and Antiguo Morelos, Fryxell 1086 (BH, pf); 5 miles E of Nuevo Morelos, Fryxell & Bates 945 (BH, CAS, CTES, ENCB, L, TAES, US, pf); 13 miles N of Aldama, Crutchfield & Johnston 5707A (MICH, TEX); Mesa de Llera, Crutchfield et al. 6086A (TEX); 18 km N of Aldama, Fryxell & Bates 2190 (BH, CAS, CHAPA, MEXU, MSC, pf); Rancho Las Yucas, ca. 40 km NNW of Aldama, Dressler 2046 (MICH); 11 miles SE of Manuel, Fryxell & Bates 836 (BH, pf); Victoria, Palmer 170 (K, MO, UC, US); 35 miles S of Cd. Victoria, Gould 10826 (MICH, UC, TAES, TEX). VERACRUZ: Baños de Carrizal, Purpus 6133 (BM, MO, UC, US);

Mala Zarza, Purpus 9010 (BM); about Lagunas, Nelson 2653 (US); Remudadero, Purpus 8676 (UC); Barranca de Santa María, vic. Zacuapán, Purpus 2236 (MO); El Ranchito, Mpio. de Actopán, Ventura 8375 (ENCB, pf); Chapopote, Mpio. de Actopán, Ventura 10483 (ENCB, pf). SONORA: Canyon Sapopa, Río Mayo, Gentry 1284 (CAS, K, MICH, MO, UC). CHIHUAHUA: La Bufa, SE of Creel, Knobloch 440 (BM, LL, WIS). SINALOA: Culiacán, Palmer 1480 (US); Lodiago, Palmer 1608 (US); Mazatlán, Ortega 6505 (US); Cerro Llano Redondo, W of Caymanero, Gentry 7020 (DS, UC, US) 7098 (DS, UC, US); 46 miles S of Guamuchil, Kinnach & Lyons 671 (US); El Monte, near Los Labrados, Mexía 936 (UC). AGUASCALIENTES: W of Aguascalientes on road to Calvillo, McVaugh 18316 (MICH). JALISCO: W of Tequila, on road to La Toma, Fryxell et al. 1594 (BH, MEXU, pf). MEXICO: Distr. Temascaltepec, Platanal, Hinton 6211 (BM, K). GUERRERO: Acapulco, Lyonnnet & Chávez 3277 (US); 2 miles W of Colotlipa, Rowell 3725 (MICH, TAES). PUEBLA: Tehuacán area, near Coxcatlán on Cerro Ajuereado, Smith et al. 3585 (US). OAXACA: Picacho San Gerónimo, Purpus 6893 (BM, MO, UC, US); 25 km al N de Juchitán, Koch, Fryxell & Cowan 78300 (BH, BR, CAS, CHAPA, CTES, ENCB, K, UMO, WIS, pf); Mpio. San Miguel Chimalapa, Koch & Fryxell 78348 (BH, BM, CAS, CHAPA, CTES, ENCB, F, NY, pf), 78355 (CHAPA, ENCB, pf). CHIAPAS: 27 miles W of Cintalapa, Breedlove 9949 (DS, pf); 5 km W of Rizo de Oro, Breedlove 36722 (DS); 3-5 km SE of Ocozocoautla, Breedlove 31217 (DS, pf).

GUATEMALA: DEPT. ZACAPA: El Progreso, 43 km from Guatemala City, Harmon & Dwyer 3488 (MO); Gualán, 15 Jan 1905, Deam s.n. (MICH).

EL SALVADOR: DEPT. SAN VICENTE: vic. San Vicente, Standley 21380 (US). DEPT. AHUACHAPAN: vic. Ahuachapán, Standley 19939 (US).

HONDURAS: DEPT. CHOLUTECA: entre Tolobre y Los Achiotres, Montaña Tapahuasca, Molina 14202 (LL, US); entre Morolica y San Antonio de Flores, Molina 13027 (LL).

NICARAGUA: DEPT. JINOTEGA: between Jinotega and Las Mesitas, W of Jinotega, Standley 9801 (US). DEPT. MASAYA: Parque Nacional Volcán Masaya, near W shore of Laguna de Masaya, Neill 3053 (MO, pf).

COSTA RICA: PROV. GUANACASTE: Santa Rosa Natl. Park, Opler 1765 (pf); vic. Libano, Standley & Valerio 44889 (US).

PANAMA: Isld. of Taboga, Sinclair s.n. (K).

CURACAO: Groot St. Martha, Arnoldo 1862 (US).

GUYANA: Moritz 1037 (O).

VENEZUELA: ARAGUA: Maracay, Krapovickas 15567 (CTES, UC, pf), Cornelio 19 (US), Pittier 5786 (US); San Juan de Los Morros, Alston 6014 (BM). CARABOBO: near Puerto Cabello, Pittier 6433 (US) 9072 (US), 1893-94, Macquers s.n. (US); between Puerto Cabello and San Estebán, Pittier 8195 (US). MIRANDA: Guarenas Valley, Pittier 11911 (US). FALCON: Dept. Federación, Hacienda Rancho Grande, Lasser & Vareschi 2769 (CAS). SUCRE: Cumaná, Funcke 14 (K), Moritz 531 (BM). DISTRITO FEDERAL: Caracas, Linden 1597 (K). MERIDA: prope coloniam Tovar, Fendler 102 (K).

COLOMBIA: BOYACA: Sotó, Cuatrecasas 1067 (US). ATLANTICO: Luruaco, Bro. Apolinar Angel 775 (US); entre Juanmina y Cuatrobocas, Dugand 4029 (US); Barranquilla, Bro. Elias 439 (US) 927 (US) 1116 (CAS, US). MAGDALENA: region El Callao, Hova del Río Cesar, Cuatrecasas & Castenada 24901 (US); Cerrejón Haught 3889 (US) 6702 (CAS, US); Santa Marta, Smith 467 (BM, BR, CAS, MICH, MO, UC, LL, US). LA GUAJIRA: between Cuestecita and Carripiá, Cuatrecasas & Castenada 25520 (US). ANTIOQUIA: Río Negro, Triana s.n. (BM).

ECUADOR: GUAYAS: 21 km SW of Guayaquil, *Worth & Morrison 8945* (K, UC, US). EL ORO: vic. Santa Rosa, *Rose & Rose 23496* (US); between Santa Rosa and La Chorrera, *Hitchcock 21154* (US); entre Puerto Pitahaya y Arenillas, Prov. de El Oro, *Escobar 1251* (HUA, QCA, TEX, pf).

PERU: DEPT. CAJAMARCA: Pucará, *Woytkowski 5663* (US); *Hutchison & Wright 3523* (UC); Río Marañón opposite Balsas, *Hutchison & Wright 5443* (MO, UC, US). DEPT. LORETO: Caballo-Cocha, *Williams 2373* (US). DEPT. TUMBES: S of Quebrada Angostura at Hualtaco, *Simpson & Schunke 500* (F).

2. *Hibiscus purpusii* Brandege, Univ. Calif. Publ. Bot. 6: 368. 1917. Type: MEXICO: VERACRUZ: Zacuapan, Fortín, Feb 1916, *Purpus 7546* (lecto-type: UC; isotypes: GH, MO, US); syntype: *Purpus 7545* (UC).

Distribution: Veracruz and Oaxaca, Mexico, at about 400 m elevation.

Shrubs, the stems becoming woody with grayish, striated bark; twigs with lines of dense pubescence (the hairs recurved) decurrent from the stipules and with a few minute appressed stellate hairs elsewhere, soon glabrate. Leaves ovate or elliptic, 4–15 cm long, 2–8 cm broad, 2–3 times as long as broad, truncate, obscurely crenate to dentate, acuminate, palmately 3–5-nerved, the nerves raised beneath, the midrib with an obscure nectariferous zone near base, nearly glabrous above and beneath or with scattered stellate hairs, pilose in axils of main veins beneath. Petioles 4–12 mm long, densely pubescent on adaxial surface. Stipules 5–6 mm long, rigid, glabrous, caducous. Flowers sessile or subsessile in axillary glomerules of 1–6 flowers. Involucel of 6–8 bracts briefly connate at the base, 3–4 mm long, linear-lanceolate, stellate-pubescent. Calyx 6 mm long, ca.  $\frac{3}{4}$ -divided, the lobes ovate, acute, 1-nerved, sparsely stellate-pubescent. Corolla 7–9 mm long, greenish-yellow, with a few scattered stellate hairs externally, glabrous internally, prominently ciliate on claw. Staminal column 3–4 mm long, glabrous; filaments ca. 2 mm long; anthers pallid (are these staminate flowers?). Capsule oblate to ovoid, 5–7 mm long, dehiscent, densely covered with large stellate hairs (the radii 1 mm long), but these easily broken off leaving a more or less glabrous fruit, longitudinally fluted because suture opposite the septum between the carpels, lacking internal hairs along suture of dehiscence. Seeds 2.5 mm long, reniform, blackish with silky pubescence, the hairs creamy-white, 4 mm long. (Fig. 3.)

*Hibiscus purpusii* is evidently rare, judging by how few specimens are to be found in herbaria. The

*Purpus* collecting locality, Remudadero, is cited by Sousa (1969) as at 19°14'N, 96°34'W; the type locality (Fortín, Zacuapam) is in the same vicinity. The Reko collection from (the vicinity of) Pochutla, at 15°45'N, 96°26'W, represents a significant disjunction, notable in a plant that is apparently rare.

The species is also exceptional for its dioecy and for its obscure, sessile, glomerulate flowers. Concerning the dioecy, however, a clear picture of the floral dimorphism in this species is not yet available.

Additional specimens examined: MEXICO: VERACRUZ: Remudadero, *Purpus 9007* (GH, 2 sheets; UC, US). OAXACA: Pochutla, *Reko 6109* (GH).

### 3. *Hibiscus jaliscensis* Fryxell, sp. nov.

Caules virelli, sparse vel moderate stellato-pubescentes, pilis cum 1–6 brachiis usque ad 1 mm longis, saepe plus minusve adpressis. Folia (non bene evoluta in hoc specimine) 15–20 mm longa, 8–10 mm lata, truncata, simplicia, in  $\frac{3}{4}$  parte apicali remote dentata, acuta, supra sparse pubescentia pilis plerumque simplicibus, infra moderate stellato-pubescentia, pilis 3–4-brachiatis. Petioli 2–5 mm longi, stellato-pubescentes. Stipulae (3–)6–9 mm longae, filiformes basibus aliquantum tumidis, erectae, glabratae, persistentes et aliquantum lignosae. Pedunculi axillares, 5–18 mm longi, dense stellato-pubescentes. Bracteolae involucrorum 7–10, distinctae, lineares vel plus minusve spatulatae, 1-nervatae, pubescentes pilis simplicibus atque stellatis, (4–)8–12 mm longae, 1.0–1.5 mm latae (ad basim angustior), calycem plus minusve aequantes vel parum excedentes. Calyces 7–8 mm longi, 5-lobati, stellato-pubescentes, pilis 3–4-brachiatis, ca.  $\frac{1}{2}$ -divisi, ad basim flavidi, in lobis viridibus, lobis intus glabris praeter in marginibus lanatis. Petala lutea (sine macula ad basim), extus sparse stellato-pubescentia ubi in alabastro exposita, cetera glabra, 17–22 mm longa. Columna staminalis glabra, pallida, 5–6 mm longa; filamenta 1–2 mm longa; antherae pallidae; pollen luteum. Styli pallidi, androecium per 3–6 mm excedentes, apice 5-partiti; stigmata capitata, fere 1-mm diam., atomarronina, villosa. Capsulae ellipsoideae, 6–12 mm longae, 7–10-mm diam., antrorse strigosae ubique vel praecipue ad apicem, strigis 0.5–1.0 mm longis. Semina aliquot per loculum, reniformia, 2.5–3.0 mm longa, dense pilifera, pilis usque ad 5 mm longis, basaliter brunneolis, apice albidis. (Fig. 4.)

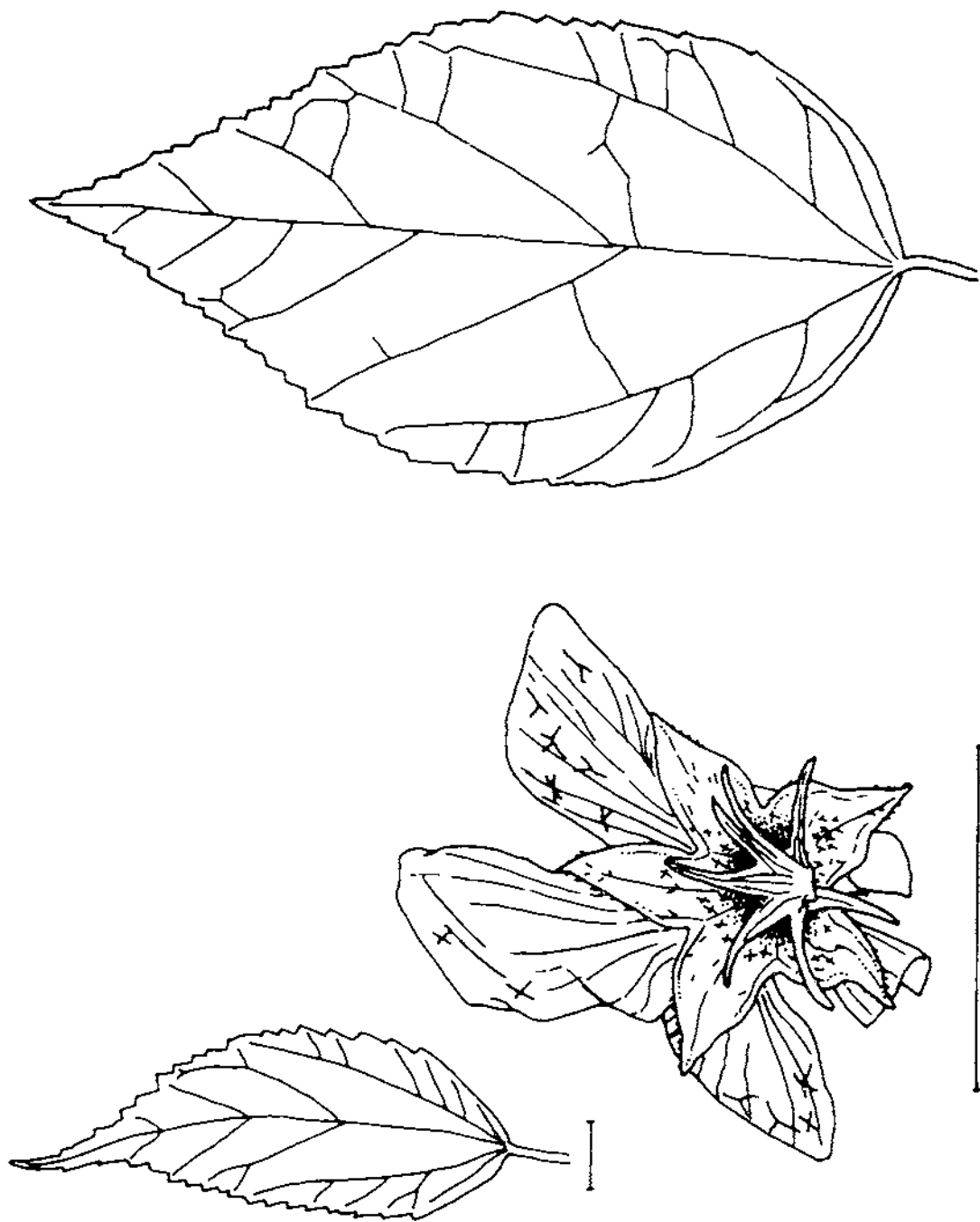


FIGURE 3.—*Hibiscus purpusi*. Leaves (left to right), *Purpus* 7546, *Purpus* 9607. Flower, *Purpus* 7546. The petals are yellow-green; the calyx is yellowish (brownish at base). Scale: 1 cm.

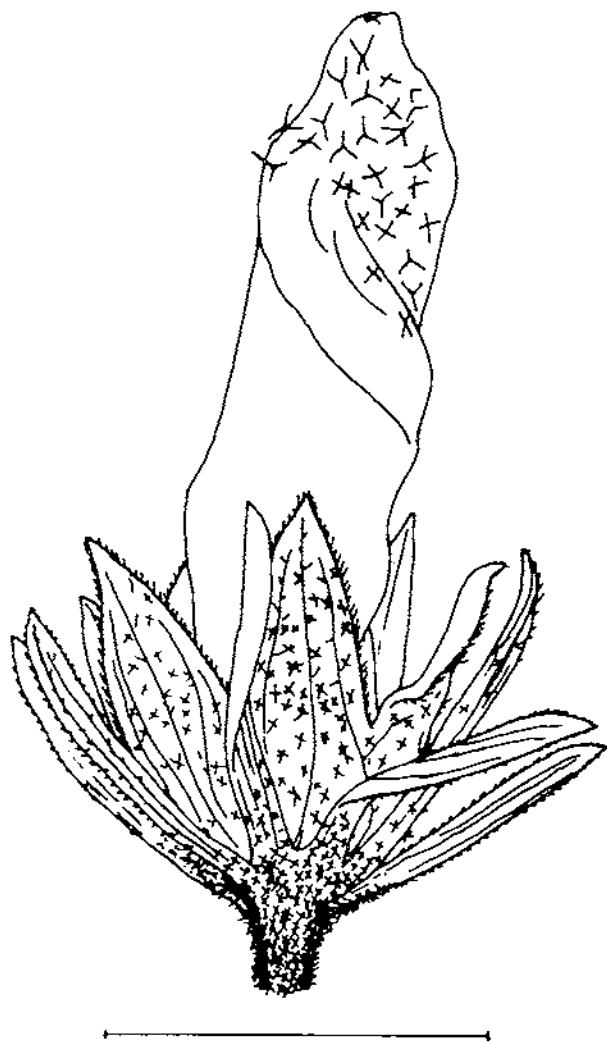


FIGURE 4.—*Hibiscus jaliscensis*. Flower, McVaugh 22904. Scale: 1 cm.

Types: MEXICO: JALISCO: steep hills, deciduous forest now leafless, 3–15 km by road south of Jilotlán, with *Bursera*, *Randia*, *Acacia*, *Cordia*; elevation ca. 800 m. Locally abundant. Slender shrub to 1.5 m high; flowers clear yellow; seeds with sordid coma, 9–10 Mar 1965, McVaugh 22904 (holotype: MICH; isotypes: ENCB, pf); Mpio. de Tenamaxtlán (?) about halfway between Tecolotlán and Juchitlán; rolling hills, grasslands with *Acacia*, many agaves, elev. 1140 m; scarce, 1 Feb 1975, McVaugh 26042 (paratype: MICH). MEXICO: Distr. Temascaltepec, Acatlán, Hutton 7578 (paratypes: K, MICH, LL, UC, US). WITHOUT LOCALITY: Sessé & Mocino s.n. (BM).

Distribution: at present known only from the collections cited above at elevations of 800 m to 1,140 m (fig. 5).

This new species is distinctive for its short pedicels, its small calyx and corolla, and its prominently strigose capsules, in combination with yellow flowers.

4. *Hibiscus ribifolius* A. Gray, Proc. Amer. Acad. Arts 5: 154. 1861. Type: MEXICO: BAJA CALIFORNIA: Cape San Lucas, Xantus 11 (holotype: GH; isotypes: NY, US).

Distribution: southernmost Baja California, Mexico, from near sea level to 300 m (fig. 5).

Shrub to 1.5 m tall. Stems stellate-pubescent, the hairs 3–6-armed, the hairs tufted (neither appressed nor oriented preferentially with the axis of the stem). Leaf lamina ovate or weakly 3-lobed, up to 2 cm long, somewhat longer than broad, basally subcordate or truncate, crenate or dentate, usually acute, palmately 5(–7)-nerved with a nectariferous zone at base of midrib beneath, dispersed-pubescent beneath (the hairs 3–5-armed, the arms 0.5–0.8 mm long) or sometimes glabrate, the upper surface nearly glabrous except on veins. Petiole 5–8 mm long, with stellate pubescence like that of stem but in addition with zone of simple recurved hairs on adaxial surface. Stipules 2–9 mm long, erect, glabrate, persistent. Peduncles solitary in the axils of the leaves, 2–3 cm long, sparsely stellate-pubescent and with poorly defined row of simple, recurved hairs on adaxial surface, articulated ca. 1 cm below flower, the pedicel above the articulation more densely pubescent. Bracts of the involucre ca. 8, linear-lanceolate or weakly oblanceolate, 8–11 mm long, 1–1.5 mm wide, acute. Calyx 8–11 mm long,  $\frac{2}{3}$ -divided, sparsely to densely stellate-pubescent. Petals 3(–3.5) cm long, yellow (fading rose), without basal spot, essentially glabrous (but claw not observable). Staminal column pallid, glabrous, 8 mm tall; filaments 3–4 mm long; anthers < 1 mm long; pollen yellow. Styles exceeding staminal column by 8 mm, united below, free for distal 3–4 mm, pallid; stigmas capitate, purple, villous, 0.7–0.9 mm broad. Capsule 9–16 mm long, antrorsely strigose. Seeds 2.5–3 mm long, brownish, sericeous, the hairs 3 mm long, sordid. (Fig. 6.)

*Hibiscus ribifolius* is distinctive for its relatively large capsules that are prominently strigose. It occurs in the extremely arid Cape region of Baja California.

Additional specimens examined: MEXICO: BAJA CALIFORNIA: Cabo San Lucas, Rauh 25469 (SD), Howell 10501 (CAS, DS), Gentry & Fox 11840 (DES, MICH, USF); Todos Santos, Jones 24702 (MO) 24202 (US) 24142 (F, MICH, MO, SD, UC, US), 21 Jan 1890, Brandegee s.n. (US); 4 miles S of Todos Santos, Harbison 3 (SD); San José del Cabo, Brandegee 63 (NY, UC, US), 17 Oct 1899, Brandegee s.n. (NY, RM, SD, UC), Gander 9734 (CAS, SD); Cape Region, 1 km E of Arroyo de los

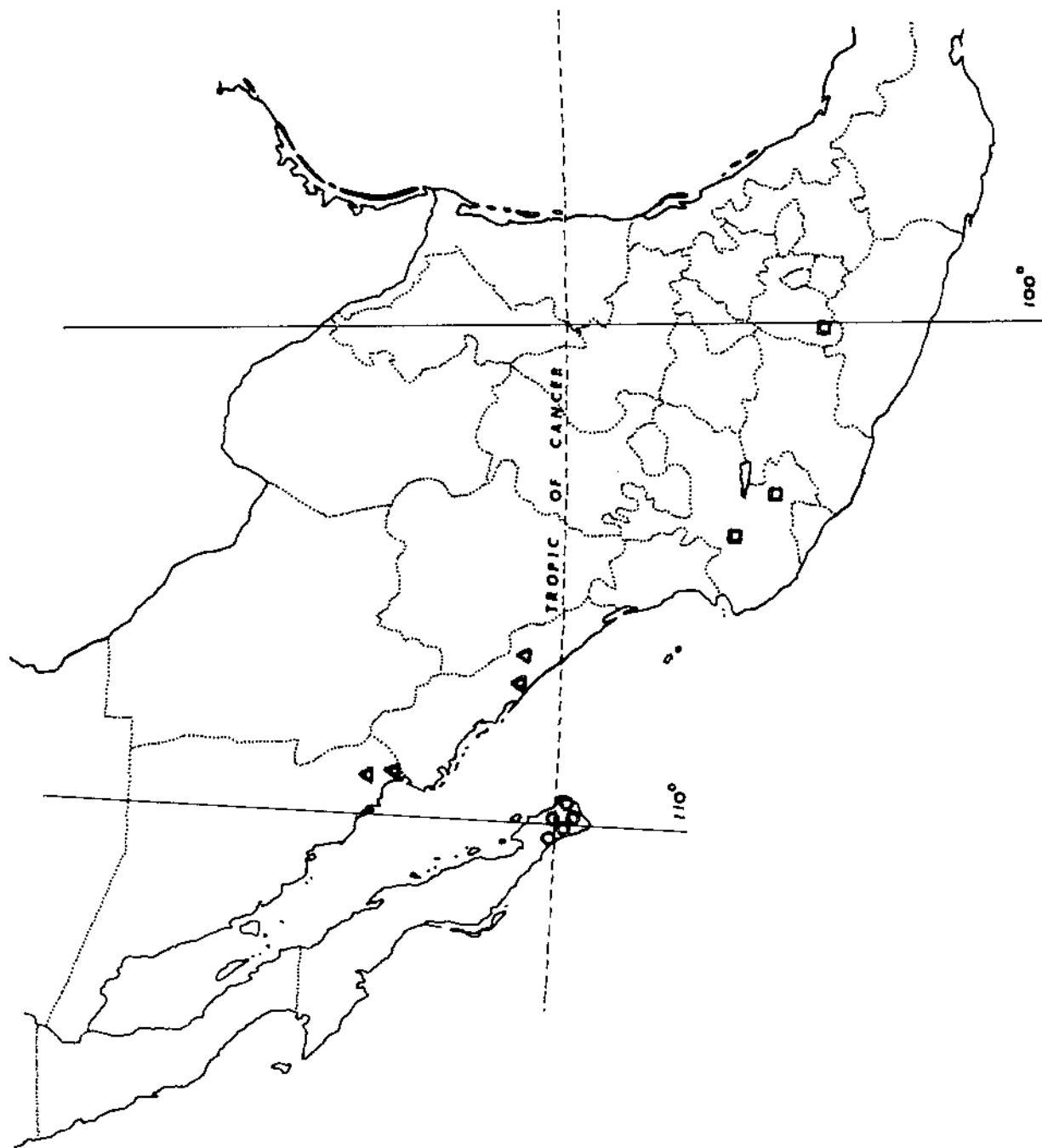


FIGURE 5.—Distribution of *Hibiscus jaiscentis* (□), *H. ribifolius* (○), and *H. citrinus* (△).

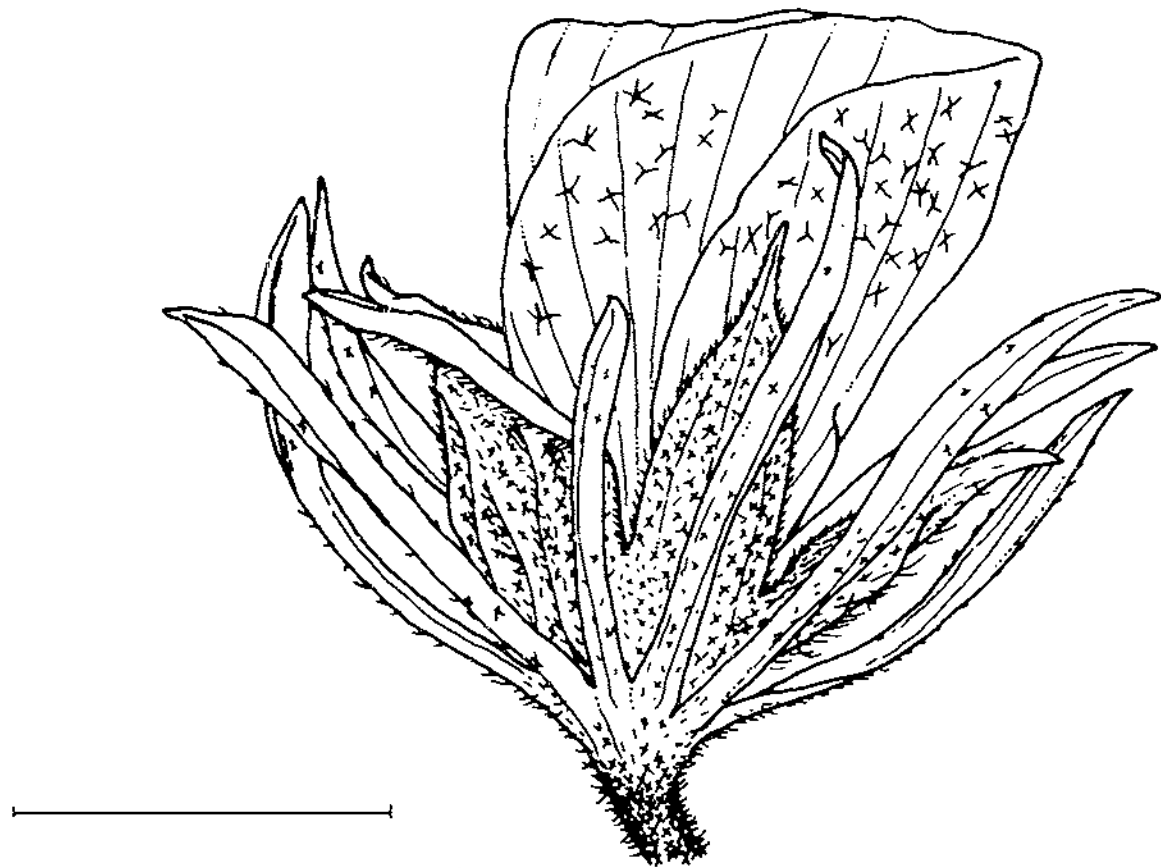


FIGURE 6—*Hibiscus ribifolius*. Flower, Jones 24142. Scale: 1 cm.

Pozos, Moran 6893 (CAS, DS, SD, TEX); 8 km S of Pescadero, Moran 7023 (CAS, DS, SD); 3.5 miles N of Cabo Pulmo, Chambers 866 (DS, UC); W of La Paz, Porter 424 (CAS, DS); San Xavier Mission, 14 Apr 1955, Norland s.n. (SD); Sierra de la Laguna, 27 Jan 1890 Brandegee s.n. (US); Agua Verde, Collins et al. 209 (US); 3.5 miles E of San Bartolo, Porter 288 (DS); between La Paz and Santo Domingo, Thomas 8456 (DS); Arroyo Teombó, SW of Loreto (25°24'N, 111°24.5'W), Carter & Kellogg 3261 (DS); Isla Espíritu Santo, Wiggins 16122 (DS, US).

##### 5. *Hibiscus citrinus* Fryxell, sp. nov.

Frutex erectus usque ad 1 m altus. Caules virentes, teres, sparse stellato-pubescentes, pilis 0.5–1.0-mm diam., plerumque 4-brachiatis, (brachiis binatim parallelis ad axem caulis adpressis dispositis). Folia ovata vel anguste lanceolata, saepe hastata, truncata, palmatim (vel interdum pedatim) 3–5-nervata, irregulariter dentata praeter ad br sim integra, acuta, usque ad 8.5 cm longa, 6.0 cm lata, aliquantum discoloria, supra sparse stellato-pubescentia (pilis antrorsis) vel glabrata, infra sparse

stellato-pubescentia, pilis persistentibus, plerumque 3-brachiatis, pilis in nervis antrorse 1–3-brachiatis. Petioli usque ad 2.5 cm longi (ca.  $\frac{1}{3}$ – $\frac{1}{5}$  longitudinem laminarum), stellato-pubescentes caulis similis atque zona pilorum simplicium recurvorum in facie adaxiali. Stipulae rigidae, filiformae, 4–10 mm longae, persistentes, glabratae. Pedunculi axillari, solitarii, 1–8 cm longi, stellato-pubescenti caulis similis praeter distaliter pilis densioribus, articulati; pedicelli 3–7 mm longi, ad apicem flavidi. Bracteolae involucrorum ca. 9, distinctae, angustae lanceolatae, 8–15 mm longae, 0.5–1.5 mm latae, 1–3-nervatae, moderate pubescentes. Calyces 6–9 mm longi, basaliter flavidi, moderate pubescentes, 5-lobati, lobis acuminatis, 1-nervatis. Petala ca. 2 cm longa, 1.2–1.5 cm lata, ubique citrina vivida, glabra. Columna staminalis glabra, pallida, 5–6 mm longa; filamenta pallida, 1–3 mm longa; antherae pallidae, 0.6 mm longae; pollen luteum. Styli 5, distaliter liberi per 4 mm proximaliter coaliti, graciles, androecium excedentes per 5–11 mm; stigmata capitata, villosa, marronina, 0.7-mm diam. Capsula 5-

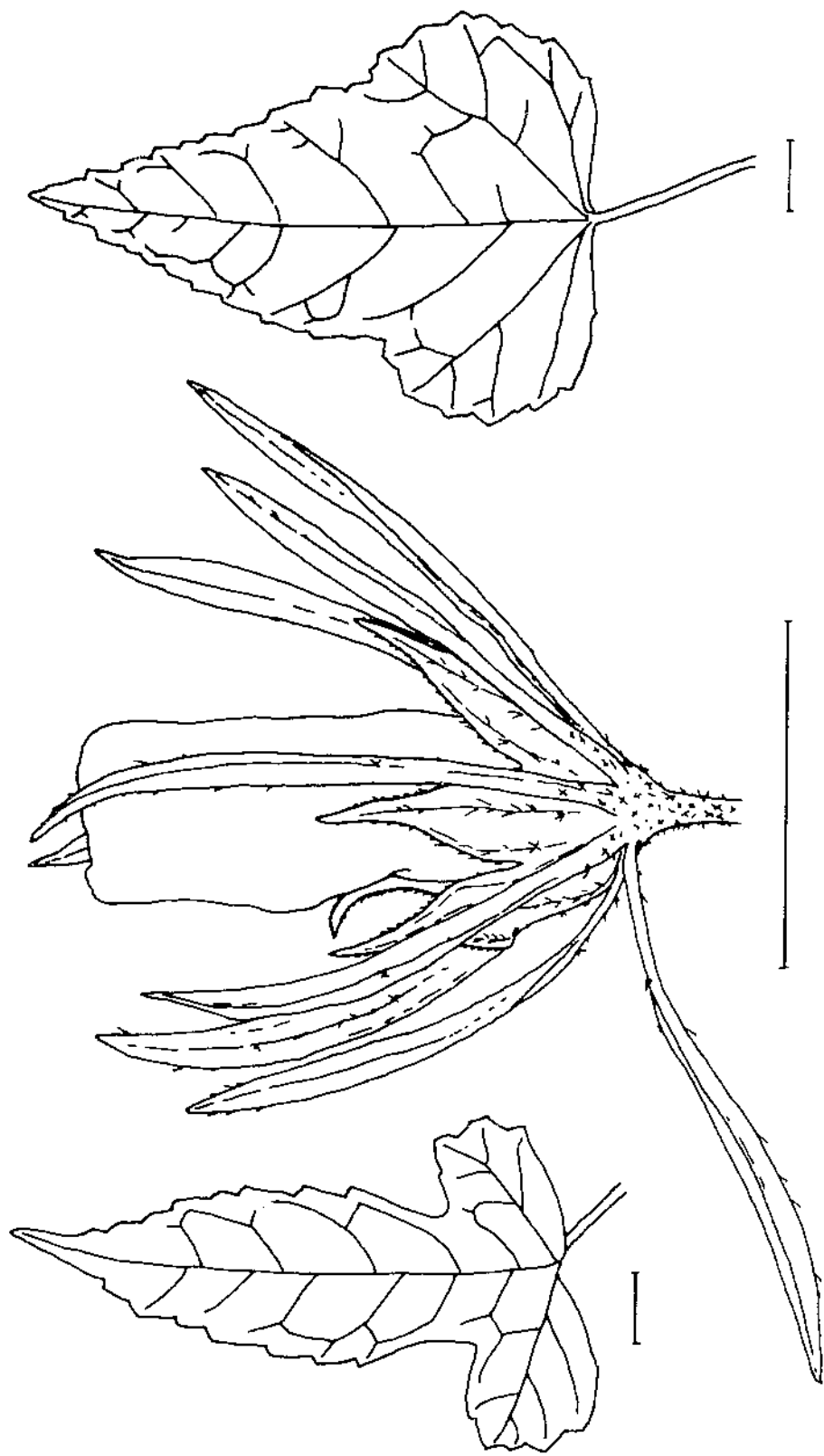


FIGURE 7.—*Hibiscus citrinus*. Leaves and flower. Fryxell & Bates 2118. Scale: 1 cm.



cellularis, 8–12 mm longa, subglobosa, ubique vel in dimidio distali antrorse strigosa, vittis perviridibus longitudinalibus (saltem ante maturitates), dehiscentes ad basem et demum patentes. Semina ubique dense pilifera, 2.5 mm longa, reniformia, fusca, aliquot per loculum; pilis usque ad 5 mm longis, sordidis vel albidis praeter prope basim infuscatis. (Fig. 7.)

Types: MEXICO: SINALOA: 24 km SW of San Ignacio (at K9) on Sinaloa Route 15; alt. 400 ft; erect plant to 1 m; 19 Oct 1972, *Fryxell & Bates 2118* (holotype: BH; isotypes: CTES, pf); Arroyo de Colompos, San Ignacio, *Narcáes Montes & Salazar 58* (paratype: US). SONORA: Agiabampo, 3–15 Oct 1890, *Palmer 776* (paratypes: BM, GH, US); Vinata, Río Mayo, 8 July 1935, *Gentry 1469* (paratype: DS); Canyon Narcissus, 11 Dec 1934, *Gentry 1183* (MICH).

Distribution: at low elevations near the Pacific coast in Sinaloa and southernmost Sonora, Mexico (fig. 5).

This species is distinctive for its pedunculate but relatively small flowers, of a bright lemon-yellow color, whence the specific epithet.

The Palmer collection (No. 776) from Agiabampo was described by J. N. Rose as a probably distinct species (*Contr. U.S. Natl. Herb.* 1: 308, 1895) but was not given a name. Although the specimen bears a manuscript name by Rose (*Hibiscus longipes*), I am unable to discover that the name was ever published for this plant. The same binomial was later (1924) published by Standley for another species, and therefore Rose's epithet is not taken up here. Another Palmer collection (No. 779) from the same locality is *Hibiscus biseptus*, indicating that the two species are sympatric.

6. *Hibiscus acicularis* Standley, *Contr. U.S. Natl. Herb.* 23: 782, 1923. Type: MEXICO: NUEVO LEON: near Monterrey, *Pringle 13880* (holotype: US; isotype: GH).

Distribution: from Tamaulipas and San Luis Potosí to Chihuahua in northern Mexico, at elevations of 500 m to 1,650 m (fig. 8).

Low perennial shrub, sparingly branched. Stems more or less densely covered with yellowish appressed stellate hairs with 4 arms aligned 2-and-2 longitudinally with the axis of the stem. Leaf lamina lanceolate-ovate or slightly 3-lobed (if lobed, the central lobe predominating), basally subcordate, truncate, or cuneate, coarsely toothed, acute,

up to 4 cm long, about twice as long as wide, palmately 3–5-nerved, with obscure nectariferous zone near base of midrib beneath, with dispersed stellate pubescence beneath (the hairs predominantly 3-armed, the arms up to 1 mm), the hairs on upper leaf surface somewhat fewer and smaller. Petioles 1–1.5 cm long, with appressed pubescence like that of stem and in addition on the adaxial surface a dense row of minute recurved simple hairs. Stipules 4–7 mm long, linear, erect, caducous. Peduncles solitary in the axils of the leaves, 2–6.5 cm long, usually exceeding the subtending leaf, with appressed stellate pubescence like that of stem (but hairs fewer and smaller) and in addition on the adaxial surface a dense row of minute, recurved, simple hairs, articulated 0.5–1 cm below flower, the pedicel above the articulation more densely pubescent. Bracts of the involucre 10–15(–20), linear, 20–26 mm long, ca. 1 mm wide, subequal to calyx, ciliate (hairs ca. 1 mm). Calyx 19–24 mm long, sometimes pallid at base, ciliate (hairs 1–2 mm long), ca.  $\frac{1}{2}$ -divided; lobes lanceolate-acuminate, 3-veined, (2–) 4 mm wide at base. Petals 2.5–3 cm long, yellow with small but prominent purple spot at base, sparingly stellate-pubescent externally where exposed in bud, minutely ciliate on claw, otherwise glabrous. Staminal column ca. 8 mm tall, purplish, glabrous; filaments often purplish, 1–1.5 mm long; anthers purplish, less than 1 mm long, often paired; pollen spheroidal, echinate, yellow-orange. Styles 5, pallid, glabrous, exceeding androecium by 2–4 mm; stigmas purple, villous, capitate, 0.6–0.8-mm diam. Fruits 8–9 mm long, subglobose, glabrous. Seeds 3 mm long, brownish, sericeous, the hairs fine, sordid to brownish, ca. 3 mm long. (Fig. 9.)

Additional specimens examined: MEXICO: TAMAULIPAS: near Victoria, *Palmer 457* (F, K, MO, US); between Jaumave and Victoria, *von Rozynski 355* (F), *McGill, Brown & Pinkava 9704* (ASU); La Tamaulipeca, vic. San Miguel, *Bartlett 10676* (MICH) *10592* (MICH). SAN LUIS POTOSÍ: al E de Núñez, km 84 carretera SLP a Antiguo Morelos, *Rzedowski 5576* (ENCB, MICH); Sierra de Guascamá, *Purpus 5384* (UC). NUEVO LEÓN: 20 miles W of Linares, *Oliver et al. 1109* (MO); 22–25 miles W of Linares, *Correll & Johnston 19790* (LL); W of Bustamante, *LeSueur 282* (TEX); near Monterrey, *Mueller & Mueller 85* (F, TEX), *Orcutt 1145* (US); Lampazos, *Edwards 302* (F); 20.3 miles S of Sabinas Hidalgo, *Mears & Mears 3217* (TEX); Mamulique Pass, 23 miles S of Sabinas Hidalgo, *Crutchfield & Johnston 5460B* (MICH, TEX); Cañon de Portrerillos, Sierra del Muerto, *Johnston et al. 10241i* (TEX). COAHUILA: Múzquiz, Mariposa Ranch, *Marsh 1043* (F, SMU, TEX). CHIHUAHUA: Almadén, *LeSueur 1414* (F).

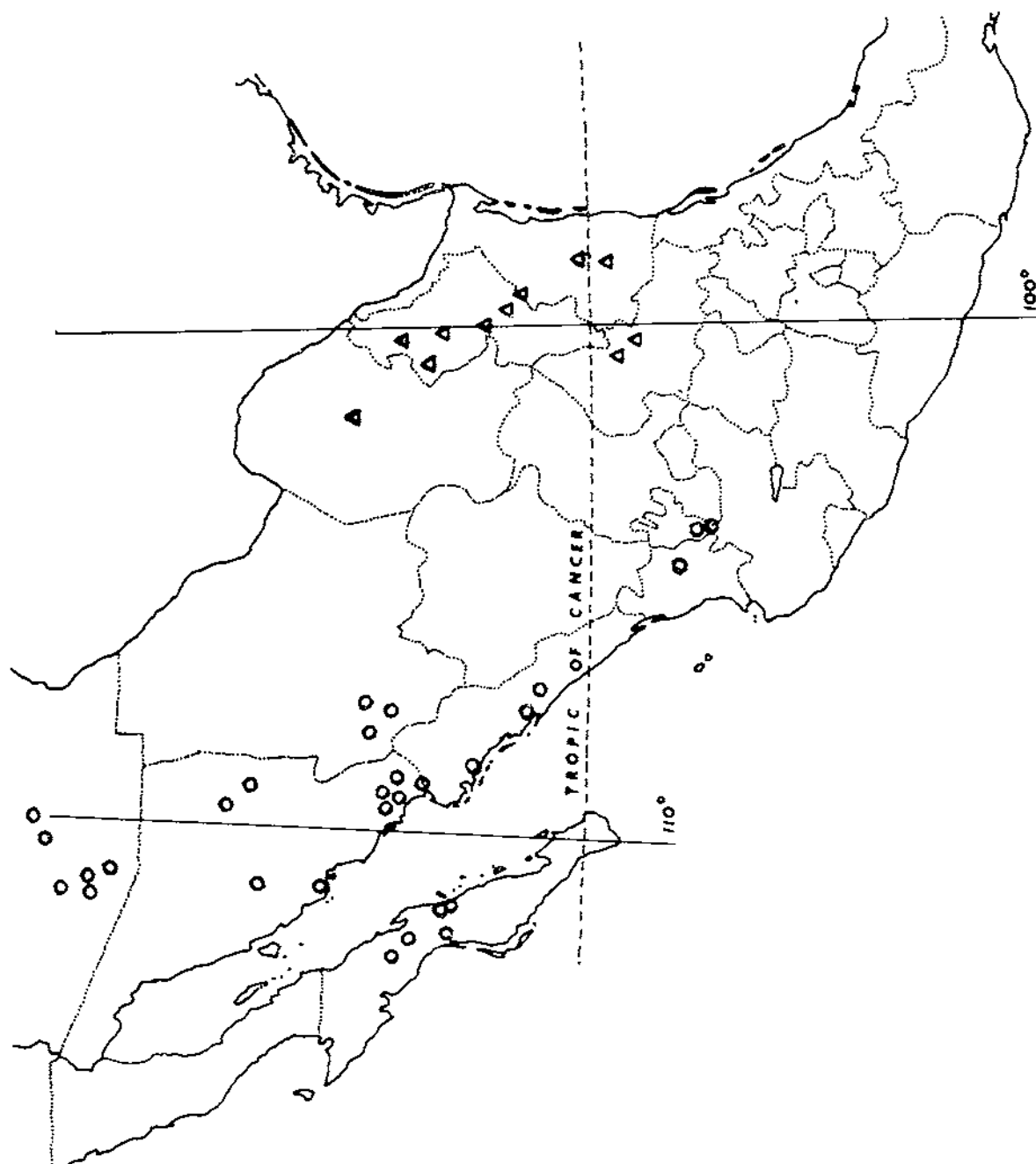


FIGURE 8.—Distribution of *Hibiscus acicularis* (Δ) and *H. biseptus* (O).



FIGURE 9.—*Hibiscus arcutarius*. Flower, *J. Fryxell* s.n. Leaf, *Fryxell* 12689. Scale: 1 cm.

7. *Hibiscus biseptus* S. Watson, Proc. Amer. Acad. Arts 21: 418. 1886. Type: MEXICO: CHIHUAHUA: Hcda. San Miguel near Batopilas, Aug 1885, *Palmer 3* (holotype: GH; isotypes: K, LE, US).

Distribution: southern Arizona, U.S.A., and in Mexico, Baja California south to Jalisco and Nayarit, and eastward into western Chihuahua at elevations up to 1,500 m (fig. 8).

Shrub to 1 m tall. Stems setose with spreading pustular-based simple hairs 1.5–2.5 mm long evenly distributed, or small stellate and scabridulous hairs present, rarely subglabrous, and also with minute recurved hairs in narrow dense lines decurrent from the stipules. Leaf lamina sometimes simple, usually deeply 5-lobed, up to 7 cm long, 7.5 cm broad, truncate or subcordate at base, dentate, with simple strigose hairs (appressed and antrorse) on upper surface, with 3-armed stellate hairs on the lower surface (and simple hairs on nerves), palmately 7-nerved with nectary at base of midrib beneath; leaf lobes narrowed at the base. Petiole to 6.5 cm long,  $\frac{1}{2}$  the length of lamina to nearly equaling lamina, with pubescence like that of stem, the minute recurved hairs on the adaxial surface. Stipules 4–14 mm long, linear, setose, persistent. Peduncles solitary in the axils of the leaves, to 15 cm long, exceeding the subtending leaves, with pubescence like that of stem, the minute recurved hairs on adaxial surface, articulated 0.5–1.5 cm below flower, the pedicel more densely setose above the articulation. Bracts of the involucl 10–11, distinct, linear, 10–30 mm long,<sup>5</sup> setose, the hairs 1–3 mm long. Calyx 12–33 mm long,  $\frac{7}{8}$ -divided, the lobes 4 mm wide, setose, the hairs 1.5–2.5(–4) mm long, sometimes simple, sometimes tufted. Petals 2.5–5 cm long, yellow with purplish spot at base. Staminal column purplish, glabrous, ca. 1 cm tall; filaments purplish, 2 mm long. Styles pallid, exceeding androecium by 5 mm; stigmas capitate, purplish, 0.8-mm diam. Capsule ovoid, 9–14 mm long, glabrous. Seeds 2.5–3 mm long, densely sericeous, the hairs 3–4 mm long, sordid. (Fig. 10.)

*Hibiscus biseptus* is a variable species. It is distinctive for its relatively large, long-petiolate leaves that are usually deeply palmately parted, though they are sometimes essentially undivided. It is distinctive for its relatively coarse, hispid pubescence, but it is sometimes stellate-pubescent and rarely is subglabrous. The lines of recurved hairs on the

stems decurrent from the stipules and on the adaxial sides of the petioles and peduncles are usually well developed in *H. biseptus*, but this characteristic, too, is variable in expression. The size of the calyx and involucl varies, and in this case there appears to be a geographical component to the variability that deserves further study. In specimens from Baja California and Sinaloa the involucl is 10–15 mm long, and the calyx 12–20 mm long. In specimens from elsewhere, the involucl is 18–30 mm long, and the calyx 23–33 mm long.

Cleistogamy evidently occurs in this species and possibly in others as well. Cleistogamic corolla "caps" have been observed attached to immature fruits of *Rose et al. 13312*.

Additional specimens examined:

UNITED STATES: ARIZONA: PINAL COUNTY: Superstition Mtns., LeBarge Canyon, *Lehto 1827a* (ASU); Fish Creek, *Peebles et al. 5245* (US). PIMA COUNTY: Baboquivari Mtns., *Kearney 10392* (US), *Gilman 56* (CAS, F, MO, US), *Harrison 4757* (US), *Hutchison 6795* (DS), *Peebles 8959* (F, US); Baboquivari Canyon, *Peebles et al. 2771* (MO), *Kearney & Peebles 14930* (CAS, US), 19 Sep 1931 *Jones s.n.* (MO, UC); Santa Catalina Mtns., *Townsend 7* (US), *Kearney 10331* (K); Rincon Mtns., above Colossal Cave, *Eastwood 17852* (CAS).

MEXICO: BAJA CALIFORNIA: Loreto, Cayuca Ranch, *Jones 27157* (CAS); Puríssima, 13 Feb 1889, *Brandegee s.n.* (UC, US); road from La Puríssima to Comondú, *Nelson & Goldman 7267* (BM, US); NE side of Cerro Azufre (27°31'N, 112°34'W), *Moran & Reveal 20156* (SD); W side of Concepción Bay, SE of Santispauquis (26°44'N, 111°59'W), *Moran 9047* (SD); San Pablo, *Purpus 39* (UC); San José del Cabo, 2 Sep 1890, *Brandegee s.n.* (UC). SONORA: 15 miles N of Hermosillo, *Wiggins & Rollins 471* (DS, LL, MICH, MO, UC, US); San Bernardo, Río Mayo, *Gentry 1617* (K, MO); Arroyo Gochico above San Bernardo, *Gentry 21995* (US); Chorijoa, Río Mayo, *Gentry 1605* (DES); near Guaymas, *Gould 12078* (TAES), *Drauet & Richards 3890* (CAS, F, US), *Jones 22859* (F, UC), *Rose 1255* (BM, US), *Palmer 668* (US), *Henrickson 2399* (MICH); Canyon de Petaquilla, *White 3318* (MICH); Puerto de los Aseraderos, *White 3091a* (MICH); Horencitos, *White 3747* (MICH); Cañon de Bavispe, *Phillips 523* (MICH); vic. Alamos, *Rose et al. 12717* (US); Agiabampo, *Palmer 779* (BM, K, US). CHIHUAHUA: Río Bonito, *LeSueur 794* (LL, TEX); Barranca de Batopilas, *Bye 7070* (COLO, MEXU, pf); slopes of Barranca de Urique, vic. Areponapuchic (27°30'N, 107°50'W), *Knobloch 1356* (MICH); La Bufa, SE of Creel, *Knobloch 522* (BM). SINALOA: Culiacán, 17 Sep 1904, *Brandegee s.n.* (UC, US); Cerros de Navachiste about Topolobampo, *Gentry 14302* (DES, LL, US), *Palmer 192* (MICH, UC, US); Topolobampo, *Hastings & Turner 84-117* (DS, SD), *Rose et al. 13312* (US); Cerro Llano Redondo, W of Caymanero, *Gentry 7102* (CAS, DES). NAYARIT: Cañon of Jesús María, *Goldsmith 148* (MO, UC, US). JALISCO: 3 km al NW de El Platanar, Mpio. de San Martín de Bolaños, *Rzedowski 26244* (ENCB); Bolaños, *Rose 2906* (K, US); San Juan Capistrano, *Rose 2504* (US).

<sup>5</sup>See following discussion.

(Continued on page 22.)

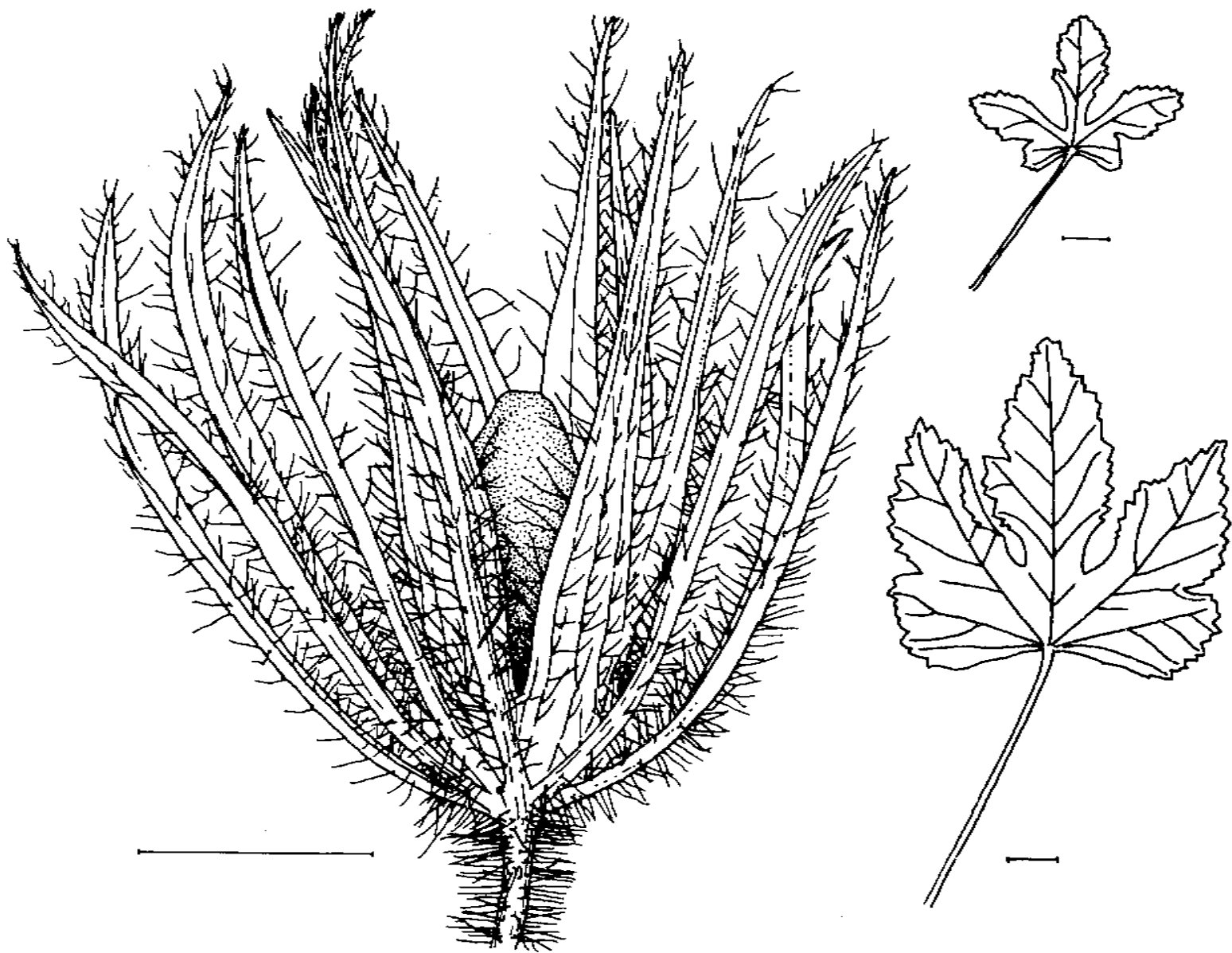


FIGURE 10.—*Hibiscus biseptus*. Flower, Palmer 3. Leaves, Rose et al. 13312 (above) and Palmer 3 (below). Scale: 1 cm.

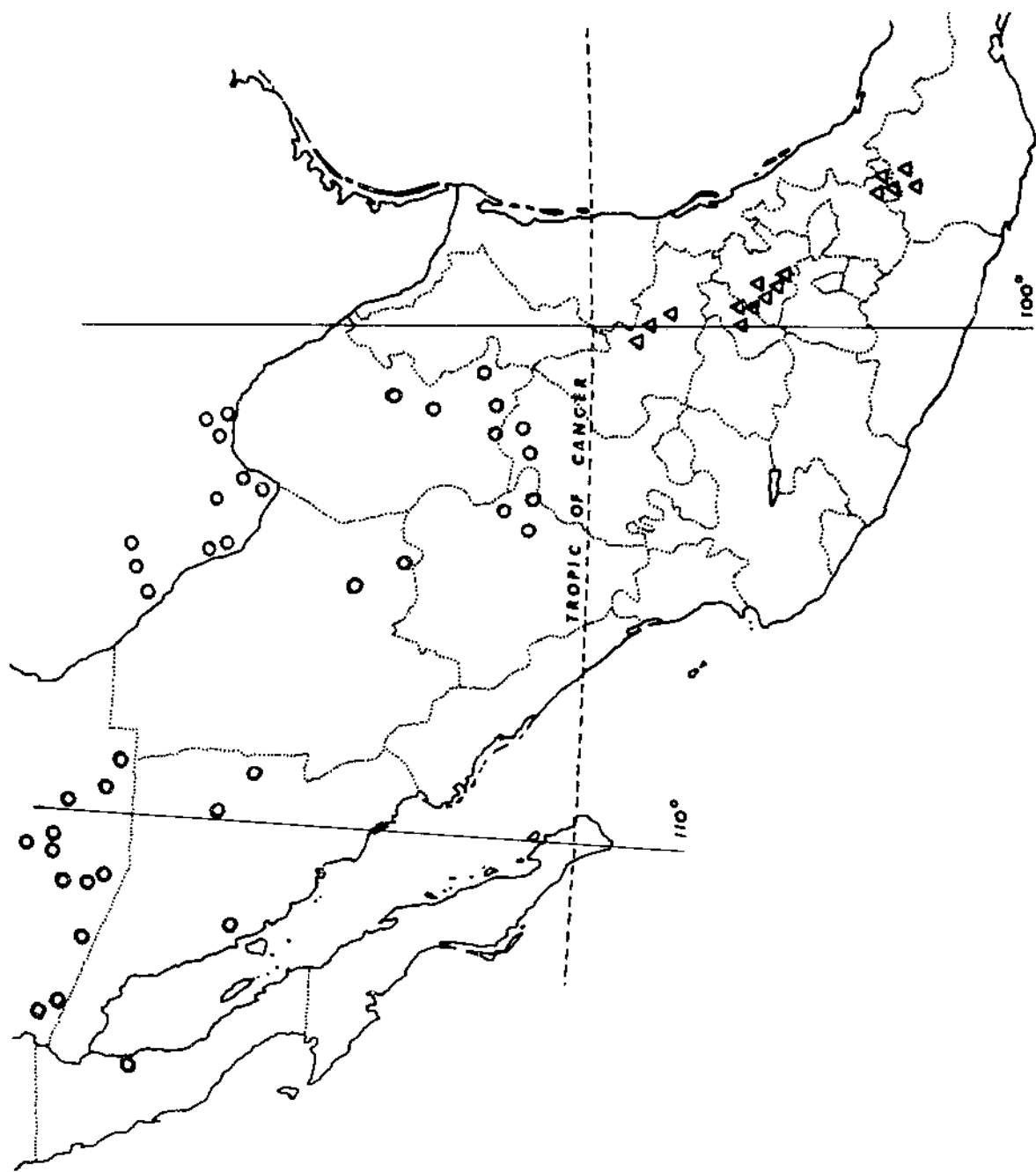


FIGURE 11.—Distribution of *Hibiscus elegans* (Δ) and *H. coulteri* (O).

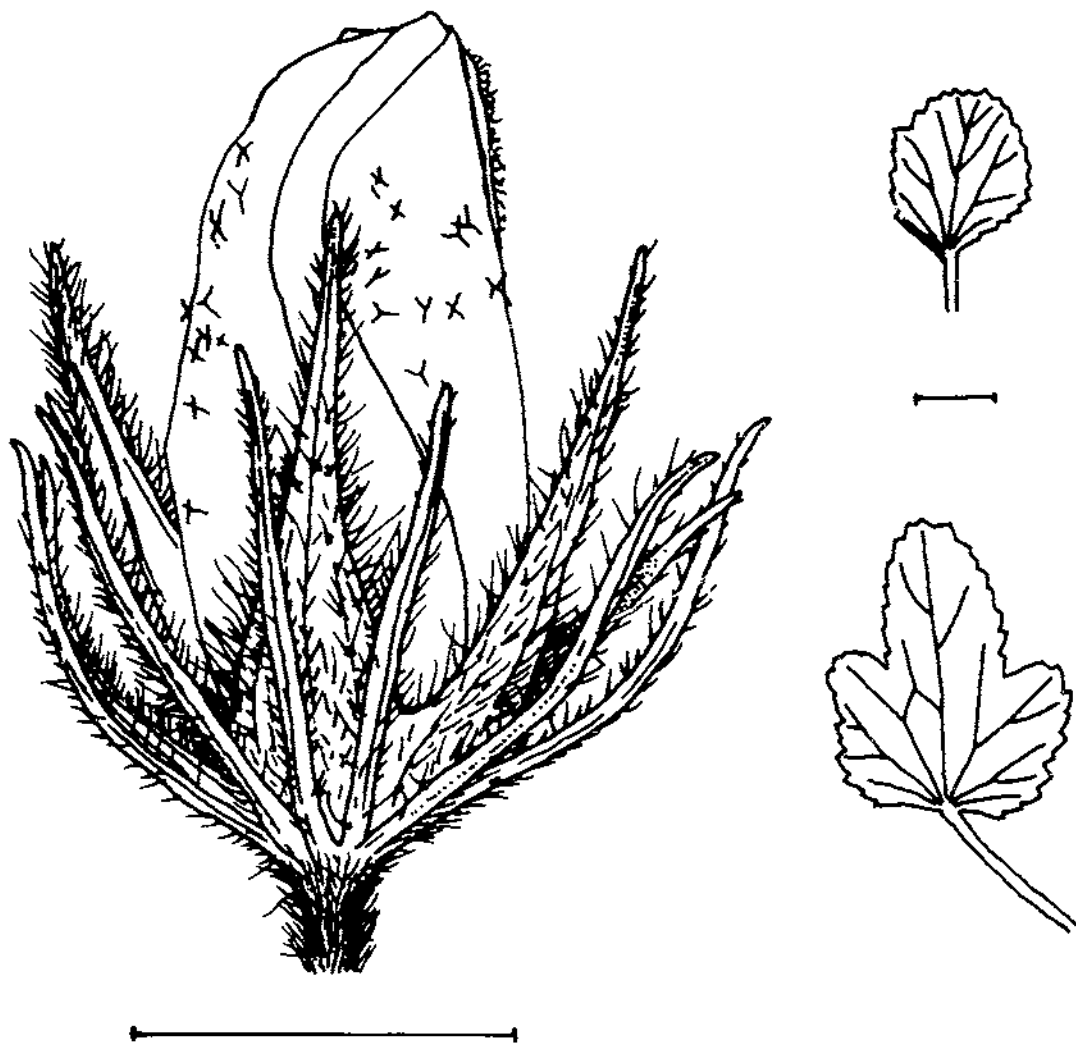


FIGURE 12.—*Hibiscus elegans*. Flower, González Quintero 2898. Leaves, Fryxell 2609 (above) and González Quintero 3096 (below). The calyx is green distally, pallid basally; the involucrel is green (except pallid at very base); the pedicel is yellowish. Scale: 1 cm.

8. *Hibiscus elegans* Standley, Contr. U.S. Natl. Herb. 23: 782. 1923. Type: MEXICO: PUEBLA: near Tehuacán, Pringle 7505 (holotype: US).

Distribution: San Luis Potosí to Oaxaca, Mexico, at elevations of 1,200 to 2,800 m (fig. 11).

Low subshrub, sparingly branched, 0.5–1 m tall. Stems densely stellate-pubescent, the hairs yellowish, mostly 4-armed, more or less appressed and with a tendency for the arms to be oriented longitudinally with the stem axis. Leaf lamina orbicular, elliptic, or ovate, usually simple or somewhat 3-lobed, truncate or cuneate at base, serrate, obtuse or acute, essentially concolorous, up to 4 cm long,

with nectariferous zone at base of midrib beneath, the lower surface with 3- and 4-armed stellate hairs (the arms ca. 1 mm long), the upper surface with smaller and fewer hairs. Petioles with pubescence like stem, 0.5–1.5 cm long. Stipules 2–5 mm long. Peduncles solitary in the axils of the leaves, 3–12 cm long, with pubescence like that of stem, often exceeding subtending leaf. Bracts of the involucrel ca. 9, distinct, hispid, 9–18 mm long, linear. Calyx 11–22 mm long, hispid, deeply 5-parted; lobes ciliate (marginal hairs 1–2 mm), 3-veined, narrowly lanceolate, 3–4 mm wide at base, 9–17 mm long. Petals bright yellow (rarely with purplish spot at base), 2.5–4.5 cm long, usually with stellate hairs externally in bud, ciliate on claw, otherwise gla-

brous. Staminal column 8-10 mm tall, glabrous, pallid (or sometimes purplish if petal spot present); filaments 2.5-3 mm long; anthers often paired, scarcely 1 mm long, pallid; pollen yellow-orange. Style exceeding staminal column by 7-10 mm, dividing to 5 distinct styles for distal 3-4 mm. Stigmas capitate, dark purple, villous, 1.2-1.7-mm diam. Capsule 10-12 mm long, sparsely strigose at apex. Seeds unknown. (Fig. 12.)

*Hibiscus elegans* is closely allied to *H. coulteri*, and they are very similar in several characters. Geographically, they are clearly separated: *H. elegans* is best known from the States of Puebla and Hidalgo, Mexico, at relatively high elevations, whereas *H. coulteri* occurs at relatively lower elevations, principally to the north in the States of Coahuila, Chihuahua, and Sonora, Mexico, and Arizona and Texas, U.S.A. (fig. 11).

Standley (1923) and Kearney (1955) distinguish them on the basis of leaf lobing. This is a satisfactory means of distinction only if one considers representatives of *H. elegans* from the southern end of its range in Puebla and Oaxaca, where leaf lobing is essentially absent. To the northwest (in Hidalgo, Querétaro, and San Luis Potosí) plants occur that have more deeply lobed leaves and which appear to be intergradations to the deeply parted leaves of *H. coulteri*. If intergradations occur in a geographically intermediate area, are the species in fact distinct?

In my judgment, they are distinct species, but leaf lobing is not a satisfactory character by which to distinguish them. The two species are geographically separated with a significant hiatus in their distribution (see fig. 11); hence, they cannot be said to intergrade. Both species are developmentally labile for leaf form, with juvenile leaves being unlobed in both species and adult leaves being more or less tipped in the direction of lobing as the plants develop. In *H. coulteri* leaf lobing is fully expressed in the early stages of the development of the plant, so that orbicular or elliptic juvenile leaves are not often seen; palmately parted leaves are the rule. The transition from juvenile to adult leaves is sometimes nicely shown in an individual specimen, however, as depicted in figure 13 and as in the isotype of *H. coulteri* (GH). In *H. elegans* this tendency to lobing is only slightly developed (to the north) or not at all developed (to the south), so that orbicular or elliptic leaves are often or usually found; when leaf lobing is present, it is less fully developed than in *H. coulteri* (fig. 12). The leaves of

*H. elegans* are never parted as those of *H. coulteri* usually are. More reliable distinguishing characters are given in the key.

Additional specimens examined: MEXICO: SAN LUIS POTOSÍ: 15 km al NW de Cd. del Maíz, *Rzedowski 9428* (ENCB), *Rzedowski 9455* (ENCB); 2 km al E de Núñez, km 84 carretera SLP-Antiguo Morelos, *Rzedowski 6252* (ENCB, LL, MICH, US); cerca de El Huizache, *Rzedowski 10806* (DS, ENCB). QUERÉTARO: 15 km from Higuierillas toward Bernal, *Wendt et al. 8098* (LL); 4.6 km NE of Higuierillas, Mpio. de Toliman, *McVaugh 26472* (MICH). HIDALGO: Metztitlán, *Galeotti 4058* (BR); near Zimapán, *Lundell & Lundell 12189* (LL, MICH), *Fryxell 694* (BH, CTES, MEXU, MO, NA, NY, TAES, pf), *Schnoberger 7737* (MICH); 20 km al S de Zimapán, *Puig 5291* (ENCB); 7 km al NE de Tasquillo, *González Q. 2981* (DS, ENCB, LL, MICH, TEX, WIS); near Tasquillo, *Booth 16151* (SMU), *Hitchcock & Stanford 7246* (US); 6 km al N de Tasquillo, *González Q. 3096* (ENCB, MICH); 10 km al E de Ixmiquilpán, *González Q. 2898* (DS, ENCB), *Rose et al. 3976* (US), Ixmiquilpán, Aug 1905, *Purpus s.n.* (UC). PUEBLA: Tehuacán, *Patoni 5* (MEXU), *Fryxell 2609* (CTES, ENCB, SMU, pf), *Rose et al. 10162* (US), *Rose & Hay 5859* (US), *Lyonnet 2255* (US), *Purpus 1263* (F, MO, UC) 5617 (BM, UC, US) 5843 (UC), *Smith et al. 3772* (F, US) 3781 (F, US); environs de Tehuacán, sur les plateaux intermédiaires du Cerro Colorado, *Diguet 556* (MICH); 10 km al SW de Tehuacán, *Rzedowski 25471* (ENCB); 4 km NW de Tehuacán, *Rzedowski 28186* (ENCB); Cerros de Coatepec, *Purpus 2611* (UC); Zapotitlán Valley near Cerro Tarantula between Teloxtoc and San Juan Raya, *Smith et al. 4006* (US). OAXACA: Coscomate, *Purpus 2611a* (BM, F, MO, UC, US); 20 km al NE de Tepelmeme de Morelos, 9 Oct 1970, *Cruz Cisneros s.n.* (ENCB); 6 miles above Domingullo, *Nelson 1850* (US).

9. *Hibiscus coulteri* Harvey ex A. Gray, Smiths. Contr. Knowl. 3 (art. 5, Pl. Wright. Texano-Neomexicanae, part 1): 23. 1850. Type: UNITED STATES: TEXAS: high hills of the San Pedro River, July 1849, *Wright s.n.* (holotype: GH; isotypes: EM, GH, K, MO).

*Hibiscus coulteri* var. *brevipedunculatus* M. E. Jones, Contr. W. Bot. 12: 4. 1908. Type: UNITED STATES: ARIZONA: Congress Junction, 4 Ma : 1903, *Jones s.n.* (isotypes: BM, DS).

Distribution: Texas and Arizona, U.S.A., to Zacatecas, Mexico, from 500 to 1,300(-2,100) m elevation (fig. 11).

Shrublet usually less than 1 m tall, with whitish pubescence. Stems covered with stellate hairs that are 4-armed, the arms tightly appressed and oriented longitudinally with the stem axis. Leaf lamina variable, mostly 3-lobed to fully trifoliolate, the leaflets 3-5 times as long as wide, remotely serrate, obtuse or subacute, stellate-hispid above and beneath, the hairs principally 4-armed; lower leaf lamina less deeply lobed, broader; juvenile leaf lamina simple, elliptic. Foliar nectary near base of mid-





FIGURE 13.—*Hibiscus coulteri*. Flower, Fryxell 3028. Branch, Fryxell et al. 1486. Scale: 1 cm.

rib beneath. Petioles 0.5–2 cm long, with pubescence like that of stem. Stipules 4–7 mm long, linear, erect, with a few stellate hairs. Peduncles solitary in the axils of the leaves, 2–18 cm long, with pubescence like that of stem except often less dense, articulated 3–13 mm below flower (the articulation sometimes obscure), the pedicel more densely pubescent above the articulation. Bracts of the involucre 9–11, slightly shorter than to subequal to calyx, whitish at base, green distally, 11–19 mm long, linear, ciliate, the hairs mostly simple, ca. 1 mm long. Calyx green (whitish toward the base), 17–20 mm long,  $\frac{1}{4}$ -divided, the lobes narrowly acuminate, ciliate on margins and principal nerves, the hairs 1–1.5(–2) mm long. Petals 2–3(–4) cm long, 1.5–3 cm broad, clear yellow throughout or yellow with a vestigial maroon spot at base (spot often yellow-striate), sparsely ciliate distally but otherwise glabrous (including nearly glabrous on claw). Staminal column pallid, glabrous, 5–9 mm long; filaments 1.5–2 mm long, often joined basally in pairs; anthers less than 1 mm long, pallid, few (ca. 15) to many (75 or more); pollen yellow-orange, spheroidal, echinate. Styles 5, pallid, glabrous, exceeding staminal column by 3–5 mm; stigmas capitate, maroon (sometimes pallid), villous, ca. 1-mm diam. Capsule ovoid, 9–10 mm long, with 5 longitudinal stripes (at least when young), usually with antrorse hispid pubescence at least apically (rarely glabrous). Seeds sericeous, 2.5–3 mm long, the hairs whitish, silky, 4–5 mm long. (Fig. 13.)

The typification of *Hibiscus coulteri* requires some commentary. Gray adopted the epithet *coulteri* that Harvey evidently had never published but had associated with Coulter's collection (No. 809) from Zimapán. Gray, however, cited Wright's collection "high hills of the San Pedro River; July [1849]" as type, and then added (as paratypes) "also Zimapán, Mexico, *Coulter* (809), and Paso de Caritas, *Gregg* [449]."

It is first necessary to establish the localities where these collections were made. According to McKelvey (1955, p. 1066), Wright's San Pedro River is the modern Devil's River in Val Verde County, Tex. She notes that Wright collected there (Nos. 599–804) in July and August of 1849. The labels on the type material bear the number "65," which was evidently a "distribution number" assigned by Gray. Wright's field number remains problematical. The type locality is approximately at 30°N, 101°W.

Coulter's collection No. 809 was made near the

well-known mining community of Zimapán, which is situated in the State of Hidalgo, Mexico, at 20°45'N, 99°23'W.

The publication of Gregg's diary (Fulton, 1944) makes it possible to determine the location of Paso Carretas, which is not found on most modern maps or in Henrickson & Straw's (1976) gazetteer. It is located approximately 15 miles directly north of Saltillo, Coahuila, Mexico (or approximately at 25°39'N, 100°58'W). Gregg estimated it as about 22–23 miles north of Saltillo in his diary entry for September 23, 1848 (Fulton, 1944, pp. 224–225), but the distances to two other localities (Mesillas and Perros Bravos, which are on modern maps) that were visited on that same journey are overestimated by Gregg; I therefore adjusted his estimate accordingly. Gregg made a sketch map in his diary, reproduced by Fulton (1944, plate opposite p. 223), which shows the location of Paso Carretas. Gray gives the spelling of the locality name as "Paso de Caritas," Fulton as "Paso de Carritas," and Gregg as "Paso de Canitas" in his "Register of Plants" (his fieldbook, which is kept at the Missouri Botanical Garden). It is correctly given on the Monterrey map (García, n.d., p. 33) as "Paso Carretas."

Wright's collection in the Gray Herbarium, the holotype, is mounted on the same sheet as Gregg's plant, together with a third specimen collected in New Mexico in 1851 by Charles Wright and numbered 901. (Duplicates of No. 901 are in BM, K, UC, and US.) An isotype, mounted separately, is also in the Gray Herbarium. All of these specimens are from within the known range of the plant generally known as *H. coulteri*. The specimen of Coulter from Zimapán, however, is from outside this range and in fact is from the range of *H. elegans*. Coulter's specimen in the Gray Herbarium (of which a photo is in US) is in fact a specimen of *H. elegans* with a fragment of *H. coulteri* mixed with it; it is mounted on the same sheet as a collection of Thurber (No. 1089) from "near Baboquivari [Arizona]." A duplicate of *Coulter* 809 is in the Torrey Herbarium (NY, mounted with a collection of Gregg ("plain west of Mapimí [Durango, Mexico, No. 605] May 9, 1847"). The Gregg plant is *H. coulteri*, and the Coulter plant is *H. elegans*, but the label on the Coulter specimen says "*Hibiscus coulteri* MSS" in a handwriting other than Gray's (presumably Harvey's) that is the same hand and ink that wrote the "809" and "Zimapán" on the label. This is evidently the source of the epithet that Gray published. Three additional duplicates of *Coulter* 809 are at Kew.

Thus, although the specific epithet "*coulteri*" is

obviously derived from Coulter's collection, it must in fact be applied to a different species than Coulter's collection represents, because Gray cited a Wright specimen as type and mentioned the Coulter specimen only in the role of paratype. When the more southerly species was later recognized, described, and named *H. elegans* by Standley, he did not notice this mixture or mention the Coulter specimen, but based his name on a later Pringle collection. The ambiguity in the meaning of *H. coulteri*, thus, is purely etymological and not nomenclatural.

There is considerable variability in this species, for example in pedicel length. A variant with extremely short pedicels was named var. *brevipedunculatus* by M. E. Jones, in contrast to other specimens with pedicels as much as 18 cm long (e.g., *McGill & Keil 8222*). Variation between these extremes, however, appears to be continuous, so that it does not seem appropriate to recognize the extremes nomenclaturally. Accordingly, the species is recognized as a single, variable taxon.

Standley (1923) has suggested that *Hibiscus acetosaefolius* DC. may be an earlier name for this species, but an examination of the Mociño & Sessé plate (Flore du Mexique, t. 79) shows that it does not conform in several characters. Its hastate leaves, in fact, are more suggestive of *Kosteletzkya* than of *Hibiscus*.

Additional specimens examined:

UNITED STATES: ARIZONA: YUMA COUNTY: Horse Tank Mtns., *Kearney & Peebles 10966* (F); Kofa Mtns., 13 May 1941, *Harbison s.n.* (SD); *Monson 4* (CAS). PINAL COUNTY: 10 miles W of Superior, *Wolff 1909* (TAES); Superstition Mtns., Le Barge Canyon, *Lehto 1827* (ASU, BM); San Tan Mtns., *Peebles et al. 1250* (US); 15 miles up Ariv. Can. from San Pedro Junction, *Anderson et al. 1041* (TAES); near Thompson, *Wolff & Dana 1909* (US). PIMA COUNTY: Tucson Mtns., *Pringle 400* (US), *Toumey 74* (DS, US), *Parish 25* (BR, DS), *Greenman & Greenman 54* (MO). *Mason & Turner 68-28a* (SD), *Thorner 2330* (CAS, LL, MO); Laboratory Hill, vic. Tucson, *Rose et al. 15179* (US); Sabino Canyon, *Eastwood 17764* (CAS), 20 Aug 1903, *Jones s.n.* (DS); La Abra Valley, *Harbison 26206* (SD); Topawa, *Harrison & Kearney 8028* (CAS); Little Ajo Mtns., 20 Aug 1972, *Engard s.n.* (SD); Organ Pipe Cactus Natl. Monument, Puerto Blanco Mtns., *Parker 7947* (OKLA, SMU); Alamo Canyon, Ajo Mtns., 12 Dec 1939, *Harbison s.n.* (SD); Baboquivari Mtns., *Gault & Haskell 3233* (US, UC), *Nelson & Nelson 1553* (K, RM), *Thacker 1220* (US), *Gilman 57* (DS, MO). MARICOPA COUNTY: McDowell Mtns., Pinnacle Peaks area, *Breedlove 1229* (DS). GILA COUNTY: Roosevelt Dam, *Eastwood 5935* (CAS); Canyon Lake, *Nelson & Nelson 1746* (K, MO, RM). COCHISE COUNTY: Mule Mtns., 17 Aug 1955, *Jones s.n.* (SD); Paul's Spur, 25 Aug 1955, *Jones s.n.* (SD); Paul's Quarry Hill, *Jones 103* (CAS). GRAHAM COUNTY: dry canyon of Gila River, 2-3 miles downstream from

Bonita Creek, *McGill 2307* (ASU, pf). TEXAS: BREWSTER COUNTY: Green Gulch, *Marsh 272* (UC); near Chisos Mtns., *Sperry 115* (TAES, US), *Parks & Cory 7016* (TAES), *Mueller 8091* (MO, US), *Ferris & Duncan 2823* (DS), *Warnock & Wallmo 12302* (TAES), *13206* (TAES); just W of Terlingua, *Smith & Butterwick 90* (LL); Glass Mtns., *Sperry T1160* (TAES), *Warnock 96* (MO); 2 miles SE of Ridge Springs, *Sperry 1559* (TAES); 15 miles E of Marathon, *Hinckley 4814* (SMU); 13 miles S of Marathon, *Wallmo 5336* (TAES); 12 miles N of Alpine, *Sperry T1025* (TAES); Deadhorse Mtns., near McKinney Springs, *Warnock 10820* (SMU); Blackgap Wildlife Area, 35 miles SSE of Marathon, *Rowell 11564* (SMU), *Mahler 93* (SMU); Stainstep Mtn., *Grimes 473* (SMU); Mariville Canyon, *Grimes 462* (SMU). COOKE COUNTY [?]: near Lindsay Mine, 24 Sep 1927, *Parks & Cory s.n.* (TAES). CULBERSON COUNTY: Beach Mtns., 6.5 miles NW of Van Horn, *Waterfall 5063* (CAS, MO, TEX); N of Van Horn, 10 Jun 1905, *Reverchon s.n.* (SMU). HUDSPETH COUNTY: Quitman Mtns., 4 miles NE of Indian Hot Springs, *Waterfall 4848* (MO). PRESIDIO COUNTY: near Presidio, *Garrett 503* (SMU); 10 miles N of Ruidoso, *McVaugh 7479* (F, K, SMU, TEX); Big Bend Ranch, head of Fresno Canyon, *Correll & Rollins 23671* (SMU); 1.5 miles S of Musgrave Canyon, *Hinckley 2045* (US). TERRELL COUNTY: 7 miles E of Sanderson, *Warnock 11871* (LL, SMU); 15 miles S of Sheffield, *Webster 271* (TEX); 5 miles W of Dryden, *Turner 5131* (TEX).

MEXICO: SONORA: S of Moctezuma, *Straw 2126* (SD); S of Magdalena, *Pennell 20264* (US); La Cienega, *Goodding 945* (US); between Santa Rosa Canyon and Bavispe, *White 621* (MICH); Cerro del Viejo, SW of Caborca, *Gentry 14467* (DES, US); Sierra Tesota, *Gentry 16576* (LL, US); Fronteras, *Hartman 978* (MO, UC); 5 miles S of Imuris, *Abrams 13207* (DS); Colonia Morelos, *White 4584* (MICH); Cañon de la Petaquilla, *White 3318a* (MICH). CHIHUAHUA: Meoqui, *LeSueur 1063* (F, MO, TEX, UC); 30 miles SE of Jiménez, *McGill & Keil 8222* (ASU); 60 km SE de Jiménez, 27 Aug 1966, *Robert s.n.* (ENCB); 68 miles NE of Aldama, *Smith, Butterwick & Whalen 354* (LL); El Pozo, Sierra de Santa Eulalia, *White 2414* (MICH) *2422* (MICH), *Palmer 128* (US). COAHUILA: Mpio. Ramos Arizpe, E of Hacienda La Posa, *Wynd & Mueller 21* (K, MICH, MO, US); 6 miles SW of Hipólito, *Muller 3015* (UC); 26.7 miles S of Monclova, *McGill & Keil 7880* (ASU); Cerro de Zapatero, *Purpus 4547* (UC); 7 miles S of Cuatrociénegas, *Fryxell, Bates, & Blanchard 1496* (pf), *Muller 3194* (LL); Múzquiz, Santa Ana Canyon, *Marsh 547* (F, TEX); 18 miles NE of Saltillo, *Waterfall & Wallis 13234* (SMU); Saltillo, *Palmer 83* (K, MO, US) *573* (US) *728* (F, MO, US), *Pennell 17284* (US); General Cepeda, *Palmer 329* (US); between Saltillo and Torreón, *Fryxell & Bates 2058* (BH, pf), *Shreve 8736* (MICH, US); Parras, *Purpus 4944* (BM, F, MO, UC, US); 11 km NE of Jimulco, *Stanford et al. 49* (DS, MO). NUEVO LEÓN: between Monterrey and Saltillo, *Fryxell 1331* (CAS, CTES, MEXU, pf); 24 miles W of Monterrey, *Flook & Spears 40* (SMU); Cañon de Huasteca, *Krueberg 4861* (UC); S base of Sierra del Fraile (25.51°N, 100.32°W), *Reeves 6067* (ASU, pf). DURANGO: 22 miles SW of Nazareno, *McGill & Keil 8042* (ASU); Mapimí, *Palmer 523a* (US); 14 miles E of La Cadena, *Jones 23052* (ENCB); Ramos to Indé, *Nelson 4703* (US); 2-4 miles NE of Chocolate, *Correll & Johnston 19993* (LL), *Fryxell & Bates 2064* (BH, CTES, ENCB, MICH, pf); 28 miles SW of Torreón, *Waterfall 15373* (SMU); 1 mile SW of Gómez Palacio, *Anderson & Anderson 5231* (MICH); W of Mapimí, *Gregg 605* (MO, NY). ZACATECAS: Cedros, *Lloyd 114* (F, US), *Kirkwood 114* (F); Sierra del Yeso, W of La Presa de Los Angeles, *Johnston et al. 11525B* (LL, TEX). BAJA CALIFORNIA: Arroyo El Cajón (30°51'N, 115°16'W), *Moran 21558* (SD, pf).

10. *Hibiscus poeppigii* (Sprengel) Garcke, Jahresh. Nat. Ver. Halle 2:133. 1850.

*Achania poeppigii* Sprengel, Syst. 3: 100. 1826. Type: CUBA: MANTANZAS: 1824, *Poeppig s.n.* (MO). *Malva-iscus poeppigii* (Sprengel) G. Don, Gen. Hist. 1: 475. 1831. *Pavonia poeppigii* (Sprengel) Kuntze, Rev. Gen. Pl. 1: 71. 1891.

*Malva-iscus floridanus* Nuttall, J. Acad. Philad. 7: 89. 1834. Type: UNITED STATES: FLORIDA: Key West. *Peale s.n.* *Achania floridana* (Nutt.) Rafinesque, New Fl. Amer. 1: 49. 1836. *Hibiscus floridanus* (Nutt.) Shuttleworth ex A. Gray, Smiths. Contr. Knowl. 3 (art. 5, Pl. Wright. Texano-Neo-Mexicanae, part 1): 22. 1850.

*Hibiscus bancroftianus* Macfadyen, Fl. Jamaic. 1: 70. 1837. Type?: JAMAICA: St. Ann, *Rose s.n.* (K). *Hibiscus macleyanus* Bancroft ex Macfadyen, Fl. Jamaic. 1: 71. 1837, pro syn.

*Hibiscus truncatus* A. Richard, Ess. Fl. Cub. 144. t. 16. 1845; Pl. Vasc. [Cuba] 53. t. 16. 1845.

Distribution: Florida, U.S.A.; Cuba; Jamaica; Mexico (from Tamaulipas to Yucatán and Chiapas); and Guatemala; from near sea level to 800 m elevation (fig. 14). It has also been reported from the Bahamas, but I have seen no specimens.

Shrub to 2 m tall. Stems sparingly pubescent with stellate, spreading, 3-5-armed hairs (the arms 0.5-1 mm long) and with narrow lines (weakly or at least variably expressed) decurrent from the stipules of curved, simple hairs. Leaf blades ovate, simple or weakly 3-lobed, basally rounded or truncate, dentate, acute, 2-5 cm long, 1.5-3.5 cm wide, palmately 5-nerved with a nectariferous zone at base of midrib beneath, stellate-pubescent beneath, the hairs predominantly 3-armed, the hairs above often 1-2-armed. Petioles 0.5-1.5 cm long, stellate-pubescent (like stem) and with dense beard of simple hairs that are straight or imperfectly recurved (geniculate) on the adaxial surface. Stipules 3-5 mm long, erect, persistent. Peduncles in the axils of the leaves, sparsely stellate-scabridulous, ca. 2 cm long, articulated 4-6 mm below the flower, the pedicel more densely pubescent above the articulation. Bracts of the involucre 8-10, distinct, linear, 6-9 mm long, antrorsely hispid. Calyx 9-12 mm long, cylindrical, ca. 1/2-divided, stellate-pubescent; lobes lanceolate-acuminate, erect. Petals 16-23 mm long (in Florida and Cuba) to 35 mm long (in Chiapas), red, erect, the corolla flaring, sparsely stellate-pubescent externally where exposed in bud. Staminal column exerted, to 22-24 mm long, glabrous, not twisted; filaments 2-3 mm long (in Florida and Cuba) to 6 mm long (in Chiapas). Styles 5, glabrous, exceeding staminal column by 2-3 mm; stigmas capitate, villous, 0.2-0.4-mm diam. (in Chiapas) to 0.8-mm diam. (in Florida and Cuba). Capsule 8-12

mm long, stellate-pubescent (the hairs 3-5-armed). Seeds 3 mm long, reniform, densely and finely sericeous, the hairs sordid, 3-4 mm long. (Fig. 15.)

This species is commonly referred to as *Hibiscus pilosus* (Swartz) Fawcett & Rendle (based on *Achania pilosa* Swartz), but an examination of the type of Swartz' name reveals that Swartz' plant has 10 styles and stigmas rather than 5 and is thus a representative of *Malva-iscus*, not *Hibiscus*. This position was correctly perceived by de Candolle (1824, p. 445) and by Schery (1942), but most other authors have erred in the application of this name.

Blanchard & McVaugh (1978) have noted that *Hibiscus tubiflorus* Mociño & Sessé ex DC., a name also commonly applied to this species, is in fact a *Kosteletzkya*, and the name *K. tubiflora* (DC.) Blanchard & McVaugh correctly applies to the plant generally known as *K. paniculata* Benth.

*Hibiscus poeppigii* is a relatively variable species. Specimens from Florida and Cuba tend to have smaller flowers (petals 1.6-2.3 cm long, filaments 2-3 mm long), larger stigmas (0.5-0.8-mm diam.), and simpler, narrower leaves; those from Chiapas tend to have larger flowers (petals 2.5-3.5 cm long, filaments 3-6 mm long), smaller stigmas (0.2-0.4 mm), and broader, more frequently lobed leaves (see fig. 15). Plants from intervening areas (Tamaulipas to Jamaica) tend to be intermediate. However, other characters (calyx size, pubescence, etc.) do not suggest that it is appropriate or possible to recognize more than a single taxon.

Additional specimens examined:

UNITED STATES: Florida: Upper Matecumbe Key, *Curtiss 166* (GH; NY, *s.n.*); Lower Matecumbe Key, *Small et al. 11594* (NY); Long Key, *Smyth 907* (VPI); *Killip et al. 40342* (UC, US); Big Pine Key, *Siebert 1294* (MO), *Martin 1303* (NY, UC), *Hill 2784* (FTG, pf), 25 Apr 1970, *Churchill s.n.* (SMU), *Small et al. 9135* (NY) *10149* (NY, US), *Killip 32096* (BR, GH, K, US) *31417* (US) *41954* (CAS), *Robertson 53* (GH); Key West, *Rugel 104* (AWH, BM, GH, K, MO, NA, NY, US, pf), *Bennett s.n.* (NY), *Garber 935* (MO) *s.n.* (GH, NY, US), *Small & Mosier 5988* (BR, GH, K, MO, NY, UC), *Blodgett s.n.* (NY), *Small & Small 4874* (NY); between Manate River and Sarasota Bay, *Rugel 103* (MO); south Florida, *Chapman s.n.* (NY); near Pine Crest, *Correll et al. 42246* (LL).

CUBA: WITHOUT PRECISE LOCALITY: Hicacos Peninsula, *Seifriz 1139* (US). ORIENTE: Salina, near Puerto Padre, *Br. León 18957* (NY); El Dudoso Cliffs, Pilon, *Bro. León & Dahlgren 22803* (NY). CAMAGUEY: Cayo Palom, *Shafer 2549* (BM, GH, NY, US); Cayo Guajaba, *Shafer 643* (NY); Cayo Romano, *Shafer 2497* (NY). LAS VILLAS: Trinidad Mtns., *Bro. Fernando Ansovin 694* (NY); Peninsula de Zapata, El Soplillar, *Roig & Cremata 2082* (NY); Potrero Seboruco at Gavilán, *Howard et*

(Continued on page 30.)

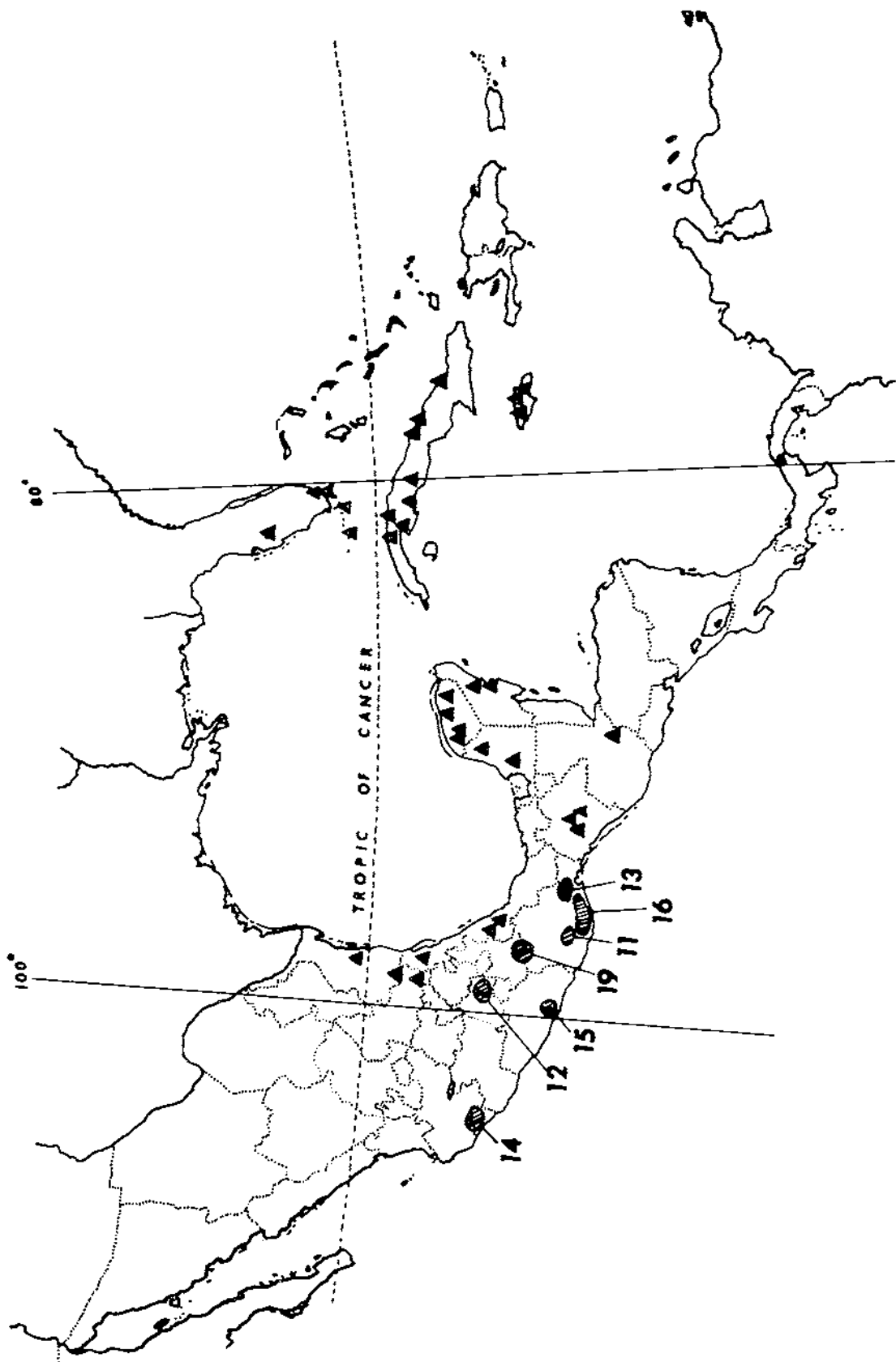


FIGURE 14.—Distribution of several red-flowered species of Hibiscus. *H. porppigii* (▲), *H. nelsonii* (11), *H. spiralis* (12), *H. peripteroides* (13), *H. colimensis* (14), *H. acapulcensis* (15), *H. kochii* (16), *H. longifolius* (19).

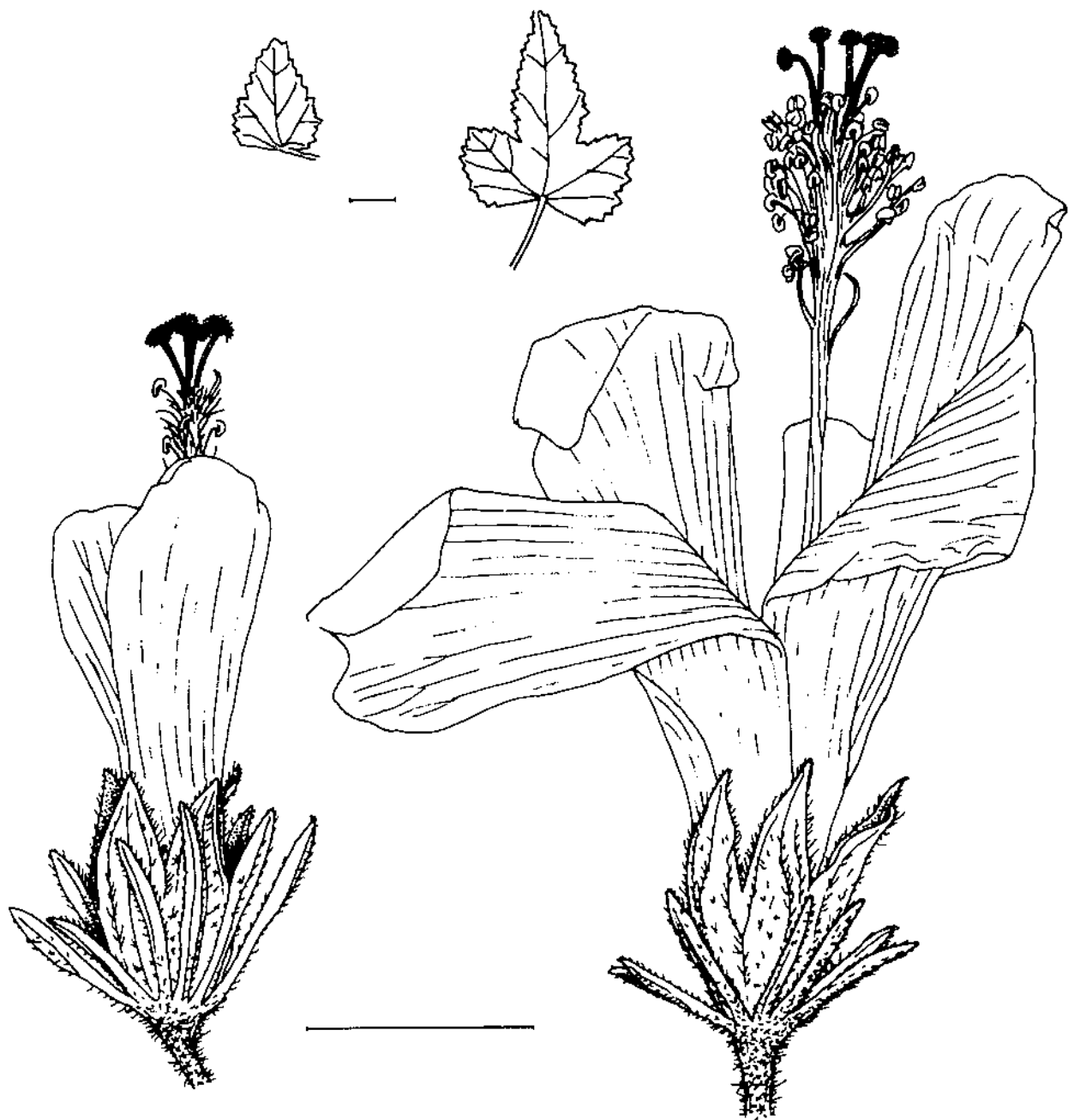


FIGURE 15.—*Hibiscus poeppigii*. Leaves (left to right), Regel 104, Lundell & Lundell 8043. Flowers (left to right), Regel 104, Breedlove 10008. The petals are red, the calyx and the involucre green; the pubescence is yellowish. Scale: 1 cm.

al. 19 (A, UC); Farallones de Guajimico, E of Cienfuegos, *Morton 10513* (US); near Cienfuegos Bay, *Howard 5432* (GH); Loma de Banao, *Bros. León & Clement 5442* (CAS, GH, NY); Río San Juan, *Britton et al. 5964* (NY). MATANZAS: Gorge of the Sumuri, *Britton et al. 239* (NY); around Matanzas, *Rugel 29* (BM, MO, NA, pf); Vardero, *Killip 32414* (US). LA HABANA: Tarrara Beach, *Bro. León 13603* (NY); near Havana, *Curtiss 746* (BM, CAS, GH, K, NY, US); vicinity of Cojimar, *Britton et al. 8220* (NY); near Chorrera, *Bro. León 340* (NY).

JAMAICA: WITHOUT PRECISE LOCALITY: Plowden Hill, *Harris 8167* (BM). MIDDLESEX: Southern Manchester, *Harris 12693* (BM, CAS, GH, K, MO, NY, US); Salem Llandoverly, St. Ann, *Harris 10379* (BM, K, NY, US); between Brownstown and St. Ann's Bay, *Britton 2944* (NY). CORNWALL: St. Elizabeth Parish, 1 mile E of Bull Savannah School, *Howard & Proctor 13920* (A); Trelawney Parish, 2 miles E of Falmouth, *Stearn 463* (A, BM); seacoast near Falmouth, *Harris 7224* (BM).

MEXICO: TAMAULIPAS: 7 miles S of Antiguo Morelos, *Graham & Johnston 4573* (TEX); 11 miles S of San Fernando, *Crutchfield & Johnston 5509B* (TEX); between San Fernando and Tres Palos, *Fryxell & Bates 954* (BH, CTES, MEXU, NA, TAES, pf); Chamal Heda, 25 June 1919, *Wootton s.n.* (US); Santillana de Tamaulipas, *Berlanther 3111* (GH); San Fernando to Jiménez, *Nelson 6625* (GH, US). SAN LUIS POTOSÍ: 1 km al S de Valles, *Rzedouski 10373* (ENCB); 50 miles E of Valles, *Chapman 3050* (UC, US). VERACRUZ: W of Tampico, 5 miles E of state line, *Crutchfield & Johnston 6097b* (LL, MICH, NY, TEX, UC); Baños del Carrizal, *Purpus 6131* (UC); Plan del Río, Mpio. de Dos Ríos, *Ventura 8549* (ENCB, pf) 12209 (ENCB, pf); Conejos, Mpio. de Puente Nacional, *Ventura 7984* (ENCB, pf); Puente Nacional, *Purpus 6132* (BM, UC); Remudadero, *Purpus 16794* (US) 15229 (MICH, UC); Zacuapán, *Purpus 2236* (UC) 4417 (UC). CHIAPAS: without locality, *Ghiesbreght 643* (BM, GH, K, as photo, US); 3 miles S of Tuxtla Gutiérrez, *Breedlove 10008* (DS, ENCB, LL, MICH, NY, US); 6.5 miles W of Tuxtla Gutiérrez, *Breedlove 20138* (DS, ENCB, MICH); bluffs above Presa La Angostura, 45 km from Tuxtla (700 m), *Breedlove 37407* (DS); Mpio. de San Fernando, at Mirador for Chicoasen Dam, *Breedlove 41469* (DS); 10 km W of Chiapa de Corzo (500 m), *Breedlove 25156* (DS, pf); N. Cahuaré, cerca Chiapa, *Miranda 5676* (DS); 5.6 miles SE of Chiapa de Corzo, *Breedlove & Raven 19768* (DS, LL, US), *Breedlove 9637* (DS); 18 km SW of La Tynitaria, *Breedlove 42106* (DS); San Bartolomé, *Goldman 756* (US). CAMPECHE: without locality, 1730, *Houstoun s.n.* (BM); Distr. Hecelchakán, Xoalumkia, *Seler & Seler 4949* (CAS, GH); Champotón, *Steere 1949* (MICH); Heda, San Pablo, near Champotón, *Collins 41* (US). YUCATAN: without locality, *Gaumer 496* (A, BM, CAS, DS, GH, K, MICH, NY, RM, UC, US) 24040 (K, US), *Goldman 583* (US); Calotmul, *Gaumer 1811* (A, CAS, K, US), *Lundell 1550* (US); San Anselmo, *Gaumer 1809* (GH, MO, US); Izamal, *Gaumer 15587* (WIS), *Greenman 383* (GH, NY); Silán, *Gaumer 1810* (BM, DS, MICH, UC); Chichen Itzá, *Lundell & Lundell 7421* (LL, MICH), *Steere 1126* (BM, MICH, MO) *Steere 1480* (MICH); between Mérida and Uxmal, *Lundell & Lundell 8075* (LL, MICH); between Mérida and Progreso, *Lundell & Lundell 8043* (LL, MICH); Progreso, *Steere 2052* (MICH); Xucal, *Gaumer 23491* (A, BM, CAS, GH, K, MO, NY, RM, US); near Cenote, *Smyth 1763* (VP1). QUINTANA ROO: Coba, along Dzitup trail, *Lundell & Lundell 7671* (LL, MICH); ca. 12 miles N of Tulum, *Williams 9* (WIS) 13 (WIS).

GUATEMALA: DEPT. JALAPA: El Rancho, *Kellerman 5594* (US). DEPT. ZACAPA: Gualán, *Deam 6278* (US).

11. *Hibiscus nelsonii* Rose & Standley ex Standley. Contr. U.S. Natl. Herb. 23: 778. 1923. Type: MEXICO: OAXACA: between Nopala and Mixistepec [San Pedro Mixtepec?], alt. 800–4,000 ft. 5 Mar 1895, *Nelson 2430* (holotype: US; isotype: GH). See comment below on type locality.

Distribution: Oaxaca, Mexico, known only from the type (fig. 14).

Shrub, height not known, the main stem woody, 6-mm diam. Stems greenish, coarsely stellate-pubescent, the hairs 5–8-armed, the arms tufted or spreading, 0.5–1 mm long. Leaf lamina truncate to slightly cordate, ovate, finely serrate, acute, 1.8–3 times as long as broad, up to 5 cm long, 3 cm broad, palmately (3–)5–7-nerved, evenly stellate-pubescent above and below, the hairs 4–6-armed, the arms more or less interlacing, randomly oriented. Petioles 7–15 mm long, ca.  $\frac{1}{4}$  the length of lamina, with pubescence like that of stem, the pubescence denser at juncture with lamina. Stipules 3–4 mm long, filiform, pubescent, persistent. Peduncles solitary in the axils of the leaves, 0.5–4 cm long, articulated 2.5 mm below the flower, sparsely pubescent below the articulation, densely so above, the pubescence like that of stem. Involucel 9–12 mm long, of 8–10 bractlets; bractlets distinct, stipitate-spatulate, the stipe yellowish, ca. 1 mm wide, the blade greenish, 2–4.5 mm wide, acute, obscurely 3–5-nerved, with stellate hairs externally, antrorsely ciliate-hispid on margin and on internal surface. Calyx 8–11 mm long, brownish, sometimes darkly so at base, densely hispid, the hairs antrorse, yellowish; lobes 2–3 mm long, rounded-acute to obtuse. Petals 1.5–2 cm long, red, tubular, coarsely stellate-pubescent externally. Staminal column 2.5–3.5 cm long, exserted, glabrous, twisted, surmounted by 5 sterile teeth; filaments arising in distal 1 cm, 2–3 mm long. Styles slender, glabrous, exceeding staminal column by 5 mm; stigmas capitate, ca. 0.5-mm diam. Capsules ovoid or subglobose, 7–8 mm long, sparsely antrorsely strigose; seeds reniform, 2.5 mm long, dark-brown, sericeous, the hairs red-brown, 3–4 mm long. (Fig. 16.)

Concerning the type locality "between Nopala and Mixistepec," it may be noted that "Mixistepec" is evidently a misspelling of "Mixtepec." In the Nopala vicinity, there are two significant villages using this name, San Gabriel Mixtepec and San Pedro Mixtepec. At the present time there is a good graded road (terracería) between San Gabriel and

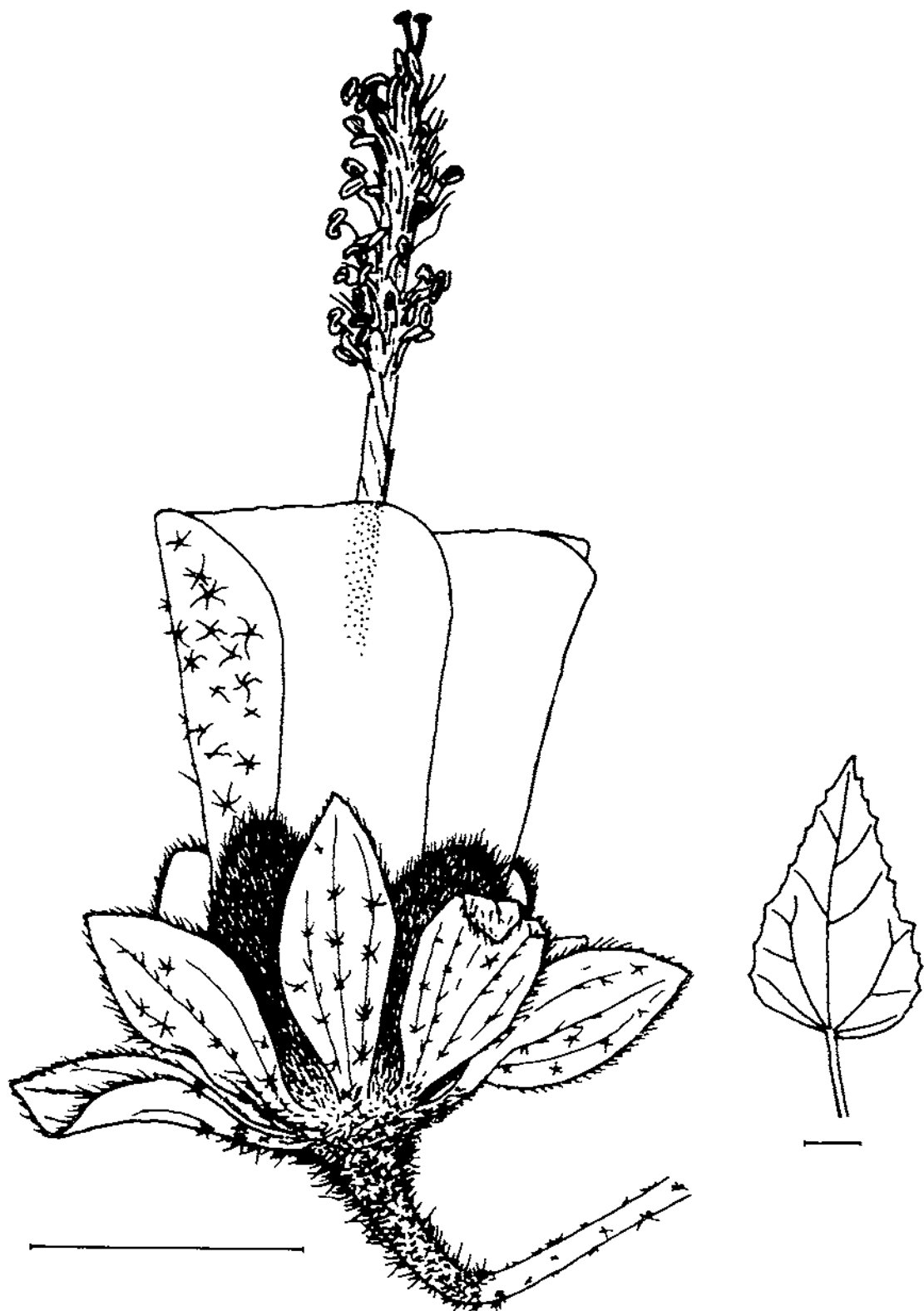


FIGURE 16.—*Hibiscus nelsonii*. Flower and leaf, Nelson 2430. The petals are red, the calyx and pedicel brownish (the hairs yellowish); the involucre is green (except yellowish at the very base). The stellate hairs on the corolla are only partially indicated. Scale: 1 cm.



Nopala. Local inquiry reveals, however, that this road is relatively new and did not exist in 1895 when Nelson collected the plant. The old road went from San Pedro Mixtepec to Nopala via several coffee fincas (Porvenir, San Isidro, and La Soledad) and is now passable only on horseback. It is probably on this road, traversing a different elevation and vegetation type, that Nelson encountered *Hibiscus nelsonii*. It is of interest that *H. kochii* may be found on the road between San Pedro and San Gabriel.

12. *Hibiscus spiralis* Cavanilles, Icon. Pl. 2: 47. t. 162. 1793. Type: *Cavanilles s.n.* (holotype: MA; as photo, BM, K, US).

Distribution: central Mexico (cf. Paray, 1953), at elevations of 2,000–2,500 m (fig. 14).

Shrub to 1.5–2 m tall; stems green with sparse, minute stellate pubescence, the hairs appressed, frequently 4–5-armed, the arms 0.2–0.5 mm long, the longitudinal lines of simple recurved hairs present but weakly expressed. Leaves ovate or lanceolate, rarely cordate, usually truncate or cuneate at the base, irregularly dentate, sometimes entire toward the base, acute, 5–7.5 cm long, 1.5–5 cm wide, (1.5–)2–4 times as long as wide, sparsely pubescent, the upper surface with antrorsely oriented simple hairs, the lower surface with stellate hairs mostly 3–4-armed, palmately 3–5(–7)-nerved with an obscure nectariferous zone at base of midrib beneath. Petioles 10–16(–25) mm long, usually about  $\frac{1}{4}$  the length of lamina, densely pubescent on adaxial surface, with scattered stellate pubescence to glabrate elsewhere. Stipules erect, glabrate, linear, 8–10 mm long (sometimes shorter), brownish but relatively persistent. Peduncles 0.5–2 cm long in flower 0.6–5 cm in fruit, articulated above middle, more densely pubescent above articulation; pedicels 4–11 mm long, antrorsely pubescent, enlarged distally. Involucellar bracts 9, distinct or nearly so, condyloid at base, linear-lanceolate to spatulate, 8–14 mm long, 1–2 mm wide (narrowed at base), sparsely pubescent, basally pallid, distally green. Calyx 9–13 mm long, broadly campanulate, ca.  $\frac{1}{3}$ -divided, the lobes broadly ovate, 3-nerved, subacute, the apex tufted, sparsely stellate-pubescent externally, glabrous within, relatively less greenish (more yellowish) than involucre, brownish at base. Corolla bright-red, 2–2.5 cm long, tubular (malvaviscoid), with scattered stellate pubescence externally where exposed in bud. Staminal column 3.0–4.5 cm long, notably exserted, glabrous, pallid, twisted, anther-

iferous only in exserted portion; filaments 2–3 mm long; anthers purplish, the pollen orange. Styles 5, with long white hairs; stigmas reddish, capitate, villous, 0.6–0.8-mm diam. Capsules 9–12 mm long, equaling or exceeding the calyx, oblong-ovoid, apiculate, antrorsely strigose. Seeds reniform, 3 mm long, blackish, sericeous, the hairs sordid, 3–4 mm long. (Fig. 17.)

Additional specimens examined: MEXICO: WITHOUT PRECISE LOCALITY: *Berlandier s.n.* (NY) 874 (MO, UC), 1838, *Vischer s.n.* (NY); near México, *Bustamante & Rocha s.n.* (NY); in montibus circa México, Sep, *Berlandier s.n.* (MO); San Antonio, 60 mi N of México, Nov 1884, *Carruthers s.n.* (BM). DISTRITO FEDERAL: ledges, Chapultepec, *Pringle 1452* (A, BM, GH, K, MICH, ND, NY, US), *Paray 242* (ENCB); circa México (Tacubaya), *Berlandier 876* (DS); Xochitepec, delegación de Xochimilco, en terreno plano, *Ventura 3143* (ENCB, pf); Cerro Xochitepec, *Galicia 21* (ENCB), *Rzedowski 22141* (ENCB, LL, MICH, WIS); del Valle de México, *Schaffner 441* (GOET) 647 (GOET) 703 (GOET).

13. *Hibiscus peripteroides* Fryxell, sp. nov.

Frutex 1–2 m altus. Caules erecti, teretes, stellato-pubescentes juventute, glabrescentes, pilis submalpigheaceis. Lamina foliorum lanceolata vel ovata, 2–7.5 cm longa, 1–5 cm lata, palmatim 3(–5)-nervata, basaliter cuneata vel subtruncata atque integra, distaliter crenata vel dentata, plus minusve acuta, sparse minusve discoloria, supra glabrata, infra persparse pubescentia, pilis stellatis, 3–4-brachiatis. Petioli 3–5 mm longi, pubescenti, in faciebus adaxialibus pilis simplicibus antrorse recurvatis, alibi pilis stellatis. Stipulae 4–11 mm longae, rigidae, ad caulem adpressae, anguste subulatae basibus tumidis, sparse pubescentes. Pedunculi axillari, saepe solitarii, 5–30 mm longi, articulati prope vel supra medium, plus minusve stellato-pubescentes. Involucellum per 2–4 mm ad basem gamophyllum, cupulam rotundatam 5 mm latam formans; lobi involucellorum ca. 9, erecti, plus minusve pubescentes, 6–13 mm longi (calycem excedentes), 1.0–3.0 mm lati, lineares vel triangulares, acuti, non manifeste 3–5 nervati. Calyces cylindranei, 7–10 mm longi, strigosi (pilis plus minusve antrorsi) praesertim in marginibus; dentes calycis triangulares, 2 mm longi. Petala rubra vel erubescencia, erecta, 17–19 mm longa, 3–5 mm lata, oblanceolata, infra in unguibus longis angustata, glabra. Columna staminalis per anthesin exserta, 24–26 mm longa, pallida, glabra, ad apicem 5 dentibus triangularibus, in parte exserta antherifera; filamenta 3–5 mm longa; antherae numerosae (ca. 75), <1 mm longae, pallidae. Styli 5, graciles, glabri, distal-

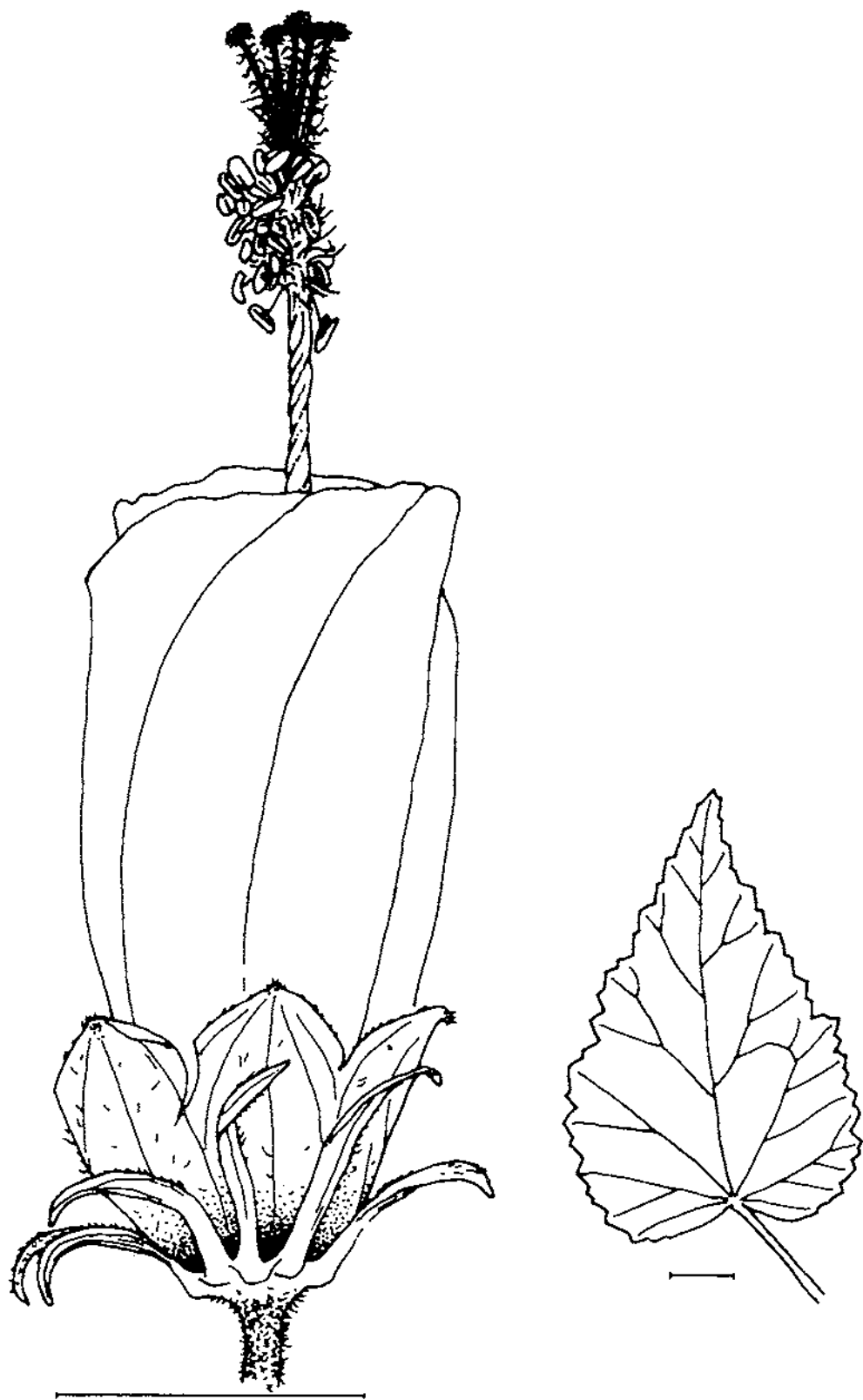


FIGURE 17.—*Hibiscus spiralis*. Flower, Galicio 81. Leaf, Rzedowski 22141. The petals are red, the calyx is brownish (especially at base), and the involucre is green (pallid basally). Scale: 1 cm.



FIGURE 18. — *Hibiscus peripteroides*. Flower, MacDougall s.n. Leaf, Koch & Fryxell 78363. The petals are red (pink, according to MacDougall), the calyx and involucre green. Scale: 1 cm.

iter libri per 5 mm, androecium excedentes; stigmata parva, rubella, pilis paucis villosis. Capsula 5-cellularis, oblonga, 9–14 mm longa, ca. 8-mm diam., antrorse strigosa. Semina 3 mm longa, sericea, pilis fuscis, 3.5–5 mm longis. (Fig. 18.)

Types: MEXICO: OAXACA: Paso Alicia, Guiengola, [Distr.] Tehuantepec, alt. 500 ft, shrub with pink flowers, 6 Apr 1969, *T. MacDougall s.n.* (holotype: NY; isotype: pf); near Tehuantepec, 7 June 1910, *Orcutt 5296* (paratypes: MO, US); Mpio. Jalapa del Marqués, Cerro Guiengola, 12 km al oeste de Tehuantepec, alt. ca. 350 m, 16 Nov. 1978, *Koch & Fryxell 78322* (paratypes: BH, CHAPA, ENCB, pf); Mpio. San Bartolo Yautepec, Puerto San Bartolo, alt. 1,010 m, 19 Nov 1978, *Koch & Fryxell 78363* (paratypes: CHAPA, CTES, ENCB, pf); Yerba Santa, San Antonio, 11 Apr 1966, *T. MacDougall s.n.* (paratypes: NY, US; the US duplicate bears the collection No. 10).

Distribution: Oaxaca, Mexico, in the southern part of the Isthmus of Tehuantepec (fig. 14).

The specific epithet refers to the resemblance of the flowers of the new species to those typical of the genus *Periptera*, with erect, narrow petals. The species shares this aspect of floral morphology with *H. colimensis*, *H. kochii*, and *H. acapulcensis*. Like these species also, *H. peripteroides* appears to be protogynous, with the styles elongating first and the androecium elongating later. (One might speculate that these species of *Hibiscus* with small red flowers and exerted genitalia share pollinators with *Periptera*.) *H. peripteroides* is distinctive for its involucl of broad linear bracts that are basally gamophyllous, forming a rounded cup. See further discussion under *H. kochii*.

The MacDougall localities cited above are more precisely located in the gazetteer of collecting localities given by Goodwin (1969).

#### 14. *Hibiscus colimensis* Fryxell, sp. nov.

Frutex 2 m altus. Ramunculi novelli minute stellato-pubescentes, pilis plerumque 4-brachiatis submalpigheaceisque, minus quam 1-mm diam., demum pilis cadentibus et caulibus glabrescentibus viridibusque. Lamina foliorum concolores, ovato-lanceolata, ad basem rotundata-truncata, pergrosse serrata (4–8 dentibus in quoque latere), usque ad 9 cm longa, 4.5 cm lata, acuta vel acuminata, palmatim 3–5-nervata (nervis prominentibus infra, haud supra), utrinque sparse ac minute stellato-puberulenta. Petioli 3–7 mm longi, stellato-pubescentes. Stipulae 6–8(–11) mm longae, erectae, subulatae, glabratae, rigidae basibus strumosis condylodes. Pedunculi axillari, solitarii, 5–10 mm longi, stellato-pubescentes. Involucellum 8-partitum, vir-

ide; bracteae involucellorum fere distinctae, lineares, minute stellato-pubescentes, calycem excedentes, 9–12 mm longae, 1–1.3 mm latae, acutae. Calyces infuscati, stellato-pubescenti, 7–9 mm longi, 5-lobati, obscure nervati; lobi calycis triangulares, ca. 2 mm longi, interdum purpurascenti. Petala coccinea, spatulata unguibus longis, 15–18 mm longa, 5 mm lata, erecta corollam tubularem formantes, extus pilis minutis glutinosis atque pilis stellatis dispersis. Columna staminalis per anthesin magnopere exserta (quam corollam duplo longior), pallida, torta; filamenta 2–3 mm longa, apicem versus insertae; antherae 50–60, pallidae, 0.5–0.7 mm longae. Styli 5, graciles, distaliter libri per 5 mm, glabri; flores protogyne ut videtur, stylis stigmatibusque exsertis ante androecium elongat, androecio stigmata demum excedentibus; stigmata non prominente. Capsula apiculata, 8–10 mm longa, antrorse strigosa praesertim apicem versus. Semina 2.5 mm longa, sericea, pilis fuscis 3–4 mm longis. (Fig. 19.)

Type: MEXICO: COLIMA: dry hills now leafless, 15–25 km NW of Santiago, road to Cihuatlán, Jalisco; elev. 50–100 m; occasional shrub 2 m high with slender wiry branches; flowers scarlet; 16 Mar 1965, *McVaugh et al. 23030* (holotype: ENCB; isotype: MICH).

The specific epithet is chosen in reference to the type locality (fig. 14). *Hibiscus colimensis* is similar to *H. acapulcensis* in its very coarsely serrate leaves, its narrow spatulate petals, and other characters, but may be distinguished by its shorter peduncles, its shorter involucl, its shorter calyx, its hispid fruit, and by the color and conformation of the calyx. See further discussion of the relationships of *H. colimensis* under *H. kochii*.

#### 15. *Hibiscus acapulcensis* Fryxell, sp. nov.

Frutex 1–2 m altus. Caules sparse stellato-pubescentes (pilis 3–6-brachiatis, patentibus vel adpressis, brachiis ca. 0.5 mm longis), seriebus decurrentibus pilorum curvatorum leviter vel haud expressis. Laminae foliorum usque ad 5 cm longae, 3 cm latae, ad basem truncatae, partibus tertiis proximalibus integris, cetera pergrosse dentatae (ca. 5–8 dentibus in quoque latere), acutae, palmatim 5-nervatae, utrinque sparse aequaliterque stellato-pubescentes (pilis plerumque 4-radiatis, supra plus minusve parvioribus). Petioli 3–4 mm longi, stellato-pubescentes atque zona pilorum simplicium recurvorum in facie adaxiali. Stipulae 4–7 mm longae, erectae,

(Continued on page 38.)

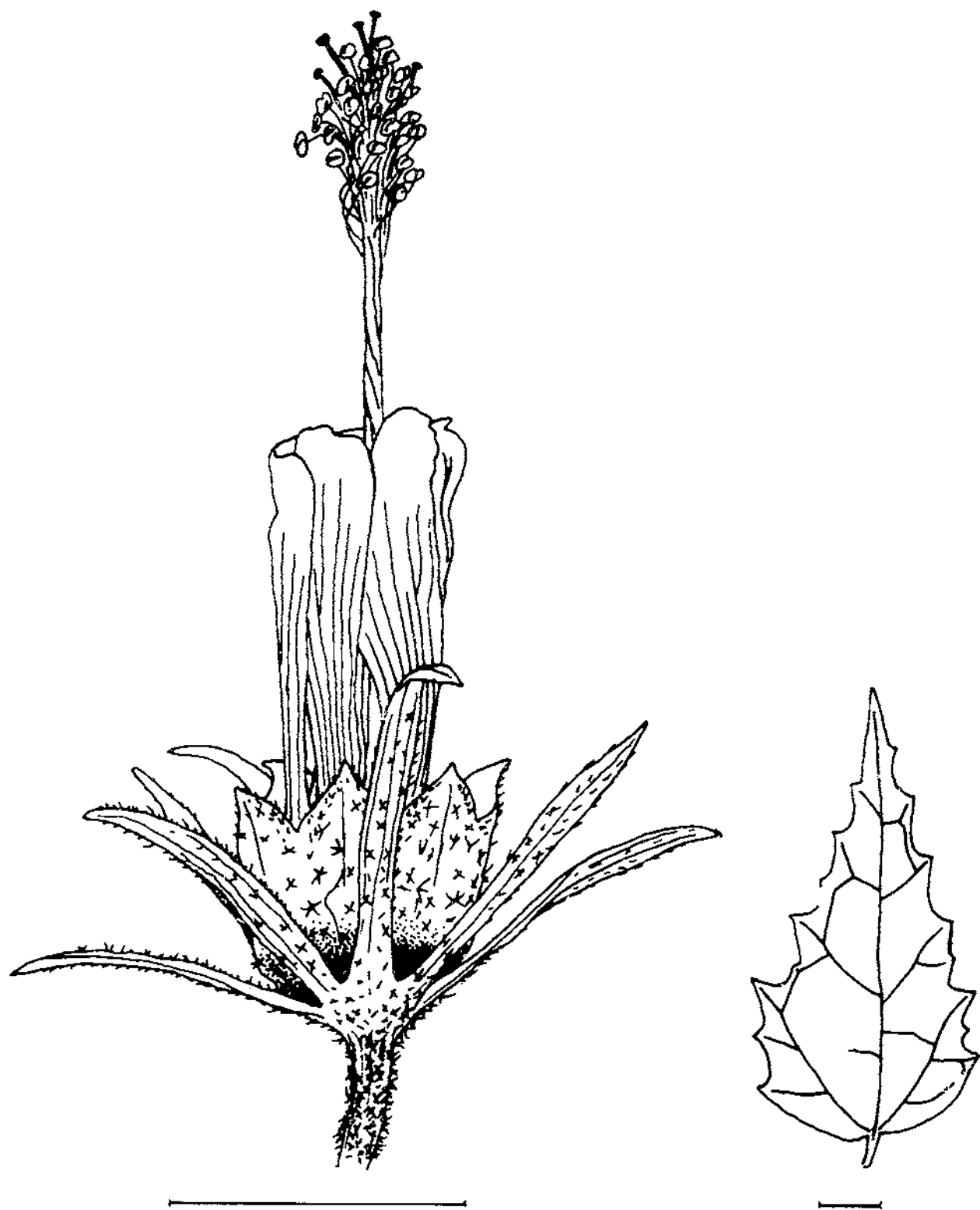


FIGURE 19. — *Hibiscus colimensis*. Flower, *McVaugh 23030*. The petals are red, the calyx is brownish (especially at base), the involucre is green, and the hairs are whitish. Scale: 1 cm.



FIGURE 20. — *Hibiscus acapulcensis*. Flower and leaf, *Troublefield & Rowell 2822-B*.  
The petals are red, the calyx is yellowish-brown with reddish lobes, and the involucre is green. Scale: 1 cm.

persistentes, spinescentes, petiolum aequantes vel excedentes. Pedunculi 1-3 cm longi, sparse stellato-pubescentes, infra flores 8-14 mm articulati, aliquantum plus dense pubescentes in pedicellis supra articulum. Bracteolae involucellorum 8-9, ad basem connatae per 1-1.5 mm, cetera distinctae, 15-18 mm longae, 1.2-2 mm latae, linearis, acutae, 1-3-nervatae, sparse stellato-hispidulae, viridae. Calyces 10-13 mm longi, 1/3-divisi, plus minusve urceolati (ad basem latiores, sursum aliquantum decrescentes), minute atque sparse stellato-puberulentes, in tubis flavidi, in apicem loborum (praeter costis pallidis) atro-rubentes. Petala 17-18 mm longa, glabra, erecta corollas tubulares formantia. Androecia exserta, 22-23 mm longa, columna glabra, filamentis 2-3 mm longis, antheris violaceis (?). Styli 5, glabri, rubelli, androecium per 2-3 mm excedentes; stigmata capitata, pallida (?), villosa, 0.2-0.5-mm diam. Capsulae oblongo-ovoideae, quasi glabrae, 10 mm longae, dehiscentes, per calycem urceolatum inclusae. Semina 3 mm longa, reniformia, sericea, pilis fuscis. (Fig. 20.)

Type: MEXICO: GUERRERO: 8 miles E of Acapulco, 5-ft shrub on mountainside, flowers red; 500 ft; 26 June 1952, *Troublefield & Rowell 2822-B* (holotype: SMU; isotypes: ENCB, MICH, pf).

The specific epithet is chosen in reference to the type locality (fig. 14). *Hibiscus acapulcensis* resembles *H. colimensis* in the very coarse serrations of the leaf margins and the narrow spatulate petals (in common also with *H. peripteroides*), and it resembles *H. kochii* in its slightly urceolate calyx with more or less purplish lobes. It may be distinguished from these species according to the characters given in the key and by characters noted in the discussion under *H. kochii*. All three of these Pacific coast species appear to be relatively rare, have restricted distributions, or both. See further discussion under *H. kochii*.

#### 16. *Hibiscus kochii* Fryxell, sp. nov.

Frutex 1-2 m altus, pauci-ramificantes. Caules aspere pubescentes, pilis plerumque 4-radiatis, plus minusve adpressis, radiis ca. 0.5 mm longis; series decurrentes pilorum curvatorum haud expressi. Laminae foliorum usque ad 15 cm longae, 7.5 cm latae, ad basem truncatae, marginibus basaliter integris autem maximum partem grosse serratis (ca. 8-10 serraturis in quoque latere), acuminatae, palmatim (3-5)-nervatae, utrinque aequaliter stellato-pubescentes (pilis plerumque 4-radiatis, supra plus

minusve parvioribus), nectario infra prope basem costam. Petioli 3-5 mm longi, stellato-pubescentes atque pilis minutis recurvatis in superficiebus adaxialibus. Stipulae 5-10(-13) mm longae, erectae, persistentes, lineari-falcatae. Pedunculi 0.5-1.5(-2) cm longi, dense stellato-pubescentes, infra flores 4-7 mm articulati. Bracteolae involucellorum 9-10, fere distinctae, 13-16 mm longae, 1-2.1 mm latae, lineares, acutae, 1-3-nervatae, sparse stellato-hispidulae, virides. Calyces 10-12 mm longi, 1/3-1/2-divisi, plus minusve urceolati (ad basem latiores, sursum aliquantum decrescentes), minute stellato-pubescentes, ad basem flavidi, lobis interdum viridis, plerumque atro-purpureis praeter 3 nervis viridis. Petala rubra, 16-18 mm longa, anguste spatulata (partibus latissimis 3-5 mm latis), erecta corollas tubulares formantia, extus grosse stellato-pubescentes. Androecia exserta, 22-23 mm longa, columna pallida, torta, glabra autem minute papillata, filamentis 2-3 mm longis, antheris atque polline rubellis vel aurantiacis, numerosis. Styli 5, graciles, glabri, rubelli; flores ut videtur protogyne, stylis stigmatibusque permature exsertis; stigmata capitata, villosa, rubella, 0.2-0.4-mm diam. Capsulae oblongo-ovoideae, antrorse hispidae, 12 mm longae, dehiscentes, calyces parum excedentes. Semina 2.2 mm longa, sericea, pilis fuscis 3-4 mm longis. (Fig. 21.)

Types: MEXICO: OAXACA: Mpio. Pochutla: ca. 4 km al N de Puerto Angel, por la carretera a Pochutla; selva caducifolia con *Bursera*, leguminosas, y *Ficus*; suelo somero, franco; alt. 100 m; en la orilla de la carretera en vegetación densa; muy escasa; 22 Nov 1978, *Koch & Fryxell 78405* (holotype: CHAPA; isotypes: ENCB, MO, pf); 1-2 km al O. de Puerto Angel, por la brecha a la Escuela de Pesca; arroyo con selva baja caducifolia perturbada, con *Croton*, *Bursera*, y diversas leguminosas; suelo arcilloso; alt. 50 m; escaso en sitios sombreados; 22 Nov 1978, *Koch & Fryxell 78403* (paratypes: CHAPA, ENCB, pf). Mpio. San Pedro Mixtepec: terracería a San Gabriel Mixtepec, 6.5 km al Norte de Puerto Escondido, alt. 160 m, 10 Nov 1979, *Koch, Fryxell, & Wendt 79464* (paratypes: CAS, CHAPA, ENCB, K, MEXU, MO, NA, NY, WIS, pf); terracería a San Gabriel Mixtepec, 8 km al Norte de Puerto Escondido, alt. 40 m, 10 Nov 1979, *Koch, Fryxell, & Wendt 79466* (paratypes: CHAPA, ENCB, F, MEXU, XAL, pf). Mpio. Santa María Huatulco: carretera a Salina Cruz, 52-53 km E de entronque con la carretera Pochutla-Puerto Angel, alt. 50 m, 14 Nov 1979, *Koch, Fryxell, & Wendt 79539* (paratypes: BM, CAS, CHAPA, ENCB, MEXU, NY, XAL, pf).

The new species is named for Stephen D. Koch, cocollector of the type, whose unflagging energy and good humor on collecting trips have been appreciated no less than his broad knowledge of Mexican botany. The new species has strikingly beautiful (though small) flowers, notable for their contrasting colors: involucrel green, calyx yellow at base with dark purplish lobes with pale veins, cor-



FIGURE 21. — *Hibiscus kochii*. Flower and leaf, Koch & Fryxell 78405. The pollen is orange, and the petals are red. The calyx, yellowish at the very base, has black-purple lobes with yellow-green nerves. The involucre is green. Scale: 1 cm.



olla bright red, and the exerted androecium a rich orange-red. *Hibiscus kochii* is similar to *H. acapulcensis* in certain respects but may be distinguished from it by its denser pubescence and by a number of other characters, most of which are employed in the key.

The red-flowered species of *Hibiscus* occurring along the Pacific watershed from Colima to Oaxaca (fig. 14) are similar in many respects and therefore deserve a careful comparison. Only two of them (*H. peripteroides* and *H. kochii*) have been collected frequently enough for us to say that we have a good understanding of their geographical and morphological ranges; both kinds of ranges are clearly limited. The remaining species (*H. colimensis*, *H. acapulcensis*, *H. nelsonii*) are known from only one collection each. Whether this scarcity of collections is a result of the rarity of the plants, inaccessibility of the areas in which they grow, or the obscurity of the plants in the associated vegetation is not certain; all three of these factors probably play a role. I think a principal role is played by the obscurity of the plants, as they are understory shrubs for the most part, growing in shady (though seasonally arid) situations, often in very dense vegetation. Their branching is sparing; their foliage is sparse; and, although their flowers are brightly colored, they are sparingly produced, and each flower lasts only 1 day. They are thus easily overlooked by botanists (even those who are looking for them) and are probably not as rare as they seem. I believe that these isolated collections are representative of discrete, narrowly distributed species rather than of variation within a single widespread and variable species. Precedent exists in section *Bombicella* for both patterns of variation. Future collections will provide the test for this interpretation.

*Hibiscus nelsonii* stands apart from this group, and is the most distinctive in its broadly spatulate involucellar bracts, rounded calyx lobes, and distinctively hispid calyx pubescence. *H. peripteroides* is also easily distinguished by the form of its involucl, the bracts of which are broadly linear and connate basally to form a rounded cup, together with a narrowly tubular green calyx. However, there is a tendency in *H. acapulcensis* toward a similar form of the involucl, indicating a relationship, although the tendency is not strong enough that the two species might be confused.

The remaining three species (*H. colimensis*, *H. acapulcensis*, and *H. kochii*) show similarities indicative of close alliance. The most striking characters are the form and coloration of the calyx. The

form is urceolate in *H. acapulcensis* and *H. kochii*, and essentially tubular in *H. colimensis*. The tips of the calyx lobes are usually darkly pigmented (except for the veins) in *H. kochii*, have much less pigmentation in *H. acapulcensis*, and have only a tendency toward such coloration in *H. colimensis*. Other characters (petal and fruit pubescence, pedicel and involucl length, dentation of the leaves, as presented in the key and in the descriptions) support the distinction of these taxa in specific rank.

17. *Hibiscus lavateroides* Moricand, Pl. Nouv. Amer. 23. t. 16. 1836. Type: MEXICO: near Tampico, *Berlandier 127* (BM, CAS, G, L, UC, US).

*Hibiscus marmoratus* Lemaire, Illus. Hort. 3: t. 82. 1856 (reproduced with modification in *Fl. des Serres t. 1159*). Type: plate 82.

*Hibiscus longipes* Standley, J. Wash. Acad. Sci. 14: 238. 1924. Type: EL SALVADOR: Finca San Nicolás, *Choussy 5* (holotype: US).

Distribution: West Indies, Mexico, Guatemala, Belize, El Salvador, and Honduras; sometimes cultivated. Borssum Waalkes (1966, p. 75) notes that *H. lavateroides* has been cultivated in Java.

Shrub 1-1.5 m tall, the stems evenly stellate-pubescent, and with longitudinal lines sometimes evident of dense more or less recurved smaller hairs, the hairs relatively persistent. Leaves cordate-ovate or weakly 3-lobed, crenate or dentate to subentire, acute, 4-9 cm long, 3.5-8 cm broad, palmately or pedately 7-nerved, with elongated (obscure) nectariferous zone at base of midrib beneath (or at base of 3 principal veins), evenly stellate-pubescent beneath, the hairs predominately 3-armed (the arms up to 1 mm long), the hairs of the upper surface smaller and with a tendency toward antrorse orientation. Petioles with pubescence like that of stem, up to 4 cm long,  $\frac{1}{2}$  the length of lamina or less. Stipules erect, linear, antrorsely pubescent, 4-5 mm long. Peduncles solitary in the axils, 2-8 cm long, medially articulated, with pubescence like that of stem. Pedicels 5-10 mm long in flower to 35 mm long in fruit. Involucellar bracts 9, distinct, broadly spatulate, acute, 8-10 mm long and 3 mm broad in flower to 12-15 mm long and 4.5-5.5 mm broad in fruit, with pubescence like that of leaf lamina. Calyx 16-19 mm long in flower to 22 mm in fruit, ca.  $\frac{1}{2}$ -divided, stellate-pubescent externally, minutely puberulent within. Petals lavender, 3-4 cm long, stellate-pubescent externally where exposed in bud, glabrous within except ciliate on claw.

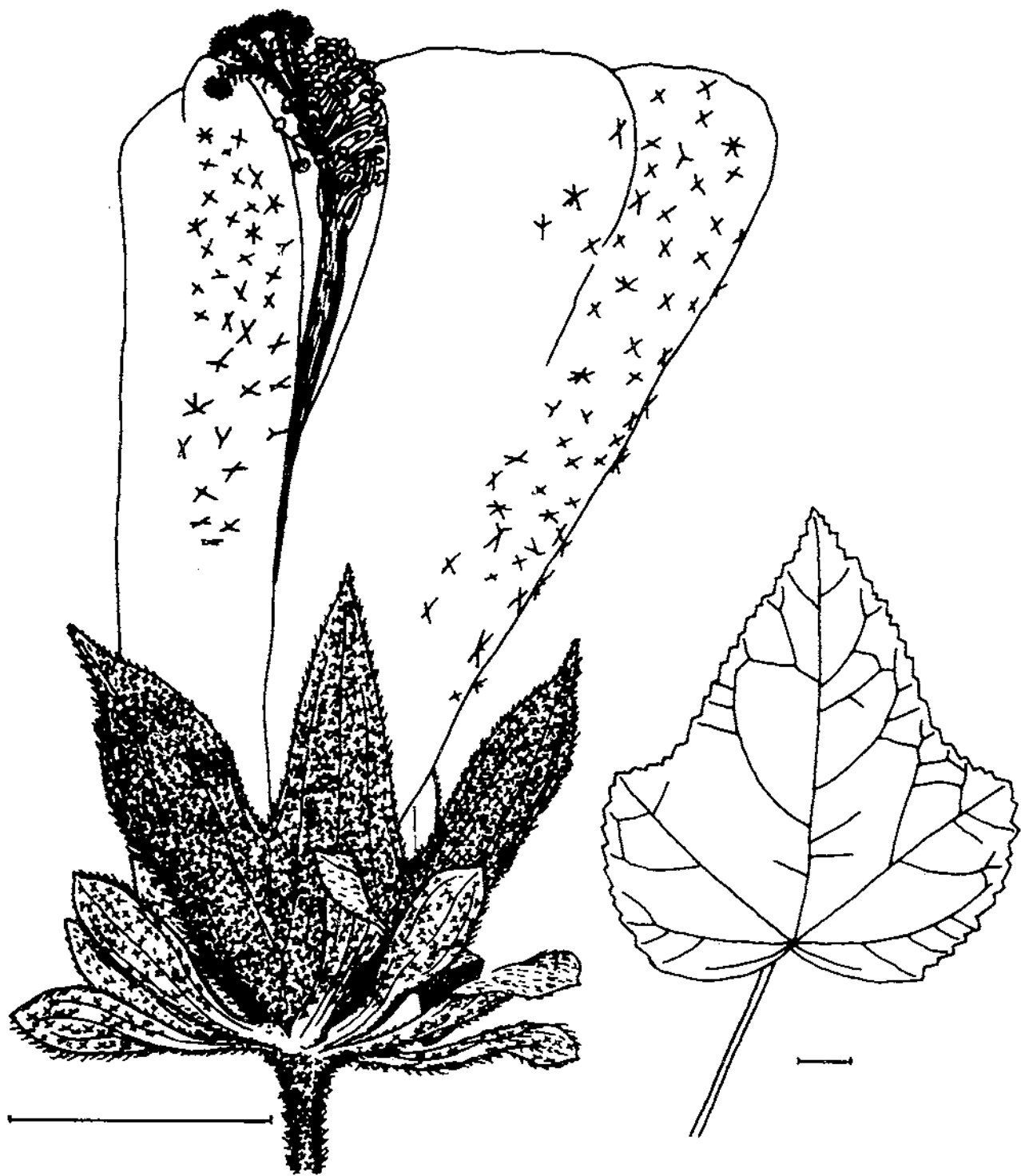


FIGURE 22. — *Hibiscus lavateroides*. Flower, Molina & Molina 30855. Leaf, Lundell 16625A. Scale: 1 cm.

Staminal column pallid, glabrous, antheriferous only near apex; filaments 2–4 mm long, sometimes secundly arranged, the androecium nearly equaling the petals. Styles 5, with scattered long white hairs; stigmas capitate, reddish, 0.7–0.8-mm diam., villos, slightly exceeding the petals. Capsule 12–14 mm long, stellate-pubescent, dehiscent. Seeds dark, 3 mm long, reniform, sericeous, the hairs chestnut-colored, 5 mm long. (Fig. 22.)

Additional specimens examined:

JAMAICA: CORNWALL: near Lucea, *Britton 2898* (NY); vic. Montego Bay, *Maxon & Killip 1645* (A, GH, NY, US). MIDDLESEX: St. Ann Parish: Grierfield, *Adams, 8737* (BM); Manchester Parish: Glasgow Distr., N of Auchtembeddie, 1,500 ft, *Proctor 24752* (GH, LL, MICH, NY, US); SE side of Heron's Hill, 1,600 ft, *Howard, Proctor, & Wagenknecht 20523* (A, LL).

GUADELOUPE: Basse-Terre, *Duss 2324* (NY, US) 3209 (US).

MEXICO: WITHOUT LOCALITY: *Jaener 127* (MO). TAMAULIPAS: vic. Tampico, *Palmer 586* (US). VERACRUZ: Pánuco, *Palmer 348* (GH, NY, US); Laguna de Nixtamalapan, *Sousa 2207* (CAS).

GUATEMALA: PETEN: La Libertad, *Aguilar 273* (MICH, MO, NY); Uxactún, *Lundell 16625* (LL, pf), *Lundell & Contreras 19921* (LL), *Bartlett 12291* (CAS, MICH, US); Santa Elena, km 6, camino para San Andrés, R. *Tán Ortiz 1373* (BM, MICH, US); Lake Petén Itza, ca. 15 miles from Flores, *Lundell 18300* (LL); Santa Elena, *Lundell 17308* (LL, pf), *Contreras 6140* (LL), W of San Andrés, *Lundell 17241* (LL), San Miguel, *Contreras 7510* (LL), San Andrés Road, *Contreras 9654* (LL, pf).

BELIZE: El Cayo Distr., vic. El Cayo, *Chanek 32* (MICH), *Chanek 50* (MICH).

EL SALVADOR: San Salvador, *Calderón 820* (US).

HONDURAS: DEPT. COPAN: in thickets along Yaruagua Creek, 1 mile W of Copán Ruinas, *Molina & Molina 30855* (EAP, F, pf). DEPT. CORTES: La Lima, cultivated, *Dickson 1362* (US). DEPT. SANTA BARBARA: Río Chambeleon, *Thieme 5152* (BM, US).

18. *Hibiscus escobariae* Fryxell, sp. nov.

Frutex 1.6 m altus. Caules erecti, teretes, virides juventute, cortice brunneola deinde, moderate stellato-pubescentes, pilis plerumque 3–4-brachiatis, brachiis 0.5–1 mm longis, interdum plus minusve pungentibus, seriebus decurrentibus pilorum curvatorum plerumque bene evolutis. Lamina foliorum ovato-triangularia, usque ad 7 cm longa, 5.5 cm lata, ad basem truncata, crenato-serrata, acuta, palmatim 5-nervata, nervis pallidis, nectario infra prope basem costam, utrinque sparse stellato-pubescentes, pilis infra plerumque 3–4-brachiatis, supra 1–4-brachiatis, brachiis ca. 0.5 mm longis. Petioli 0.5–0.8 cm longi, sparse stellato-pubescentes atque pilis recurvatis in superficiebus adaxialibus. Stipulae 1.5–3.5 mm longae, erectae, persistentes,

lineares. Pedunculi 0.5–2 cm longi, solitarii in axillis foliorum, infra flores 4–7 mm articulati, stellato-pubescentes, pilis plus densis atque longis (usque ad 1.5 mm) supra articulum. Bracteolae involucellorum 9, lineares, 8–10 mm longae, 0.5–0.8 mm latae, acutae, sparse pubescentes, virides. Calyces 12–16 mm longi, aequaliter stellato-pubescentes, usque ad ½-divisi, lobis 5, triangularibus, acutis, 5–7 mm longis. Petala ca. 4 cm longa, lilacina pallida (in sicco fere alba), fere ubique extus stellato-pubescentes, intus glabra. Androecia inclusa; columna ca. 3 cm longa, glabra, pallida, 0.5-mm diam., antherifera in 8 mm distalibus; antherae atrosanguineae confertae in filamentis brevis (1 mm); pollen aurantiaca. Styli glabri, pallidi, androecium per 3 mm excedentes; stigmata capitata, villosa, 0.8-mm diam., plus minusve pallida. Capsulae 12–13 mm longae, dehiscentes, distaliter stellato-pubescentes, pilis plerumque 3-brachiatis, brachiis 0.5–1 mm longis, cetera glabrae. Semina ignota. (Fig. 23.)

Type: ECUADOR: Provincia de El Oro [pocos km al Sur de Arenillas, 80°3'W, 3°34'S], 80 m; arbusto de hasta 5 pies, de flores color morado claro, crece bajo árboles en bosque muy seco tropical perturbado. Polen rojo. 27 May 1979, L. Albert de Escobar 1298 (holotype: TEX; isotypes: HUA, QCA, pf).

The new species is named for the collector, Linda Escobar, whose recent collections from Ecuador have included this new species among many interesting collections. *H. escobariae* shows its closest affinity with *H. lavateroides* but may be distinguished by its smaller, unlobed leaves, its shorter peduncles, its narrower involucellar bracts, its smaller calyces and androecium, but equally large petals, and its glabrous styles.

19. *Hibiscus longifolius* Fryxell, *Brittonia* 25: 78. 1973. Type: MEXICO: PUEBLA: near Tehuacán, *Purpus 1262* (holotype: UC; isotypes: F, GH, NY).

Distribution: desert regions of southern Puebla and northern Oaxaca, Mexico, around 2,000 m elevation (fig. 14).

Shrub 1–1.5 m tall. Stems woody, up to 5 mm in diam. or more, densely canescent (the indumentum whitish or ferruginous, composed of interlaced stellate hairs). Leaf lamina truncate or cordate, ovate, rounded-acute, crenate or dentate, discolored, softly stellate-tomentose, very densely so beneath, 20–50 mm long, 15–35 mm wide. Petioles densely canescent, 5–15(–20) mm long, ¼–½ the length of the lamina. Stipules 1–3 mm long, fili-

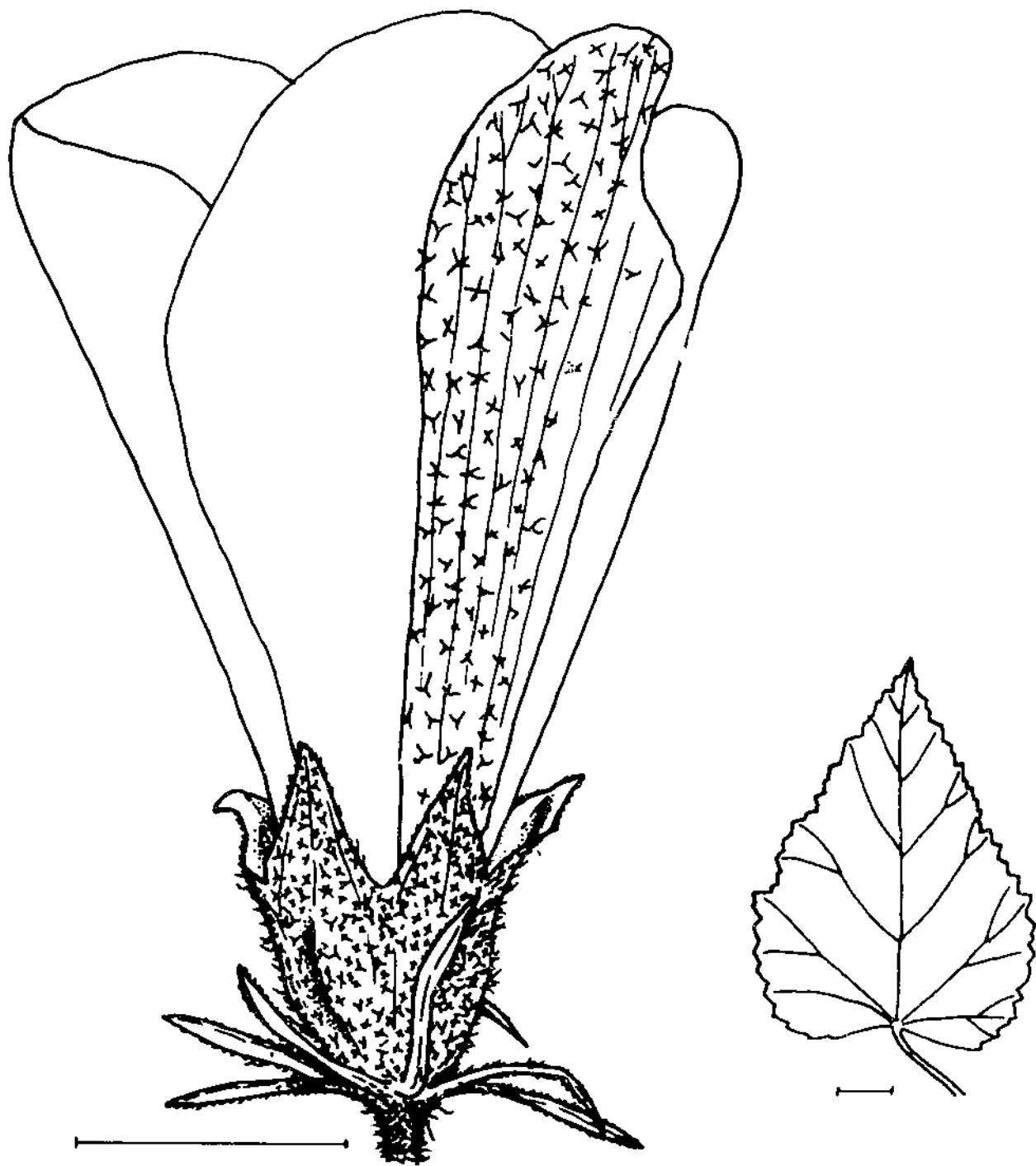


FIGURE 23. — *Hibiscus escobariae*. Flower and leaf, Escobar 1298. Scale: 1 cm.



FIGURE 24. — *Hibiscus longifolius*. Flower, Delgado & Garcia 570. Leaf, Stevens et al. 2518.  
The pubescence of the calyx and involucre is only partially indicated. Scale: 1 cm.

form, caducous. Peduncles solitary in the axils, 2-3.5 cm long, canescent, obscurely articulated at or above the middle. Involucellar bracts 6-7, free, inserted at the base of the calyx, sessile, broadly lanceolate or subspatulate, acute, 7-13 mm long, (2-) 4-6 mm broad, tomentose. Calyx 15-22 mm long, ca.  $\frac{4}{5}$ -divided, the lobes 5-10 mm wide at the base, tomentose. Petals bright-red drying red-purple, 3-4 cm long, 2-3 cm broad, glabrous. Staminal column ca. 15 mm long, 1-mm diam., glabrous, pallid, the free filaments originating nearly throughout length of the column, slender, 10-18 mm long, the androecium almost equaling the petals. Style reddish, single as it emerges from the staminal column, 5-branched for the distal 10 mm, the branches slender, sparsely hairy toward the apex, the hairs white, 0.5-1 mm long. Stigmas reddish, capitate, 0.3-1-mm diam., slightly exceeding the petals. Capsules 8-14 mm long, ovoid or oblong, apiculate, glabrous. Seeds ca. 2.5 mm long, reniform, blackish, sericeous, the hairs sordid, 3-4 mm long. (Fig. 24.)

Additional specimens examined: MEXICO: OAXACA: 1 mile S of Oaxaca-Puebla border, 6 miles SW of Acatepec, *Moran 7714* (SD), *Stevens et al. 2518* (MSC, pf); Mpio. Cuicatlán, Cañon de Tomellín, *Delgado & Garcia 570* (CHAPA, pf). PUEBLA: Cerro de Chicamole, Aug 1909, *Purpus s.n.* (UC); Cerro de Paxtle, near San Luis Tultitlanapa, *Purpus 3258* (UC); Sierra de Chalchi, *Miranda 3507* (MEXU); 2 mi W of Petlalcingo, *Dunn, Dziekanowski & Pennell 23056* (UMO).

20. *Hibiscus cardiophyllus* A. Gray, *Smiths. Contr. Knowl. 3* (art. 5, Pl. Wright. Texano-Neo-Mexicanae, part 1): 22. 1850 (non Baillon, 1885). Lectotype: UNITED STATES: TEXAS: Turkey Creek, West Texas, *Wright 527* [63] (GH; isolecotypes: GH, K, NY); syntype: on the Rio Grande, S. Texas, *Wright s.n.* (GH).

*Hibiscus martianus* Zuccar. *Linnaea* 24: 193. 1851. Type: in cult. Monac. ex Mexico, 1845, *Zuccarini s.n.* (BR).

Distribution: Texas, U.S.A., and northeastern Mexico, south to Puebla from near sea level to 1,700 m elevation.

Shrub 0.5-1.5 m tall, the entire plant densely and evenly stellate-pubescent. Leaf lamina cordate, inconspicuously serrate to (rarely) subentire, ovate or weakly trilobulate, obtuse to acutish, markedly discolored, with interlacing stellate hairs above and beneath, palmately 7-9-nerved, 3-7 cm long, about as wide as long, often with an inconspicuous nectary at the base of the midrib beneath. Petioles up to 9 cm long, somewhat shorter than to some-

what longer than the lamina, evenly stellate-pubescent. Stipules 4-7 mm long, pubescent, linear-lanceolate, sometimes bifid, spreading, caducous. Pedicels solitary in the axils of the leaves, 4-11 cm long, exceeding subtending petiole, evenly stellate-pubescent, articulated 0.5-1 cm below flower. Bracts of involucre ca. 9, distinct, spatulate, acute, 15-20 mm long (shorter than the calyx), 3-6 mm wide (broadest at the middle), 3-5-nerved, stellate pubescent, discolorous. Calyx stellate-pubescent, 22-30 mm long, campanulate, more than  $\frac{1}{2}$ -divided, 5-lobed; lobes lanceolate, gradually acuminate, 3(-5)-nerved, 9-10 mm broad (at sinus). Petals bright-red, 15-28 mm long, glabrous. Staminal column 8-10 mm tall, pallid, glabrous, surmounted by 5 minute teeth; filaments 2-5 mm long; anthers whitish, pollen yellow, spherical, echinate. Styles 5, slender, glabrous, exerted from staminal column by 3-4 mm; stigmas capitate, villous, 1-mm diam., purplish. Capsule 15-20 mm long, sparingly hispid to essentially glabrous, straw-colored at maturity. Seeds reniform, blackish, 3.5 mm long, minutely pubescent, the hairs whitish. (Fig. 25.)

Gray cites two specimens of Charles Wright as syntypes and then adds reference to several other specimens in the role of paratypes: "Also Zimapan, Mexico, *Coulter* (No. 805). Near Monterey, *Gregg* (185, &c), *Dr. Edwards & Major Eaton, Wislizenus* (370)." The Wright specimens, however, are the focus of attention for typification of this species.

Gray's citation of the Wright collections reads "Rocky hill-sides, Turkey Creek, W. Texas, June; and on the Rio Grande, in Southern Texas." The first of these collections was made by Wright in June 1849 (probably June 21-29) on Turkey Creek in western Uvalde County, Tex., near the present-day Clive (McKelvey, 1955, p. 1065). Wright's collection number was 527, but Gray renumbered this 63 when he distributed duplicates, and it is by the latter number that isotypes may be identified in other herbaria.

The second Wright collection was made on August 24, 1848 "on the hills near the Rio Grande" in the vicinity of Eagle Pass in Maverick County, Tex. (McKelvey, 1955, p. 1057). Both collections are in fruiting condition and mounted on the same sheet in the Gray Herbarium. The 1849 Turkey Creek collection is designated as lectotype because duplicates of it are more widely distributed to other herbaria.

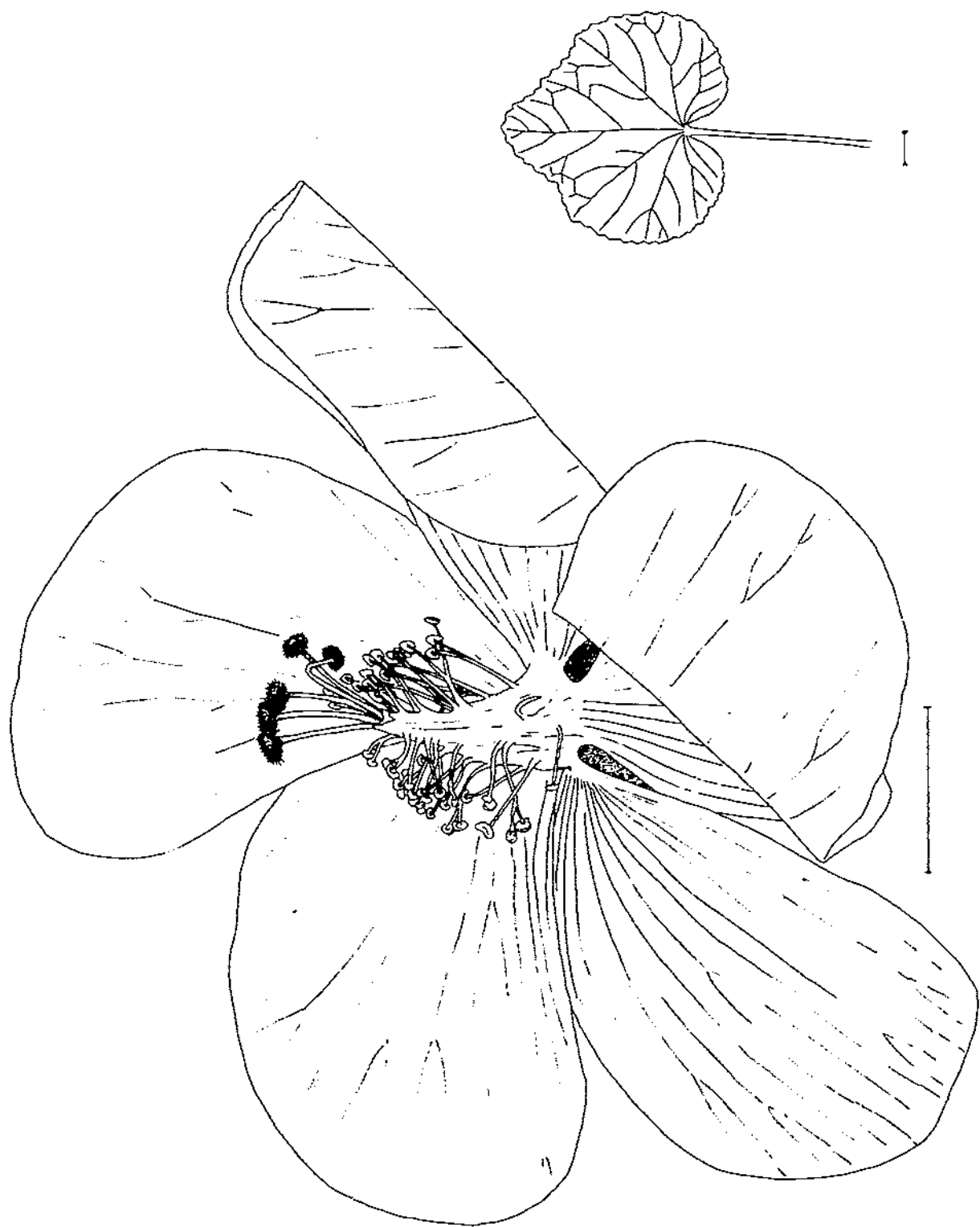


FIGURE 25. — *Hibiscus rardiophyllus*. Flower, Weedon 4009. Leaf, Fryxell 1323. Scale: 1 cm.

Additional specimens examined:

MEXICO: PUEBLA: 2 miles W of Tehuacán, *Pringle* 6751 (BM, BR, K, MICH, MO, ND, RM, UC); Sierra de Chaichi, *Miranda* 3508 (MEXU); Cerro de Paxtle, near San Luis Tultitlanapa, *Purpus* 3258 (BM, MO, UC, US); El Riego, *Purpus* 1266 (UC). HIDALGO: Zimapán, *Coulter* 805 (paratype: K). SAN LUIS POTOSÍ: eastern SLP, *Kenoyer* 2398 (CAS); 6 km S of Núñez, *Handlos* 262 (MO); Minas de San Rafael, *Purpus* 4902a (BM, MO) 4902 (UC); 35 km SSE de Rioverde, *Rzedowski* 7711 (ENCB); 8 km al W de San Lorenzo, *Rzedowski* 6452 (ENCB, MICH); Santa Ana Pozas, Mpio. de Guadalcázar, *Rzedowski* 10803 (ENCB); 19 km al SSE de Rioverde, *Rzedowski* 24846 (ENCB); 2 km al NNE de Cárdenas, *Rzedowski* 24618 (DS, ENCB, MICH); 2.5 miles NW of Santo Domingo, *Moran* 13388 (SD). TAMAULIPAS: without locality, *Berlandier* 3110 (K); San Miguel, Sierra de San Carlos, *Bartlett* 10551 (MICH) 10674 (MICH); 4.7 miles N of Jaumave, *Harriman* 11539 (OSH, pf); 11 miles NE of Jaumave, *Crutchfield & Johnston* 5614 (MICH); 34 miles S of Cd. Victoria, *Dunn, et al.* 23106 (UMO); 1 mile S of turnoff to Llera, *Gaumer & Clark* 9 (pf); ca. 30 miles S of Cd. Victoria, *Higgins* 2616 (ENCB, MICH), *Fearing & Thompson* 166 (SMU); 15 km S of Cd. Victoria, *Fryxell* 1014 (DS, GH, MEXU, MICH, NY, UC, pf); between Cd. Victoria and Cd. Mante, *Moore & Wood* 3632 (A); 69 km N of Cd. Victoria, *Fryxell & Bates* 823 (BH, CTES, MEXU, NA, TAES, pf); 146 km N of Cd. Victoria, *Fryxell & Bates* 816 (BH, pf); 7 miles NW of Padilla, *Daniel & Meschbat* 342 (SMU); Punta Algodón, ca. 50 miles SE of San Fernando, *Fryxell* 1225 (pf); 50 miles SE of Nuevo Laredo, *García & García* 31 (SMU). NUEVO LEÓN: Cañon de Meleros, Santa Catarina, *Marroquin s.n.* (ECNB); Huasteca Canyon, 7 miles S of Santa Catarina, *Moran* 7826 (SD, UC), *Ward* 5712 (MICH), *Kruckeberg* 4860 (DS, RM, UC); S base of Sierra del Fraile (25.51°N, 100.32°W), *Reeves* 6074 (ASU, pf); 10 miles W of Monterrey, *Schery* 19 (MICH, MO); near Monterrey, *Pringle* 1943 (BM, BR, K, UC); 8 mi W of Monterrey, *Hitchcock & Stanford* 6833 (DS, RM, UC); 72 km N of Monterrey, *Fryxell* 1323 (CAS, pf); 9 km W of Sabinas Hidalgo, *Fryxell & Kirkpatrick* 2432 (CHAPA, MSC, pf); 20 miles E of Sabinas Hidalgo, *García* 6 (SMU); 7.4 miles SE of Linares, *Gaumer & Clark* 24 (pf). COAHUILA: W of Monterrey, *Gregg* 185 (paratypes: GH, K); Saltillo, *Palmer* 308 (MO); Sierra de Parras, *Purpus* 1043 (MO, UC), *Purpus* 4643 (BM, MO), *Purpus* 4943 (UC); Mt. Caracol, 21 miles SE of Monclova, *Palmer* 107 (K, MO); 63 miles S of Monclova, *Soderstrom* 368 (MICH); between San Buenaventura and Cuatrociénegas, *Fryxell et al.* 1492 (BH, MEXU, pf); Múzquiz, Santa Anna Canyon, *Marsh* 419 (SMU); Puerto San Lázaro, Sierra San Lázaro, *Muller* 3061 (MICH, UC). CHIHUAHUA: Sierra del Diablo, 8 km NW of Cañon del Rayo, *Stewart* 983 (BM, UC).

UNITED STATES: TEXAS: STARR COUNTY: Rio Grande City, *Tharp* 6040 (US), *Hunt* 26 (DS); 9 mi E of Rio Grande City, *Lundell & Lundell* 9987 (DS); Falcon State Park, *Fleetwood* 11568 (SMU); 30 miles NE of Roma, *Lonard* 2043 (SMU, UC). CAMERON COUNTY: Rio Hondo, *Chandler* 7048 (MO, UC, US); 5 miles above Laguna Atascosa, *Traverse* 1115 (SMU). HIDALGO COUNTY: 12 mi W of Mission, *Clover* 38 (DS, CAS). WEBB COUNTY: vic. Laredo, *Rose* 18048 (US), *Rose et al.* 8234 (US), *Ramírez* 32 (SMU); 15 miles N of Laredo, *Cabrera* 67 (SMU). VAL VERDE COUNTY: vic. Del Rio, *Rose & Fitch* 17976 (US), *Hanson s.n.* (MO), *Tharp* 3585 (US); near mouth of Pecos River, Oct. 1883, *Howard s.n.* (US), *Hinckley & Hinckley* 464 (US). KINNEY COUNTY: Anacacho Springs, *Parks* 14041 (SMU). DIMMIT COUNTY: 8 miles NW of Carrizo Springs, *Johnston et al.*

3569 (RM, SMU). McMULLEN COUNTY: Tilden, *Parks* 1499 (SMU). SAN PATRICIO COUNTY: 7.5 miles S of Taft on bluff overlooking Nueces Bay, *Jones* 357 (SMU). ZAPATA COUNTY: 4 miles NW of Zapata, *Reed* 372 (SMU); 15 miles N of San Ygnacio, *Cory* 35889 (SMU). LIVE OAK COUNTY: Clegg, *Parks* 1517 (MO). UVALDE COUNTY: Montell, *Palmer* 12997 (CAS, K, MO).

21. *Hibiscus denudatus* Bentham, Bot. Voy. Sulphur 7. t. 3. 1844. Type: MEXICO: BAJA CALIFORNIA: Magdalena Isld., *Barclay* [3085] (lectotype: K; isotype: BM); syntype: *Hinds s.n.* (K).

*Hibiscus involucellatus* (A. Gray) Wootton & Standley, Contr. U.S. Natl. Herb. 19: 417. 1915. Based on: *Hibiscus denudatus* var. *involucellatus* A. Gray, Smiths. Contr. Knowl. 3 (art. 5, Pl. Wright. Texano-Neo-Mexicanae, part 1): 22. 1850. Type: UNITED STATES: TEXAS: near El Paso, *Wright s.n.* (holotype: GH; isotype: K).

Distribution: Baja California, Mexico; California, Arizona, New Mexico, and Trans-Pecos Texas, U.S.A.; and Coahuila, Mexico, south to Durango, from near sea level to 1,300 m elevation.

Subshrub 0.5–1 m tall. Stems densely stellate-pubescent, the hairs 6–10-armed, yellowish. Leaf lamina ovate, oblong, or orbicular, basally truncate, crenate-dentate to subentire, usually obtuse (sometimes acute), palmately 3–7-nerved, densely stellate-pubescent above and below, slightly discolorous, usually longer than broad, up to 3 cm long, 3 cm broad. Petioles 5–10 mm long, with pubescence like that of stem. Stipules inconspicuous, pubescent, 2–3 mm long, subulate, caducous. Peduncles 0.5–1.5(–4.5) cm long, with pubescence like stem. Involucellar bracts subulate to filiform, 0.5–4 mm long (sometimes wholly suppressed), pubescent, persistent. Calyx 11–15 mm long, deeply divided, densely stellate-pubescent; lobes 3-nerved, lanceolate-acuminate. Petals 20–27 mm long, 15–20 mm broad, lavender (sometimes white) usually with dark spot near base, almost glabrous (sometimes ciliate on claw). Staminal column glabrous, 8–9 mm high, sometimes purplish near base, stamiferous throughout; filaments 2–3 mm long; anthers numerous, lavender (?); pollen orange or yellow, spheroidal, echinate. Styles exceeding staminal column by 5–6 mm, 5-parted for distal 3 mm, glabrous or with sparse delicate white hairs; stigmas capitate, maroon (or often whitish in Baja California), hairy. Capsules 7–8 mm long, globose, when immature or just ripened greenish with 5 longitudinal dark-green stripes, becoming uniformly straw-colored in age, basally glabrous, apically somewhat pubescent with mostly simple hairs



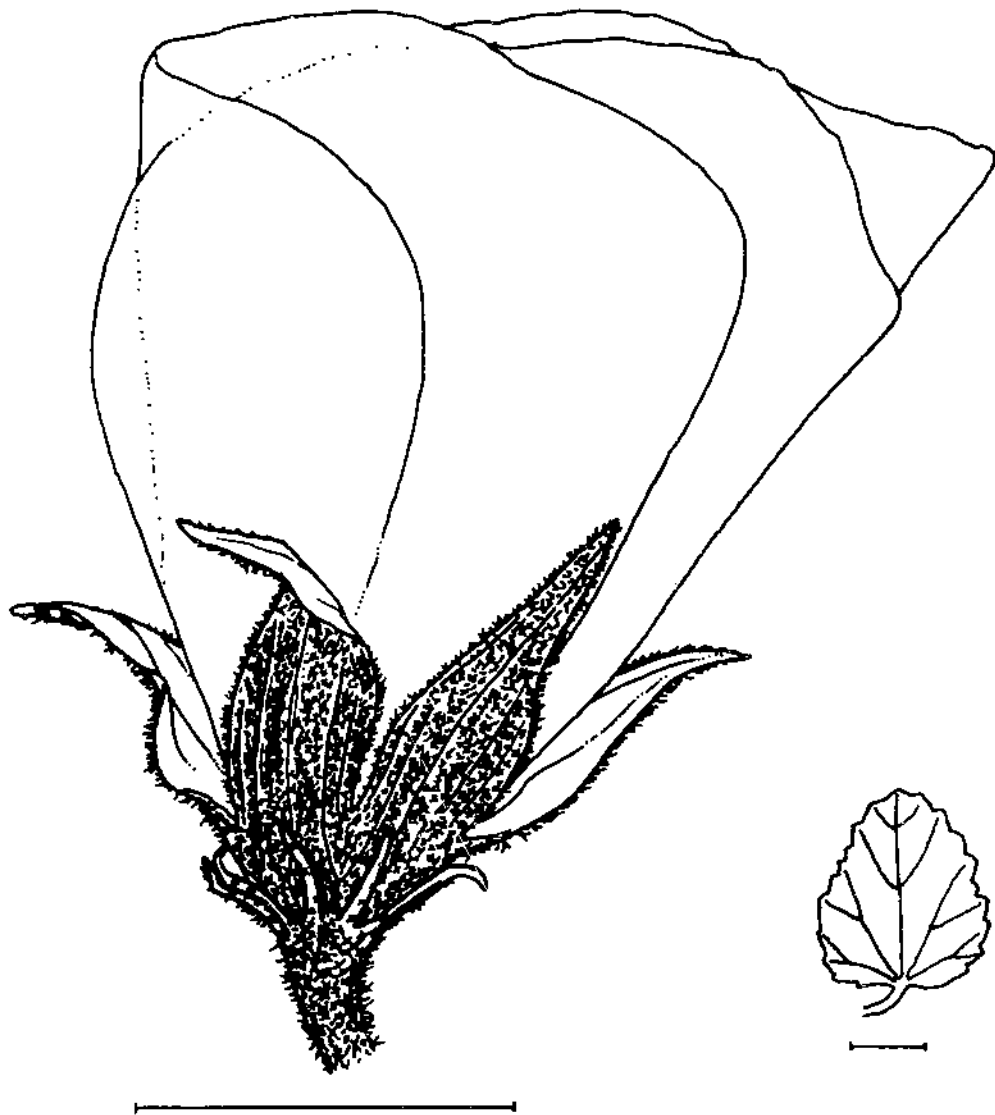


FIGURE 26. — *Hibiscus denudatus*. Flower, Fryxell et al. 1508. Leaf, Wiggins & Wiggins 15760. Scale: 1 cm.

(sometimes glabrous throughout). Seeds reniform, 2.5 mm long, blackish, sericeous, the hairs whitish, 3–4 mm long. (Fig. 26.)

Gray described var. *involucellatus* on the basis of the relative development or suppression of the involucre, but found no other distinguishing feature. Kearney & Peebles (1942) considered the two taxa, which Wootton & Standley distinguished in specific rank, to have different growth habits and ecological niches. In my judgment only one taxon is represented here, which is somewhat variable but whose variability is essentially continuous. An additional feature of the variability that does not seem to have

been noted previously is that the corolla color of *H. denudatus*, though usually lavender, is often white, especially in Baja California. In either case, the corolla has a dark red center. Raven (1964) provides background information relevant to the choice of lectotype given above for Bentham's name.

Additional specimens examined:

UNITED STATES: CALIFORNIA: SAN BERNARDINO COUNTY: Whipple Mtns., Wolf 3140 (DS, UC, US); Mesquite Canyon, Parish & Parish 13967 (MO); Palm Springs, Gabriel 225 (US); Bard, May 1919, Westover s.n. (US). RIVERSIDE COUNTY: 8.2 miles W of Shaver's Summit, Wiggins 9691 (DS,

UC); Chuckawalla Springs, *Hall 5902* (DS, UC); 10 miles W of Coachella, *Hall 5782* (DS, UC). IMPERIAL COUNTY: 4.8 miles N of Ogilby, *Bacigalupi & Hutchison 6121* (TAES); 9.3 miles E of Glamis, *Hitchcock & Muhlick 22239* (UC). SAN DIEGO COUNTY: Borrego State Park, *Nelson & Nelson 3375* (SMU); 15 miles E of Banner, *Gould 2274* (TAES, UC); Signal Mtn., 17 Feb 1933, *Epling & Robison s.n.* (US), *Abrams 3178* (DS, MO, UC), *Wolf 2175* (DS). ARIZONA: PIMA COUNTY: Vail, *Thorner 108* (DS, MO, TAES, UC, US); near Tucson, *Nealley 284* (TEX, US), *Pringle 15113* (MO, US); Quitovaquito, *Mearns 2757* (DS, US); 3 miles W of Colossal Caves, *Lehto 2275* (BM). COCHISE COUNTY: Huachuca, *Wilcox 535* (US). MARICOPA COUNTY: Phoenix Mtns., *Fryxell 153* (pf); 2 miles S of Scottsdale, *Russell 10907* (SMU); Tempe, Papago Park, *Gillespie 5443* (DS), *Abrams 13072* (DS). YUMA COUNTY: Gila Mtns., *Harrison & Kearney 6252* (US), *Pebbles et al. 4965* (US); Kofa Mtns., *Lehto & Reeves 20131* (ASU, pf); Mohawk, *Kearney 3928* (US); Castle Dome Mtns., *Dickson 38* (UC). NEW MEXICO: GRANT COUNTY: *Mearns 76* (US). DONA ANA COUNTY: Tortugas Mtns., 1 Sep 1908, *Wootton & Standley s.n.* (US); W of Organ Mtns., 12 Aug 1895, *Wootton s.n.* (US). SIERRA COUNTY: Lake Valley, Sep 1914, *Beals s.n.* (U.S.). TEXAS: BREWSTER COUNTY: near Castolon, *Fryxell 1246* (pf); near Chisos Mtns., *Sperry 339* (TAES, US); 53 miles SE of Marathon, 22 Aug 1959, *Wallmo s.n.* (TAES); 56.5 miles S of Alpine, *Bates & Blanchard 2910* (US); Juniper Canyon, 16 miles NE of Castolon, *Cutler 21834* (TAES); between San Vicente and Glenn Springs, *Sperry 1561* (TAES); 14.5 miles SE of Terlingua, *Parks & Cory 30271* (TAES); hills N of Garden Springs, *Wallmo 5383* (TAES); Ward Spring, W side of Chisos Mtns., *Warnock 13111* (LL, TAES); between Burro and Wasp Springs, W side of Chisos Mtns., *Warnock & Wallmo 13233* (TAES); 14 miles W of Big Bend Park headquarters, *Hess 817* (OKLA, SMU); Heath Canyon, *Warnock & Hinckley 235* (SMU); Santa Elena Canyon ledges, *Rose-Innes & Warnock 21599* (SMU). PECOS COUNTY: *Tharp 43-697* (MO, UC). CULBERSON COUNTY: Beach Mtns., *Waterfall 5066* (MO). HUDSPETH COUNTY: 9 miles W of Sierra Blanca, *Reed 238* (SMU); Quitman Mtns., *Waterfall 4866* (MO). PRESIDIO COUNTY: W end of Pinto Canyon, *Hinckley 3048* (TAES); W of Capote Fall, Brita Ranch, *Hinckley 1709* (SMU); near Porvenir, S end of Van Horn Mtns., *Waterfall 4745* (CAS, MO, SMU); Capote Canyon, 8 miles NE of Candelaria, *Ohlendorf 321* (TAES), *Ohlendorf 713* (TAES); 15 miles SW of Chispa, *Waterfall 5315* (MO); Presidio, *Parks & Cory 32824* (TAES). CRANE COUNTY: 8 miles S of Crane, *Tharp 47500* (MO, TAES, TEX); 6 miles S of Crane, 11 July 1941, *Tharp s.n.* (SMU). PECOS COUNTY: 21 miles E of Ft. Stockton, *Cory 40278* (TAES). EL PASO COUNTY: Franklin Mtns., *Ferris & Duncan 2400* (CAS, MO); near El Paso, *Stearns 71* (US), *Jones 4339* (BM, BR, CAS, DS, K, UC, US), *Rose 4985* (US); McKelligan Canyon, Franklin Mtns., *Shinners 9007* (SMU).

MEXICO: CHIHUAHUA: 46.6 miles S of Juarez, *McGill, Brown & Pinkava 9210* (ASU, pf); 16.8 miles N of Aldama, *Lehto & Broome 22842* (ASU); 28 miles NE of Aldama, *Smith, Butterwick, & Whalen 349* (LL); 1 mile SE of Chihuahua on road to Mecoqui, *Owmbey & Owmbey 1843* (BM, MICH, US); Mecoqui, *LeSueur s.n.* (CAS, K, MO, UC, US); 37 miles N of Cd. Jiménez, *White 2187* (MICH, US); 31 miles SE of Jiménez, *Muller 3336* (MICH, UC); Colonia Diaz, *Nelson 6443* (US); Sta. Eulalia Plains, 18 Aug 1885, *Wilkinson s.n.* (US); El Pozo, Sierra de

Santa Eulalia, *White 2427* (MICH); 17 miles NW of Escalon, *Fly 513* (SMU); 31 miles W of jct. Rt. 45 and road to Casas Grandes, *Stuessy 1101* (SMU). COAHUILA: 106 km W of Saltillo, *Fryxell & Bates 2061* (BH, CTES, ENCB, MEXU, MICH, pf); 7 miles S of Cuatrociénegas, *Fryxell, Bates, & Blanchard 1497* (BH, pf); Monclova, *Palmer 84* (K), *Marsh 1820* (SMU, TEX); 15 miles S of Sabinas, *Waterfall 16654* (SMU, UC) 16658 (SMU, UC); Perros Bravos, *Gregg 481* (MO). DURANGO: 36 km N of Padricena, *Fryxell, Bates, & Blanchard 1508* (BH, pf); Mapimí, *Palmer 523* (US); 2 miles W of Bermejillo, *Shreve 8776* (MICH). SONORA: Isla Tiburón, *Johnston 4261* (CAS), *Wiggins 17169* (DS), Dec 1965, *Alcocer & Sosa s.n.* (DS, MSC), *Moran 8754* (SD); E of Torreón, *Schery 44* (MO); Fronteras, *Hartman 977* (MO, UC); near Puerto Peñasco, *Raven 14813* (DS, UC), *Hammerly 1* (CAS, DS), *Keck 4213* (DS); Kino Point, *MacDougal & Shreve 31* (US) 46 (US); Guaymas, *Dawson 1006* (MICH), *Palmer 523* (MICH); Río de Bavispe, Cañon de las Estacas, *White 3069* (MICH); Colonia Morelos, *White 4574* (MICH). BAJA CALIFORNIA: Isla Sta. Magdalena, Cabo San Lázaro, *Davidson 2006b* (SD); ca. 22 miles S of San Felipe, *Wiggins 20846* (SD, TEX); Arroyo San Francisquito, 4.5 miles NW of Las Arrastras, *Moran 17250* (SD); Cantillas Canyon, *Orcutt 461* (MO); 12.1 miles N of Junta Prieta, *Hastings & Turner 67-63* (SD); Isla Coronado (26°7.3'N, 111°17'W), *Wiggins 17453* (DS); Catalina Isld., *Moran 9354* (SD) 9374 (SD, UC), *Wiggins 17635* (DS); Espíritu Santo Isld., *McClintock s.n.* (CAS); Danzante Isld., *Moran 9222* (SD); Carmen Isld., *Palmer 15* (US); San Diego Isld., *Moran 9597* (LL, SD); Tortuga Isld., *Wiggins 17368* (DS), *Moran 9019* (SD); Pichilique Isld., *Rose 16512* (US); San Estebán Isld., *Moran 8821* (MICH, SD); Santa Rosalia, *Whitehead 717* (US); southernmost of Tres Virgenes volcanoes, 25 miles W of Santa Rosalia on W side of pass, *Chambers 770* (DS, SD, UC); 4.8 miles W of Santa Rosalia, *Wiggins 7944* (US); 8 miles S of Santa Rosalia, *Wiggins 11399* (CAS, DS, UC, US); near San Francisquito Bay, *Harbison 41888* (SD), *Rose 16758* (US); Valle de Agua Camarga, 15 miles W of Los Angeles Bay, *Harbison 41760* (SD); mouth of Guadalupe Canyon, E side of Sierra Juarez, *Moran 6016* (DS, SD); Arroyo Venecas, *Moran 10267* (SD); Los Angeles Bay, *Moran 10371* (DS, SD), *Palmer 523* (BM, K, ND, UC, US), *Cowan 2329* (CAS, US); Concepción Bay, *Rose 16715* (US); 8.9 miles N of Puertocitos, *Hastings & Turner 63-130* (DS, SD); Mulegé, *Rose 16650* (US), *Wiggins & Wiggins 18220* (CAS, DS); Magdalena Bay, *Mason 1884* (CAS, K, US); Magdalena Isld., Man-of-War Cove, *Moran 10822* (SD); Magdalena Isld., 25 Feb 1889, *Brandegee s.n.* (UC); 20.9 miles E of San Lina (suburb of San Ignacio), *Hastings & Turner 63-298* (DS, SD); Sierra de las Pintas, *Gentry 8754* (SD); top of Las Tres Virgenes grade (27°23'N, 112°24'W), 10 Oct 1967, *Howe s.n.* (SD); Arroyo Miramar (30°3'N, 114°31'W), *Moran 18278* (SD); NE ridge of Cerro Azufre (27°31'N, 112°33'W), *Moran 20519* (SD); Todos Santos, *Jones 24100* (CAS, DS, MICH, MO, SD, US), 24205 (UC); Las Flores, Los Angeles Bay, *Harbison 41715* (S'); 23 km N of La Paz, *Fryxell 2009* (ENCB, MSC, UNLV, pf); 5 miles S of La Ventana on hwy. to San Felipe, *Wiggins & Wiggins 18760* (BM, MICH, RM, SMU, TEX, US); 4-5 miles SW of El Arco (26°8'N, 112°7'W), *Moran & Reveall 20080* (US); 40 miles NE of Pozo Alemán, *Wiggins 7808* (DS, LL, US); Santa Gertrudis Mission, *Whitehead 622* (US); San Gregorio, 7 Feb 1889, *Brandegee s.n.* (UC).

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