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NEW OR NOTEWORTHY SPECIES OF FLOWERING PLANTS FROM  
THE SIERRA MADRE DEL SUR OF GUERRERO AND  
MICHOACÁN, MEXICO

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ABSTRACT

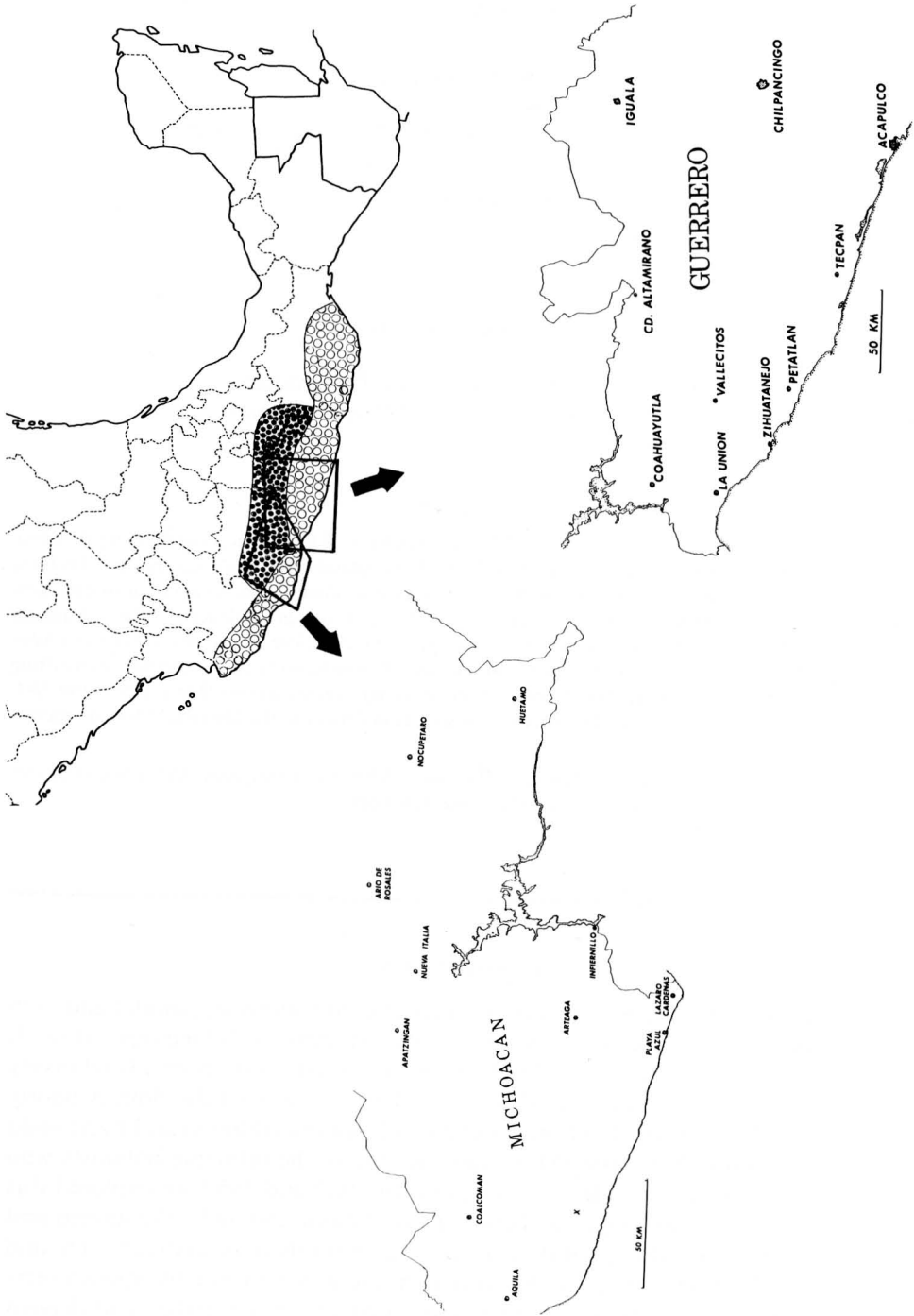
The Sierra Madre del Sur of Pacific coastal Mexico has been of limited accessibility and therefore not well explored botanically. Only G. B. Hinton and E. Langlassé have made significant collections from the area. More recent collections by the authors have resulted in the recognition of nine new species, described herein as follows: Acanthaceae—*Elytraria mexicana*; Malvaceae—*Bastardiastrum batesii*, *Gossypium schwendimanii*, *Hibiscus zygomorphus*, *Kosteletzkyia flavicentrum*, *Periptera lobelioides*, *Sida fastuosa*, and *Sida prolifica*; and Turneraceae—*Piriqueta mexicana*. Other species meriting specific comment include *Dioscorea insignis* (Dioscoreaceae), *Anotea flavida* (Malvaceae), and *Helicteres rekoii* (Sterculiaceae). Illustrations of the new species and a key to the described Mexican species of *Elytraria* are included.

Key words: Mexico, *Anotea*, *Bastardiastrum*, *Dioscorea*, *Elytraria*, *Gossypium*, *Helicteres*, *Hibiscus*, *Kosteletzkyia*, *Periptera*, *Piriqueta*, *Sida*, taxonomy.

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INTRODUCTION

The Sierra Madre del Sur runs from northwest to southeast, parallel and very close to the Pacific coast, from Jalisco to the Isthmus of Tehuantepec (Fig. 1; Rzedowski 1978, pp. 24–25). In Michoacán and Guerrero the Sierra is relatively inaccessible because of the lack of roads, and for this reason the flora is poorly known. In earlier times G. B. Hinton and his collaborators (Hinton and Rzedowski 1972, 1975) and E. Langlassé (McVaugh 1951) were the principal botanists who made botanical collections from this region. In 1982 and 1983 we explored this area by means of a new highway between Cd. Altamirano and Zihuatanejo and other available roads that permitted access. The flora there is relatively rich, and among the collections made, the following represent new or notable species meriting comment. Conventional acronyms are used to indicate herbaria of deposit of specimens, except that “pf” refers to the senior author’s herbarium, kept in College Station, Texas.



## TAXONOMY AND DISCUSSION

*Acanthaceae****Elytraria mexicana* Fryxell & Koch, sp. nov.**

Fig. 2

*Elytraria imbricatae* affinis autem bracteis floralibus dorsaliter villosis vice ciliatis tantummodo, atque sine auriculis conspicuis scariosis subterminalibusque; bracteolis 2.5–3 mm longis vice 3–4 mm, pilis sine papillis ad basem; labio supero corollae 2 mm longo vice 1.5 mm, labio infero albo vice caeruleo, lobis divergentibus atque lateralibus rectis vice parallelis atque rotundatis.

Perennials from a woody root, acaulescent or more commonly with a woody, leafless stem up to 10 cm long, bearing leaves in a terminal rosette, older plants with 1—several such stems arising from the original crown. Leaves narrowly to broadly spatulate, acute to acuminate at the apex, attenuate basally to a more or less winged petiole, the larger leaves 5–12 cm long and 1–3.5 cm wide, sparsely to densely villous on both surfaces with hairs to 1.5(–2) mm long, lower side paler than the upper, irregularly denticulate to nearly entire, remotely notched and sometimes with a few rounded teeth toward base. Peduncles to 20 cm long, villous beneath the bracts, wiry, erect to decumbent, occasionally proliferous, covered by imbricate, abruptly acuminate, spinulose bracts 1.5–4 mm long, with up to 7 branches, these up to 10 cm long, each branch terminating in a spike; spikes 1–4 cm long, straight and erect or curving upward, cylindric but tapering upward slightly; flowers solitary and sessile in the axils of conspicuous, imbricate bracts and subtended by a pair of inconspicuous, adaxial bracteoles; floral bracts rigid, overlapping  $\frac{1}{3}$ – $\frac{1}{2}$  their length, 3.5–5 mm long, floccose-villous on back, especially toward the margins, ovate with slightly broadened, white margins only on lower half, narrowed to an acuminate, spinose tip; bracteoles 2.5–3 mm long, reaching to about the middle of the calyx, lanceolate, acuminate and sometimes aristate, the costa green and sparsely villous with narrow-based hairs, the margins broad and hyaline; sepals 4, nearly distinct, 3.5–4 mm long, hyaline except for the costa, villous on back and margin toward the apex; lateral sepals lanceolate, acuminate, and aristate, with convex costae; the anterior and posterior sepals broader, with concave costae forming a shallow groove in the lower part, the anterior bidentate and 2-aristate, the posterior merely acute; corolla bilabiate, the tube straight and narrow, 4–5.2 mm long, the upper lip 2 mm long, purple or blue, 2-lobed, the lobes 1 mm long, the lower lip white, divided nearly to the base into 3 subequal lobes, these 3.5–4 mm long, narrowed basally, broadened apically and divided into 2 divergent, straight-sided, secondary lobes, the margins entire except for 1–2 narrow teeth sometimes shown on the secondary lobes (not shown in Fig. 1B); stamens 2, the filaments short, the anthers 0.8 mm long, positioned beneath the upper corolla lip, the thecae mucous and slightly divergent below, staminodia absent; ovary superior, the style filiform, broadened upward into a spatulate lamina, this folded around and enclosing the anthers in bud and early anthesis, bearing an apical stigmatic zone. Capsules 3–3.5 mm long, ovoid, acuminate,

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Fig. 1. Map of Mexico showing the approximate extent of the Sierra Madre del Sur (open circles) and the adjacent Balsas Depression (closed circles) (adapted from Rzedowski 1978, Fig. 4). Enlarged portions of Michoacán and Guerrero show localities referred to in text and in specimen citations. The "X" indicates the type locality for *Piriqueta mexicana*.

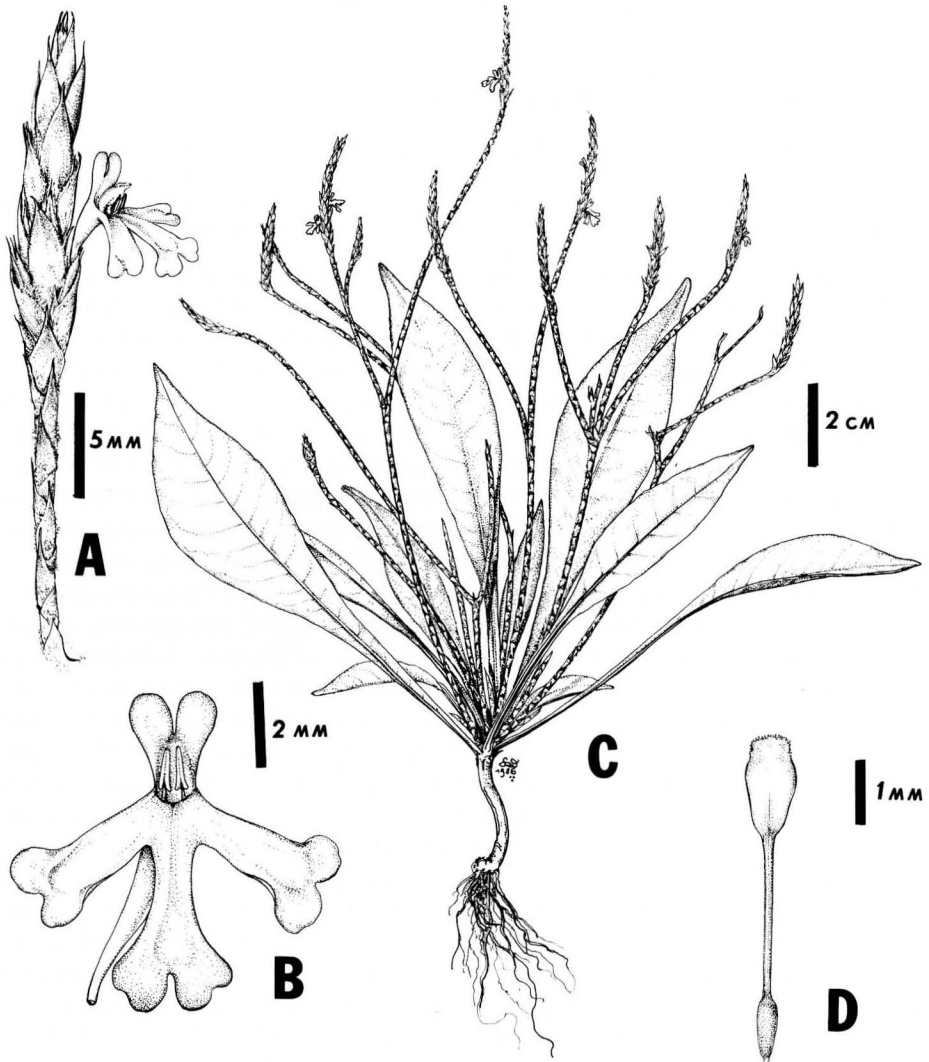


Fig. 2. *Elytraria mexicana*.—A. Inflorescence.—B. Corolla.—C. Flowering and fruiting plant.—D. Gynoecium, showing spatulate style and stigma. (Koch and Fryxell 83103)

short-stipitate, shiny, loculicidally dehiscent from the apex, bilocular, each locule containing (6–)8 seeds, retinacula none; seeds 0.5 mm long, dark brown and pitted, with a papilla in each pit.

*Type*.—GUERRERO: Mpio. de Coyuca de Catalán, 38 km al S de Cd. Altamirano, por la carretera a Zihuatanejo, ladera con pastizal, con bosque caducifolio en las cañadas, suelo franco, alt. 650 m; sobre laderas en orilla de la carretera, común, 11 Nov. 1983, Koch & Fryxell 83103 (holotype: CHAPA; isotypes: CAS, ENCB, MEXU, MICH, US, pf).

*Paratypes*.—MICHOACÁN: Mpio. de Parácuaro, Paso de Yeguas, 17 km al W de Cuatro Caminos, carretera a Apatzingán, vegetación riparia en selva baja caducifolia alterada, con *Cordia*, *Crescentia*, y varias leguminosas, alt. 255 m; 18

Oct. 1982, *Torres 1529, Martínez, & Villaseñor* (MEXU). GUERRERO: Cerro "Del Alquitrán," adelante de Petaquillas, al SE de Chilpancingo de los Bravos, alt. 1400–1500 m, 22 Oct. 1978, *Schwabe, Kailing & Halbinger s.n.* (MEXU).

The broad, flattened style observed in *Elytraria mexicana* was also seen in Mexican material (Central American material was not available) of *E. bromoides* Oerst. and *E. imbricata* (Vahl) Pers. This is not in agreement with Gibson (1974, p. 363) in her generic description, nor with the illustration (Fig. 81E, p. 365) of *E. imbricata*.

Heretofore only three species of *Elytraria* were known from Mexico: *E. macrophylla* Leonard, apparently a rare endemic from the rain forest area of eastern San Luis Potosí [known to the authors only from the original description (Leonard 1939) and a photograph and fragments of the type at US]; *E. bromoides*, found in Texas, eastern Mexico, and Guatemala; and *E. imbricata*, a widespread, common species ranging from Arizona and Texas through the West Indies, Mexico, and Central America to South America, and introduced into the Old World (Leonard 1934). As far as is known, *E. mexicana* is restricted to the Balsas Depression (Fig. 1), where it is known along wooded streams in savannah and in areas of tropical deciduous forest. The four species can be distinguished by the characters presented in the following key:

#### KEY TO THE MEXICAN SPECIES OF *ELYTRARIA*

1. Plants acaulescent; bracts of the inflorescence 7–10 mm long, acuminate, entire, the margins ciliate, not broad and scarious or white; corollas blue, the upper lip 4.5 mm long; capsules 5 mm long ..... *E. bromoides* Oerst.
1. Plants usually caulescent with rosettes of leaves at the ends of naked stems; bracts of the inflorescence 3–5 mm long; corollas purple or blue (unknown in *E. macrophylla*), the upper lip 1.5–2 mm long (unknown in *E. macrophylla*); capsules 3–3.5 mm long (unknown in *E. macrophylla*).
  2. Leaves up to 30 cm long and 11 cm wide, obtuse at the apex; peduncle bracts 7 mm long; floral bracts glabrous dorsally, ciliate, without broad scarious margins; calyx lobes glabrous or with a few hairs at the tip ..... *E. macrophylla* Leonard
  2. Leaves up to 12 cm long and 3 cm wide, acute to acuminate apically; peduncle bracts up to 5 mm long; floral bracts villous dorsally or with broad scarious margins; calyx lobes villous on the back and margin toward the tip.
    3. Inflorescence bracts dorsally glabrous, awned from a notched apex, and with well-developed, ciliate, scarious margins that become auricles on the apical part of at least the upper bracts; bracteoles 3–4 mm long, nearly equaling the calyx, villous to villosulous with papilla-based hairs; anterior calyx lobe exaristate and minutely bidentate; corollas uniformly purple or blue; the lobes of the lower lip parallel and rounded ..... *E. imbricata* (Vahl) Pers.
    3. Inflorescence bracts villous on the back and margin, ovate and acuminate with a spinose tip, the margin broadened and white only below the middle; bracteoles 2.5–3 mm long, about half the length of the calyx, sparsely villous, with slender-based hairs; anterior calyx lobes 2-aristate; upper lip of the corolla purple or blue, the lower white, its lobes divergent and straight-sided ..... *E. mexicana* Fryxell & Koch

#### *Dioscoreaceae*

#### DIOSCOREA INSIGNIS Morton & Schubert

This species was described from collections from the states of Guerrero and México by Schubert and Morton (1972). In spite of its showy nature, they noted that it had been collected only a few times by Hinton et al. and never by other

collectors. We encountered a staminate plant in October 1982 from another locality but were unable to find it again in November of 1983.

*Specimens examined.* —GUERRERO: Mpio. de La Unión, carretera Zihuatanejo-Cd. Altamirano, 18 km al NE de Vallecitos de Zaragoza (65 km de la carr. Zihuatanejo-Lázaro Cárdenas); bosque mesófilo en una cañada; suelo muy pedregoso, principalmente de hojarasca; alt. 1290 m; trepadora voluble y herbácea; tépalos blancos, con puntos morados en la base; se vió un ejemplar subiendo hasta 20 m en el tronco de un árbol, 26 Oct. 1982, Koch & Fryxell 82200 (BM, CHAPA, ENCB, K, MEXU, MICH, MO, NY, OSH, TEX, US, WIS, pf).

### *Malvaceae*

#### ANOTEA FLAVIDA (DC.) Ulbrich

This monotypic genus is known only from the central part of Guerrero. It was first collected by Sessé and Mociño in the 18th century; the basionym (*Malvaviscus flavidus* DC.) was based on a drawing by the artists employed by Sessé and Mociño (*Icones Florae Mexicanae*, Torner Collection acc. no. 6331.389, Hunt Institute). No specimen of this collection is known. It was also collected in the 18th century by Haenke, whose plant is the basis of the name (synonym) *Malvaviscus acerifolius* K. Presl. Neither of these two old collections has a precise indication of locality. The plant remained unknown until 1967, when it was recollected to the south of Chilpancingo (Fryxell 1968), a site for several later collections (*Croat 45715*, *Fryxell 623*, *Fryxell & Bates 2168*, *Koch et al. 79125*, *Kruse 138*). It was believed that the species (and the genus) occurred only in this small population, but in 1983 we discovered it at another locality, appreciably farther to the south. Shortly thereafter, we discovered an undetermined herbarium specimen at yet another locality. These collections are:

*Specimens examined.* —GUERRERO: Mpio. de Acapulco, terracería a Pablo Galeana, 2–3 km al O de la carretera México-Acapulco (52 km al N de Acapulco); alt. 680 m, 24 Nov. 1983, Koch & Fryxell 83254 (BH, BM, CANB, CAS, CHAPA, CTES, ENCB, F, MEXU, MICH, MO, NY, RSA, SD, TEX, XAL, pf). Acahuitzotla, adelante de Chilpancingo, entre Acahuitzotla y Palo Blanco, 14 Nov. 1977, Germán & Funk 622 (MEXU).

Rather than being restricted to a single population, this species appears to be scattered over a relatively large area in the Sierra Madre del Sur in the central part of the state of Guerrero.

#### ***Bastardiastrum batesii* Fryxell & Koch, sp. nov.**

Fig. 3

*Bastardiastrum* speciebus aliis differt per pedicellos 2–4 cm longos, et petala lavandula ungue albo, et ungues contiguos caluso per pilos implicatos (ut in *B. wissaduloide*), et pubescentiam minutam ad insertionem staminum.

Widely branched low shrub ca. 1 m tall, the stems minutely glandular-puberulent. Leaf blades cordate-ovate, up to 8 cm long, 6–8 cm broad, progressively smaller upwards, crenate-serrate, acuminate, slightly discoloured, minutely stellate-pubescent above and beneath; petioles half to greater than the length of the blade, glandular-puberulent; stipules 2–4 mm long, subulate, caducous. Pedicels solitary in the leaf axils, 2–4 cm long, slender, glandular-puberulent; calyx 7–9

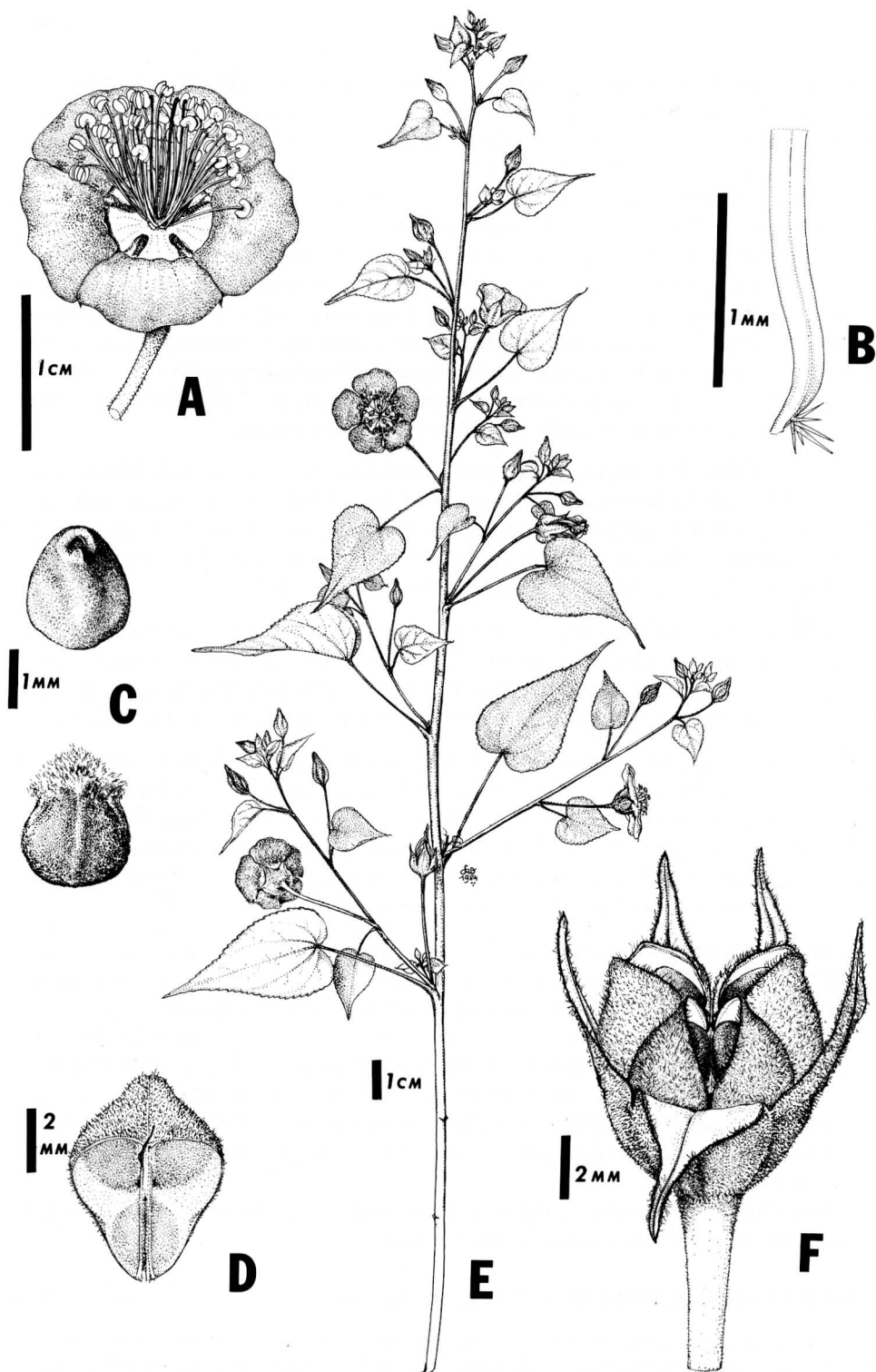


Fig. 3. *Bastardiastrum batesii*.—A. Flower.—B. Individual staminal filament showing pubescence at insertion.—C. Seeds, showing greater pubescence on lower seed relative to upper.—D. Individual carpel showing placement of single lower seed and two collateral upper seeds.—E. Flowering branch.—F. Fruit. (Seeds from Koch and Fryxell 82194; remainder from Koch and Fryxell 82165)



mm long, minutely stellate- and glandular-puberulent, divided about halfway to the base, the lobes triangular-acuminate, ca. 3 mm wide at base, each with a distinct midrib; corolla pale lavender with a white center, the petals 8–12 mm long, the claws relatively broad (2.5–3.5 mm) with their adjacent margins cohering by interlocking hairs; staminal column nearly obsolete, the free filaments arising near petal bases; filaments 25–30 with minute stellate hairs at point of insertion, otherwise glabrous, erect, ca. 6 mm long; anthers pale lavender with cream pollen; styles 3, pallid, glabrous; stigmas capitellate, purplish, subequal to anthers. Fruit ca. 5 mm long, included in calyx, minutely pubescent with stellate and glandular hairs; mericarps 3, crested and rounded-acute, cohering at maturity, divided into upper and lower cells by a constriction; upper cell dehiscent with two collateral seeds; lower cell indehiscent, 1-seeded; seeds blackish, ca. 2 mm long, the upper 2 subglabrous, the lower densely pubescent along the hilum.

*Type*.—GUERRERO: Mpio. de La Unión, carretera Zihuatanejo-Cd. Altamirano, 33 km al NE de Vallecitos de Zaragoza (83 km al NE del entronque con carr. Zihuatanejo-Lázaro Cárdenas); talud en zona de bosque sabanoide de encino; alt. 1600 m; 24 Oct. 1982, Koch & Fryxell 82165 (holotype: CHAPA; isotypes: BH, BM, CTES, ENCB, F, MEXU, MICH, MO, NY, US, pf).

*Paratype*.—GUERRERO: Mpio. de La Unión, 44 km al NE de Vallecitos de Zaragoza (92 km de carr. Zihuatanejo-Lázaro Cárdenas); bosque tropical caducifolio, alt. 1340 m; infrecuente en la orilla de la carretera y en el bosque, 25 Oct. 1982, Koch & Fryxell 82194 (BH, CHAPA, ENCB, MEXU, MICH, MO, pf).

The specific epithet is chosen to honor David M. Bates, whose revision of *Bastardiastrum* (Bates 1978) is the basic work on this wholly Mexican genus. The new species is most similar to *B. wissaduloides* (E. G. Baker) Bates morphologically. Like *B. tricarpellatum* (Robinson & Greenman) Bates, it occurs at relatively high elevations. It is distinguished from these and all other species of the genus by a number of morphological characters, as follows:

1. Pedicels are evidently longer in *B. batesii* than in other species.
2. Only in *B. batesii* and *B. wissaduloides* do adjacent claws cohere by interlocking hairs, but claws of the petals are marginally ciliate in all species.
3. Corollas are lavender with a white center in *B. batesii*, the center bordered by a darker lavender line in fresh flowers (lost in dried specimens). Other species have uniformly colored corollas varying from lavender to nearly white.
4. Fresh petals of *B. batesii* have a slight geniculation near the border of the white center (poorly preserved in pressed specimens). Apparently other species lack this geniculation.
5. The distinctive pubescence at the point of insertion of the stamens of *B. batesii* (Fig. 3B) is evidently unique in the genus.

***Gossypium schwendimanii* Fryxell & Koch, sp. nov.**

Fig. 4

*Gossypio arido* affinis a qua pedicellis calycibusque glabris, et foliis brevioribus latioribusque, et bracteolis involucellorum interdum 2–3-dentatis, et seminibus angustioribus pubescentia cinerea, et apicibus ramulorum demissis differt.

Trees to 4 m tall, the lateral branch tips tending to droop; twigs essentially glabrous, the cortex red-brown, becoming grayish bark on older branches, with

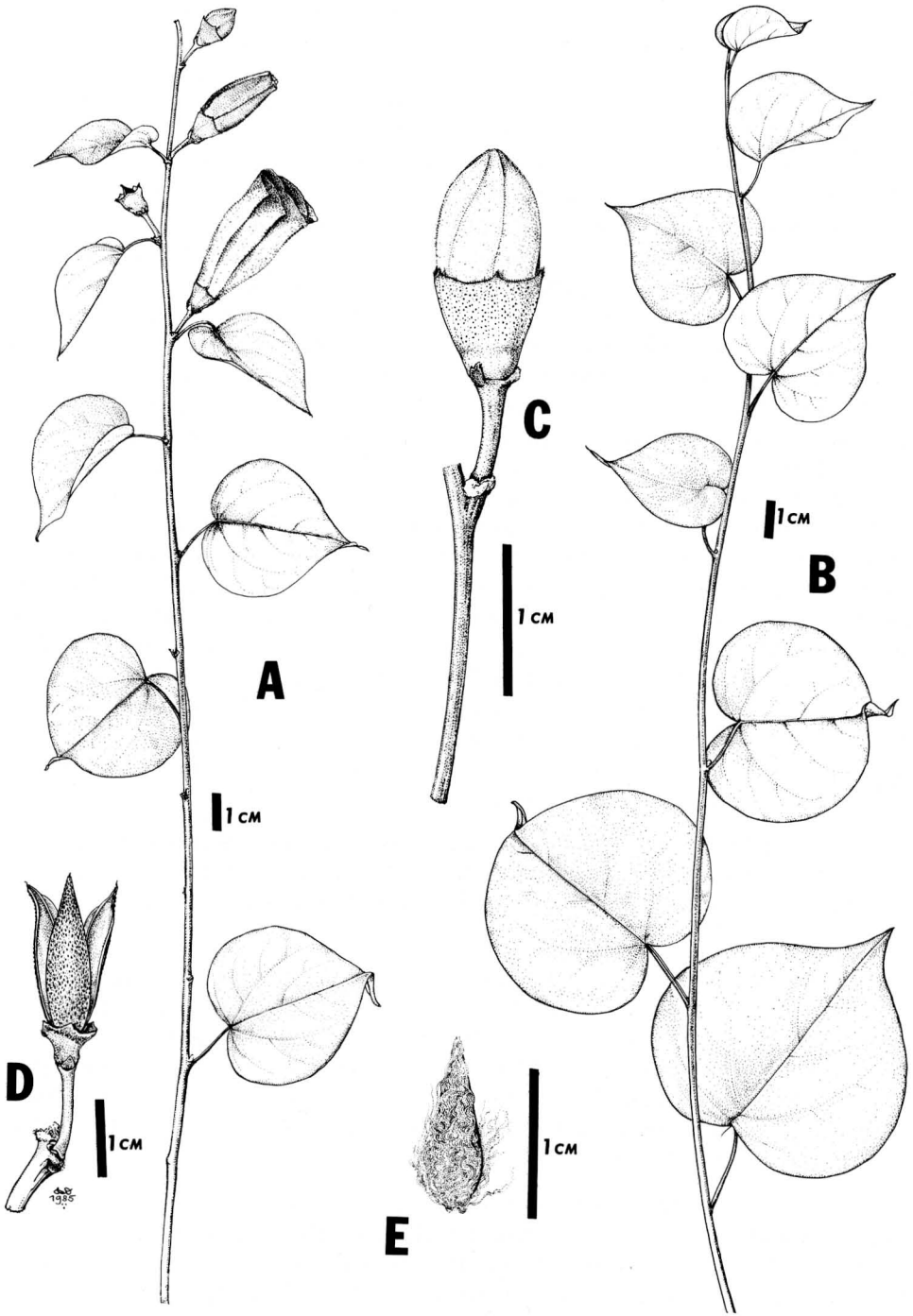


Fig. 4. *Gossypium schwendimanii*.—A. Flowering branch.—B. Vegetative branch showing fully developed leaves.—C. Flower bud.—D. Fruit.—E. Seed. (Koch and Fryxell 83239)

neither gossypol glands nor lenticels prominent; terminal and axillary buds ferruginous-pubescent. Leaf blades broadly ovate, up to 8 cm long, 0.9–1.1(–1.6) times as long as broad, deeply cordate to truncate, entire, acuminate, concolorous, coriaceous, glabrous (or with a few hairs beneath in the axils of the principal nerves), palmately 5–7-nerved, the nerves pallid, with inconspicuous black gossypol glands throughout blade, usually with a small nectary near base of midrib beneath; petioles 1–3 cm long, very sparsely pubescent (especially distally) to glabrate, black gland-dotted; stipules minute, caducous. Pedicels solitary (rarely paired) in the leaf axils, 4–7 mm long, stout (1–1.4 mm in diam) and thickened upward, black gland-dotted, glabrous, sometimes suffused with pink, surmounted by 3 sunken involucellar nectaries; involucellar bracts 3, erect, inserted above the nectaries, 1–2 mm long, black gland-dotted, obscurely and minutely pubescent to glabrate, triangular, sometimes obscurely 2–3-toothed; calyx 5–7 mm long, prominently black gland-dotted, campanulate, subtruncate, minutely 5-toothed, the teeth usually <1 mm long, glabrous except for the minutely ciliate margin, yellowish or sometimes suffused with pink (especially on distal margin); corolla narrowly funnelform; petals 3.5–4 cm long, externally yellowish stellate-pubescent where exposed in bud, otherwise glabrous, minutely gland-dotted, with dark purple spots internally on the lower halves, distally (in sicco) yellowish suffused with lavender; staminal column glabrous, pallid, lacking black glands, 2.5–3 cm long; filaments ca. 3 mm long, arising along the entire length of column, purplish; anthers purple, pollen yellow; style exceeding staminal column, clavate, pallid, black gland-dotted, the stigmatic lobes decurrent. Capsule 2–2.5 cm long, 3-celled, narrowly fusiform, brownish, verruculate with dense, raised, black gossypol glands, externally glabrous, with a few fine hairs internally along the line of dehiscence; seeds narrowly turbinate, 10–12 mm long, 3.5–4 mm in diam, densely hairy, the hairs tan to grayish, wavy, 2–3 mm long.

*Type*. —MICHOACÁN: Mpio. de Arteaga, carretera a El Infiernillo, 22 km al S del entronque con la carretera Arteaga-Nueva Italia, bosque bajo caducifolio, alt. 210 m, 21 Nov. 1983, *Koch & Fryxell 83239* (holotype: CHAPA; isotypes: BM, MEXU, MICH, US, pf).

*Paratypes*. —MICHOACÁN: Mpio. de Arteaga, carretera a El Infiernillo, 15 km al S del entronque con la carretera Arteaga-Nueva Italia, bosque bajo caducifolio, alt. 450 m, 21 Nov. 1983, *Koch & Fryxell 83238* (CHAPA, MEXU, pf); En Infiernillo, alt. 150 m, *Soto 3687* (CAS, MEXU); Al lado del camino a Infiernillo, 13 millas al NW de Infiernillo, 28 Nov. 1964, *Bratz s.n.* (MEXU); En la cañada al 19 km al NE de Churumuco, carr. a La Huacana, alt. 350 m, 25 Mar. 1979, *Soto & Zárate 1316* (MEXU).

*Gossypium schwendimanii* superficially resembles the widespread *G. aridum* (Rose & Standley) Skovsted, which occurs along the Pacific coast of Mexico from Sinaloa to Oaxaca, extending inland to Puebla, and reported from one station in Veracruz. The new species may be distinguished from *G. aridum* by the glabrous calyx and pedicel; the sometimes toothed involucellar bracts; the shorter and broader, sometimes cordate leaf blades; the distinctively different seeds (which resemble the long and narrow, grayish-pubescent seeds of *G. lobatum* H. Gentry); and possibly by the drooping branch tips. The species is named for Jacques Schwendiman of the Institut de Recherches du Coton et des Textiles Exotiques, Mont-

pellier, France, who first pointed out to us the distinctive nature of the wild cotton of the Infiernillo Valley.

**Hibiscus zygomorphus** Fryxell & Koch, sp. nov.

Fig. 5

Ab speciebus sectionis *Bombicellae* floribus rubris per flores zygomorphos corollis rotatis et per androecium declinatum non exsertum recedens.

Shrub to 1 m tall, the stems green, hispidulous with sparse, 3–5-armed stellate hairs and narrow rows of simple recurved hairs. Leaf blades simple, the largest narrowly ovate, to 8 cm long and 3 cm broad, basally truncate to cuneate, smaller and narrower upward, becoming narrowly lanceolate, coarsely crenate-serrate, acute, essentially concolorous, the principal veins beneath pale and raised, palmately 3–5-nerved, sparsely hispidulous especially on veins, the intercostal areas with appressed simple hairs above and 3–4-armed stellate hairs beneath; petioles 2–10 mm long, with a line of recurved hairs on the adaxial side, otherwise sparsely hispidulous; stipules 3–5 mm long, erect, subulate, straight to falcate, subglabrous, persistent. Pedicels solitary in the leaf axils, 0.5–1.5 cm long, articulated 5–10 mm below the flower, hispidulous; involucler 7–8 mm long, the bractlets 8–9, erect to spreading, narrowly lanceolate, 1-nerved, hispidulous; calyx 5–7 mm long, narrowly campanulate, divided about halfway to base, basally glabrous, the lobes hispid with ascending simple and bifurcate hairs 0.5–1 mm long; petals 1.5 cm long, rich red, glabrous throughout (including the margins of the claw), more or less rotate, the flower presented horizontally at anthesis; staminal column pallid or suffused with red, glabrous, markedly curved downward at anthesis making the flower zygomorphic, the filaments 1–2 mm long, mostly arising on distal half of column, the pollen golden-yellow, spinulose (or echinate); styles 5, exceeding staminal column, more or less recurved, slender, glabrous, reddish; stigmas capitate, 0.8 mm in diam, villous, dark red. Capsules slightly exceeding the calyx, globose, completely glabrous; seeds unknown.

*Type*.—GUERRERO: Mpio. de La Unión, 20 km al N de La Unión por la terracería a Coahuayutla de Guerrero, alt. 280 m, 14 Nov. 1983, *Koch & Fryxell 83136* (holotype: CHAPA; isotypes: BM, CTES, ENCB, F, MEXU, MICH, NY, RSA, pf).

*Hibiscus zygomorphus* belongs to *Hibiscus* section *Bombicella* DC. (Fryxell 1980) and forms a part of the group of species with red corollas that occurs in western Mexico. It differs most markedly from these in having zygomorphic flowers (as the specific epithet indicates) with a rotate rather than a tubular corolla, and with a declined rather than a straight, exserted androecium. Other characters such as the type and distribution of pubescence also are distinctive.

**Kosteletzkya flavicentrum** Fryxell & Koch, sp. nov.

Fig. 6

*Kosteletzkyae blanchardio* affinis sed petiolis longioribus, et pedicellis brevioribus (1–2.5 cm longis), et involucellis brevioribus (2–3 mm longis), et columna staminali valde luteis.

Robust herb to 1.5 m tall, the stems green and sparsely hispid with stellate and simple hairs 0.5–1 mm long. Leaf blades heteromorphic (the lower palmately 3–5 lobed, up to 12 cm long, the upper progressively narrowed to narrowly lanceolate, greatly reduced in the inflorescence), cordate, coarsely serrate with minutely spi-

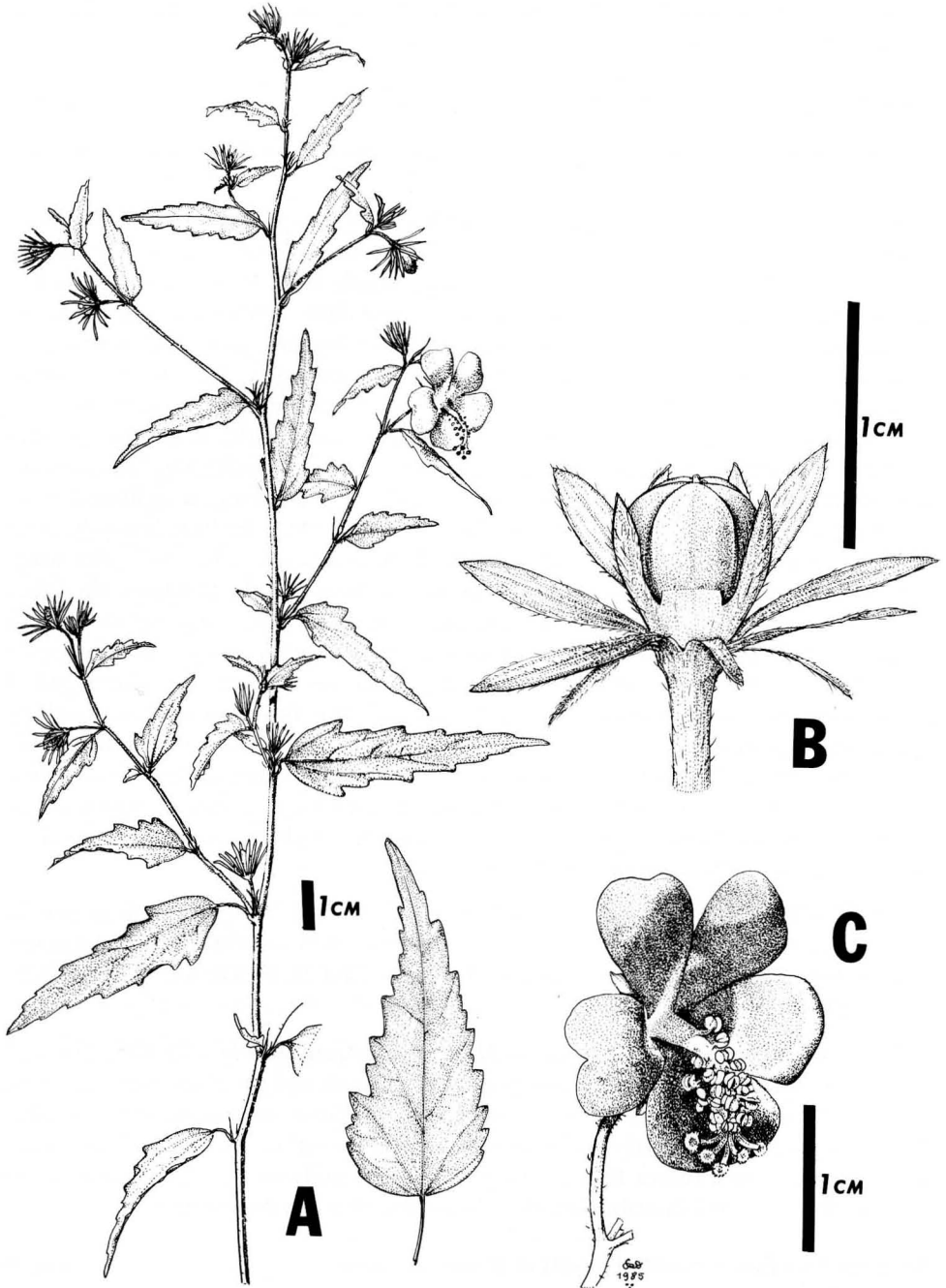


Fig. 5. *Hibiscus zygomorphus*.—A. Flowering branch and separate fully developed leaf.—B. Fruit (with one calyx lobe removed).—C. Flower. (Koch and Fryxell 83136)

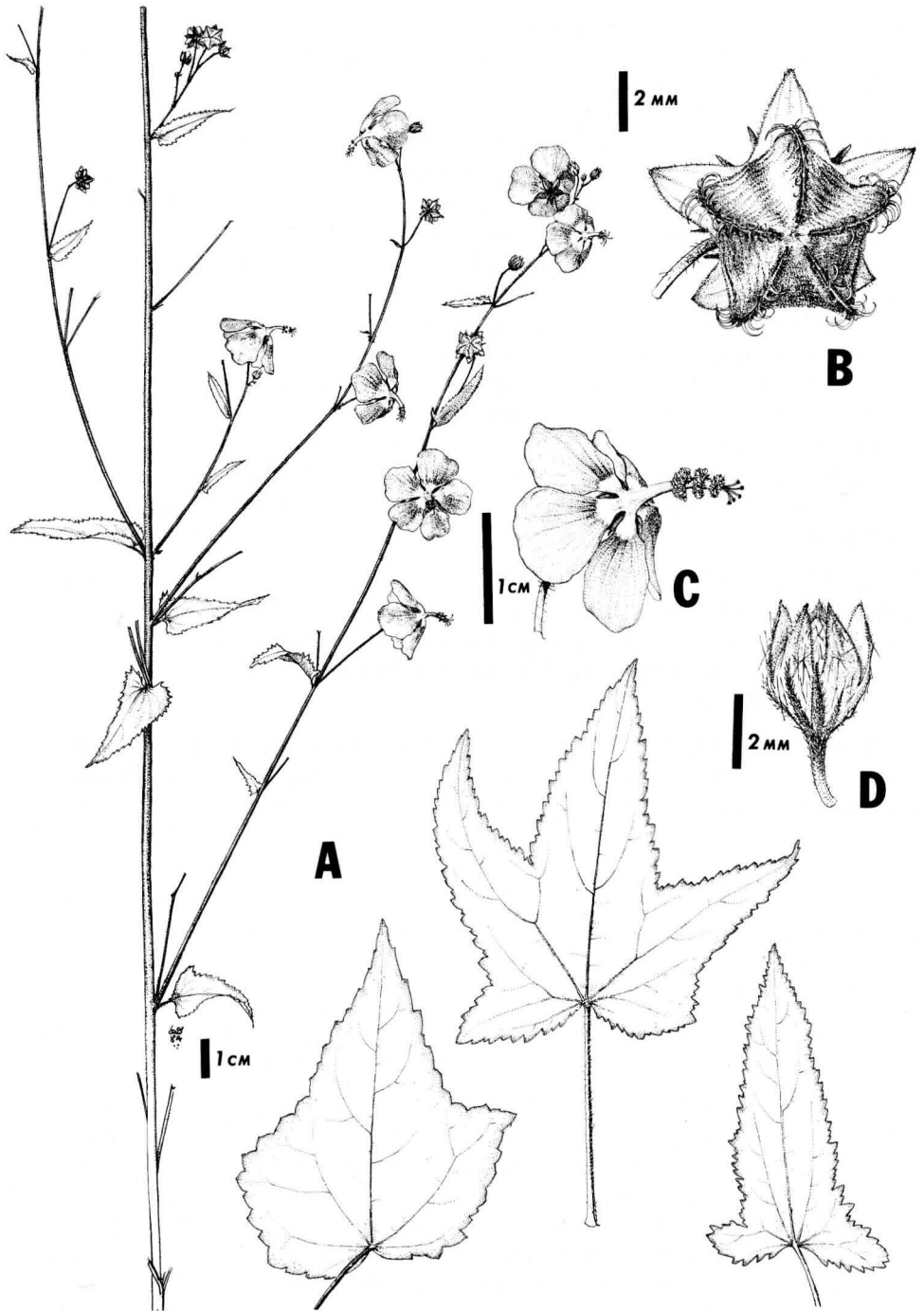


Fig. 6. *Kosteletzkya flavicentrum*.—A. Flowering branch and several separate leaves.—B. Fruit.—C. Flower.—D. Flower bud. (Koch and Fryxell 82184)

nescent teeth, acute, concolorous, minutely and obscurely stellate-pubescent (the hairs <0.5 mm long, 4–6-armed) on upper surface, with similar pubescence plus scattered predominantly 3-armed hairs 1 mm long on lower surface; petioles up to 2(–8) cm long, hispid; stipules subulate, ca. 4 mm long. Inflorescence more or less paniculate; pedicels 1–2.5 cm long, slender, scabridulous; involucellar bracts 6–8, subulate, 2–3 mm long, hispid; calyx 4 mm long, minutely stellate-pubescent, pale green with dark green margins, divided halfway or more to base, the lobes sometimes suffused with purple; corolla 10–12 mm long, lavender with a sharply delimited bright-yellow center, externally stellate-pubescent where exposed in bud, otherwise glabrous including claw margin; staminal column ca. 8 mm long, declined, bright yellow, glabrous; anthers bright yellow, subsessile, the filaments ca. 0.5 mm long, inserted in upper half of column, sometimes whorled in distinct tiers; pollen bright yellow; styles 5, exceeding androecium, pallid, glabrous, the stigmas capitate. Capsules depressed, ca. 6 mm in diam, 5-lobed or -winged, transversely striate, stellate-pubescent throughout and prominently hispid with uncinata hairs on the suture margins, fully dehiscent, the carpel walls falling away; seeds solitary, 2.5 mm long, blackish, superficially appearing glabrous but minutely striate-hispid.

*Type*.—GUERRERO: Mpio. de Zihuatanejo, carretera Zihuatanejo-Lázaro Cárdenas; puente sobre un desemboque, 6.5 km al NO de Zihuatanejo; orilla de la carretera y relleno de tierra, suelo arenoso, alt. 10 m; común, 25 Oct. 1982, *Koch & Fryxell 82184* (holotype: CHAPA; isotypes: BH, BM, CTES, ENCB, F, MEXU, MICH, MO, NY, pf).

The specific epithet refers to the yellow center of the flower, which includes the claws of the petals, the staminal column, and the anthers, and which contrasts strikingly with the lavender blades of the petals. The species is most similar to *K. blanchardii* Fryx., which occurs at higher elevations (ca. 1000 m). The new species also has a different leaf form, a different type of pubescence, longer petioles, shorter pedicels, smaller involucels, calyces, and petals, no red border on the yellow claw, a yellow staminal column, shorter filaments, and smaller fruits.

***Periptera lobelioides* Fryxell & Koch, sp. nov.**

Fig. 7

Planta hispidula foliis discoloribus (supra purpureis, infra viridis), calyce late rotundatis (ad basim 7–8 mm latis) 10-costatisque, petalis 15–20 mm longis anguste spatulatis.

Branched erect subshrub 1–1.5 m tall, the stems hispidulous with hairs simple and ca. 0.2 mm long or stellate and 0.5–1 mm long. Leaf blades triangular to hastately 3-lobed, the lower leaves to 8 cm long, progressively smaller upwards, more or less cordate at base, obscurely crenate to subentire, acute, discolorous (purplish above, greenish beneath), minutely and harshly stellate-hispid, more densely so beneath; petioles with pubescence like that of the stem, nearly equaling the leaf blade on larger leaves, progressively shorter than the blade upwards; stipules subulate, 3–5 mm long, inconspicuous. Flowers solitary in the axils (or sometimes paired with a subsidiary branch with several younger flower buds), the pedicel generally 2–3 cm long, antrorsely hispid, often purplish; calyx 8–10 mm long, broadly rounded, 7–8 mm broad basally, green (drying yellowish) but with 10 prominent purple nerves, stellate-pubescent, divided about halfway to base,

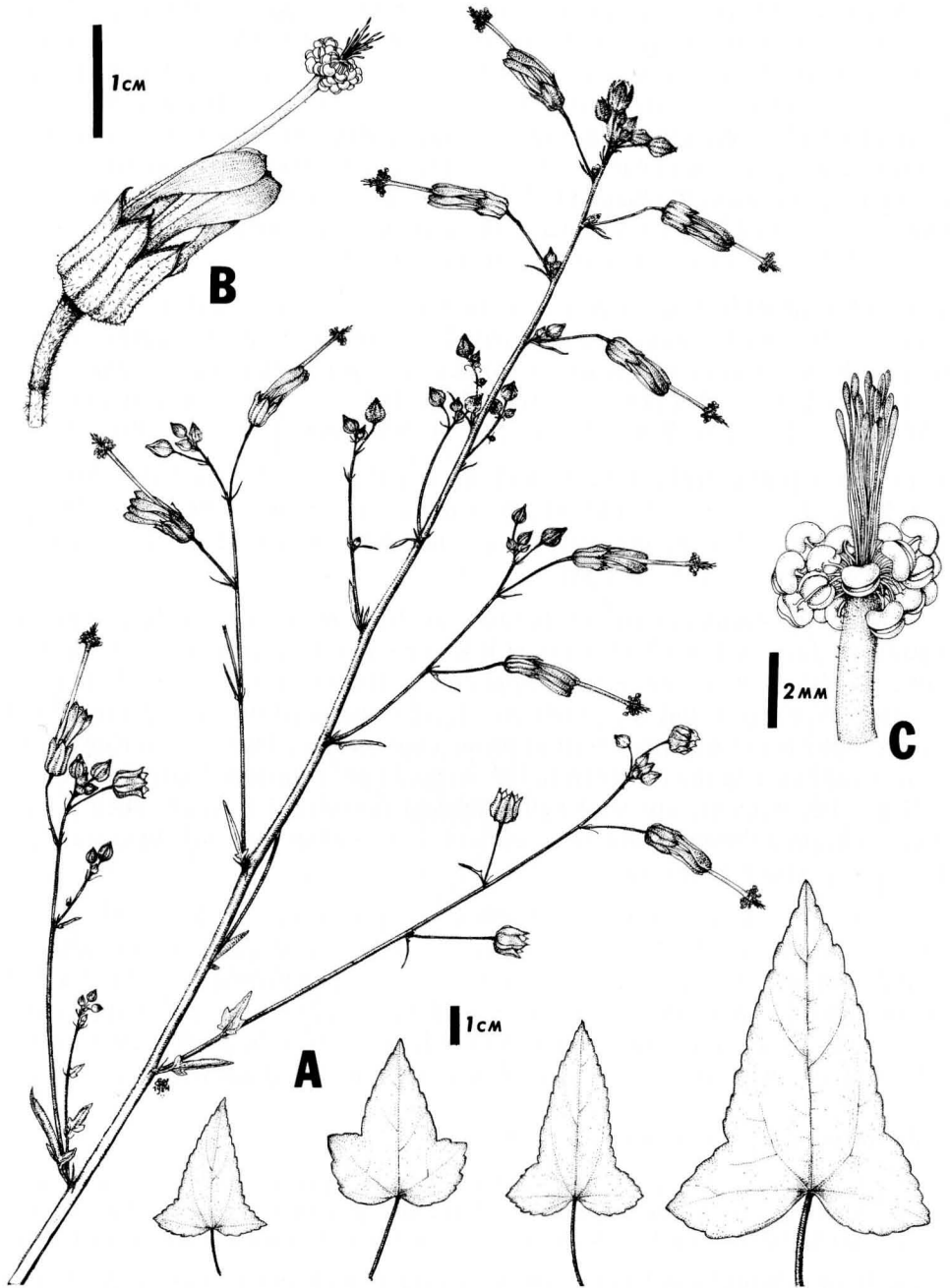


Fig. 7. *Periptera lobelioides*.—A. Flowering branch and several separate leaves.—B. Flower.—C. Detail of anthers, styles, and stigmas. (Koch and Fryxell 82162)



the 5 lobes erect in flower, spreading in fruit, rounded-apiculate, red-orange (drying purplish) at apex; petals erect, narrowly spatulate, 15–20 mm long, 2–3 mm broad, orange-red becoming deep red, minutely stellate-pubescent on interior and exterior of the attenuate claw; staminal column up to 33 mm long (ca. twice length of petals), pallid, sparsely and minutely stellate-pubescent at base (and sometimes above), often glabrous distally; anthers borne at the apex of the column, ca. 40, red (drying purplish), the filaments 2–3 mm long, the pollen yellowish; styles and stigmas ca. 12–14, narrowly clavate, the tips purple. Fruits [immature] oblate, yellowish-hirsute; mericarps ca. 12, dorsally umbonate.

*Type*. — GUERRERO: Mpio. de La Unión, carretera Zihuatanejo-Cd. Altamirano, 84 km al N del entronque con carretera Zihuatanejo-Lázaro Cárdenas; bosque sabanoide de encino con elementos tropicales; suelo franco; alt. 1550 m; infrecuente, 23 Oct. 1982, Koch & Fryxell 82162 (holotype: CHAPA; isotypes: BH, BM, CAS, CTES, ENCB, F, MEXU, MICH, NY, OSH, RSA, US, WIS, pf).

*Paratypes*. — [same locality], Nov. 1983, Koch & Fryxell 83115 (CHAPA, MEXU, pf). Mpio. La Unión, 4 km al NE de el Bálsamo, camino Zihuatanejo-Cd. Altamirano, 1500–1700 m, bosque de Pino-Encino en cañada, 21 Nov. 1983, Martínez & Barrie 5516 (MEXU, pf).

The specific epithet is chosen because of the superficial resemblance of the flowers to those of *Lobelia laxiflora* H.B.K. The flowers at anthesis are presented horizontally. They are evidently protandrous. The calyx and exerted staminal column are straight, but the petals are slightly displaced downward (this slight zygomorphy is not well preserved in pressed specimens). Thus, a hovering flower visitor approaching the flower from below would have its dorsal side dusted with pollen. The filaments are (at length) reflexed downward to make such pollen placement on a flower visitor more certain. The stigmas later occupy essentially the same position as the anthers.

*Periptera lobelioides* was observed only at the type locality on the northern slope of the Sierra Madre del Sur, on the opposite side of the divide (Puerto Bálsamo?) from Vallecitos de Zaragoza, on the road from Zihuatanejo on the coast to Ciudad Altamirano. The plants were scattered over the grass-covered slopes. It apparently has its nearest affinity with *P. trichostemon* Bullock from Sinaloa, from which it differs by its longer petals, broader calyx, and more numerous carpels.

***Sida fastuosa* Fryxell & Koch, sp. nov.**

Fig. 8

Ad *Sidam spinosam* accedens sed foliis grandioribus (usque 8 cm longis), et spinis mericarpiorum retrorsum barbellatis, et floribus fructibusque dispersis saepe geminatis; ad *S. salviifoliam* accedens sed foliis grandioribus, et carpellis non plus quam 5, et floribus fructibusque dispersis saepe geminatis.

Herbs or subshrubs to 1 m tall, the stems green, with stellate hairs 0.2–0.5 mm long and simple setae 1–2 mm long. Leaf blades lanceolate, to 8 cm long and 2 cm wide, broadest at base, truncate or subcordate, serrate to the base, acute, slightly discoloured, palmately 5-nerved, evenly and softly stellate-pubescent on lower surface with hairs 0.2–0.4 mm long, with sparser and smaller hairs on upper surface; petioles up to 2.5 cm long, with pubescence similar to that of stem; stipules 4–8 mm long, filiform, ciliate. Pedicels solitary or in often unequal pairs in the leaf axils, up to 6 mm long, articulated 1–2 mm below flower, minutely pubescent;

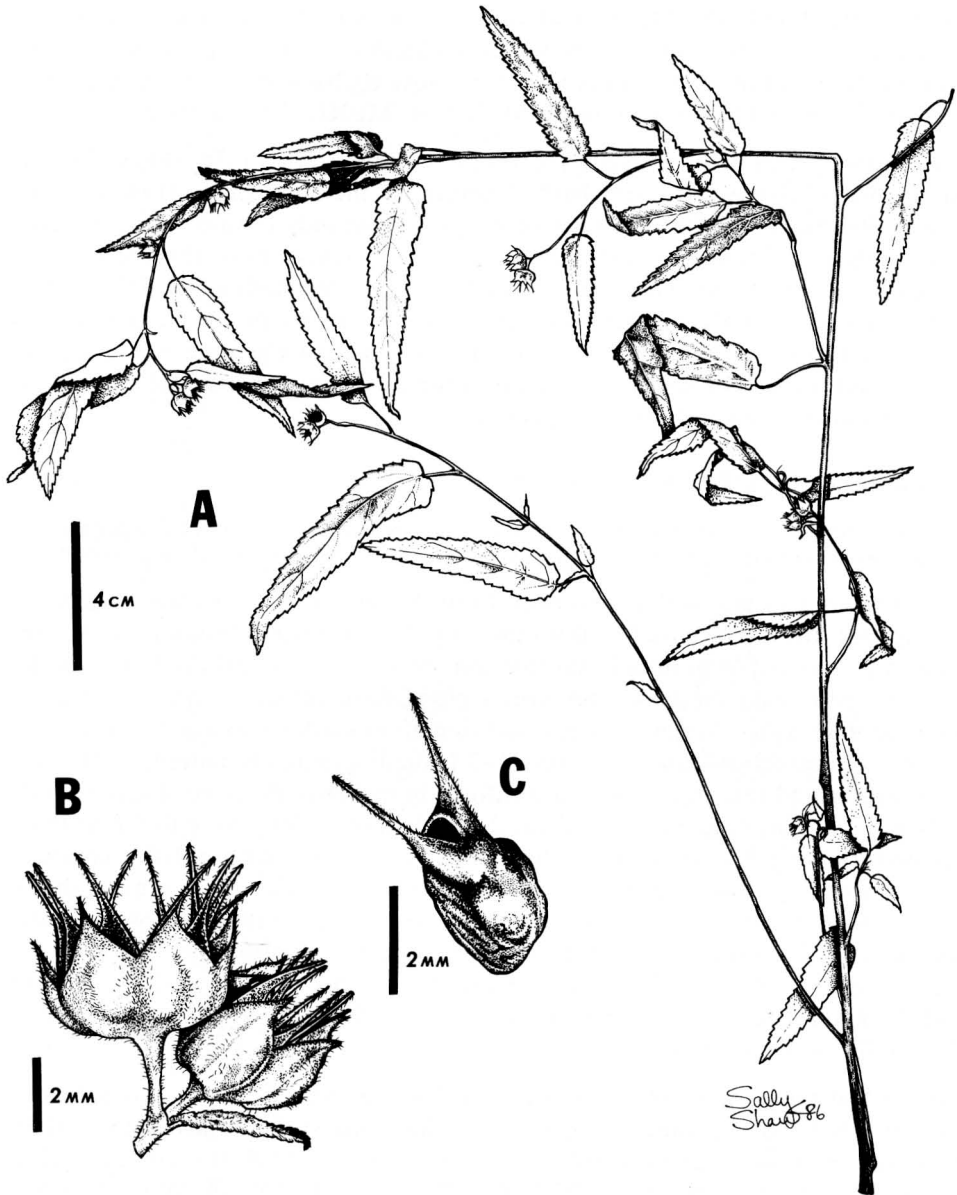


Fig. 8. *Sida fastuosa*.—A. Fruiting plant.—B. Paired fruits in axil of reduced leaf.—C. Individual mericarp. (Koch and Fryxell 8383)

calyx (in fruit) 4–6 mm long, evenly and minutely stellate-pubescent; divided about halfway to the base, 10-ribbed at base; flowers (in anthesis) unknown. Fruits 4–5 mm in diam; mericarps 5, ca. 5.5 mm long (including spines), the lower half indehiscent, broadly trigonal, glabrous, rugulose laterally and dorsally, the upper half dehiscent, minutely hispidulous, with two apical spines; spines ca. 2.5 mm long with hairs becoming retrorse toward apex, diverging widely at maturity; seeds solitary.

*Type.*—MICHOACÁN: Mpio. de Tiquicheo, 36 km al N de Huetamo por la carretera a Zitácuaro, cañada con bosque caducifolio, suelo franco, alt. 730 m; infrecuente en sitios perturbados y sombreados, 10 Nov. 1983, Koch & Fryxell 8383 (holotype: CHAPA; isotypes: BM, ENCB, MEXU, MICH, MO, pf).

The new species belongs in *Sida* section *Cordifoliae* (DC.) Fryx. (Fryxell 1985) on the basis of the retrorsely barbed spines of the mericarps. However, the 5-carpelled fruits and the spines retrorsely pubescent only toward the apex make it somewhat anomalous in this section. These differences notwithstanding, it is placed in section *Cordifoliae*, whose variation is correspondingly enlarged. The new species is readily distinguished from other species in the section by its 5-carpelled fruits, its long narrow leaves, and its frequently geminate (and sparse) flowers and fruits. The specific epithet is chosen with reference to the erect habit and handsome foliage of the new species.

***Sida prolifica*** Fryxell & Koch, sp. nov.

Fig. 9

*Sidae salviifoliae* affinis sed pubescentia densiore (pilis paene 1 mm longis), et foliis late ellipticis et plus minusve obtusis, et inflorescentiis densis profusisque, et mericarpis rugulosis grossioribus.

Subshrubs 1 m tall, widely branched from the base, densely stellate-pubescent throughout, the stem hairs 0.4–0.9 mm long. Leaf blades elliptic, up to 3.5 cm long and 2 cm wide (commonly shorter and narrower), 2–3 times as long as wide, truncate, serrate to the base, sometimes purplish-margined, acute to obtuse at apex; petioles 3–6(–15) mm long (ca.  $\frac{1}{4}$ – $\frac{1}{3}$  length of blade); stipules 4–7 mm long, filiform, prominently ciliate. Flowers 1–3 (usually unequally paired) in the leaf axils, aggregated into long dense racemiform branches with reduced leaves; pedicels up to 8 mm long, articulated ca. 2 mm below flower; calyx 6–7 mm long, divided about halfway to the base, the lobes acute, sometimes purplish-margined; corolla orange-yellow, sometimes with a red center. Fruits ca. 5 mm in diam; mericarps 8–9, 4–5 mm long (including spines), prominently rugulose laterally and dorsally in lower part with 4–6 winglike ridges along the juncture between the dorsal and lateral walls, laterally smooth in upper part, apically deshiscent and 2-spined; spines 1–2 mm long, retrorsely barbed, diverging at maturity at almost 90°; seeds solitary.

*Type.*—MICHOACÁN: Mpio. de Arteaga, 6 km al NE de Puerto San Salvador (98 km al S de Nueva Italia), bosque bajo caducifolio, suelo arcilloso, alt. 680 m, muy común en orilla de la carretera, 21 Nov. 1983, Koch & Fryxell 83240 (holotype: CHAPA; isotypes: BM, CTES, ENCB, F, MEXU, MICH, MO, US, XAL, pf).

*Paratypes.*—MICHOACÁN: Mpio. de Arteaga, 101 km al S de Nueva Italia, carretera a Playa Azul, 700 m, 11 Nov. 1977, Koch & Fryxell 77458 (CHAPA, pf, and elsewhere). Mpio. de Nocupétaro, en La Manga 3 km al SE de Nocupétaro, alt. 600 m, 11 Oct. 1985, Soto-Núñez, García & Vidal 10661 (MEXU, pf).

*Sida prolifica* belongs in *Sida* section *Cordifoliae* (Fryxell 1985) and has its nearest affinity with *S. salviifolia* Presl. The mericarps of the two species are very similar in size and conformation (cf. Fryxell 1978, Fig. 1), except that those of *S. prolifica* are more coarsely rugulose with fewer and more prominent ridges along the angles. In addition, the two species differ in that *S. prolifica* is more

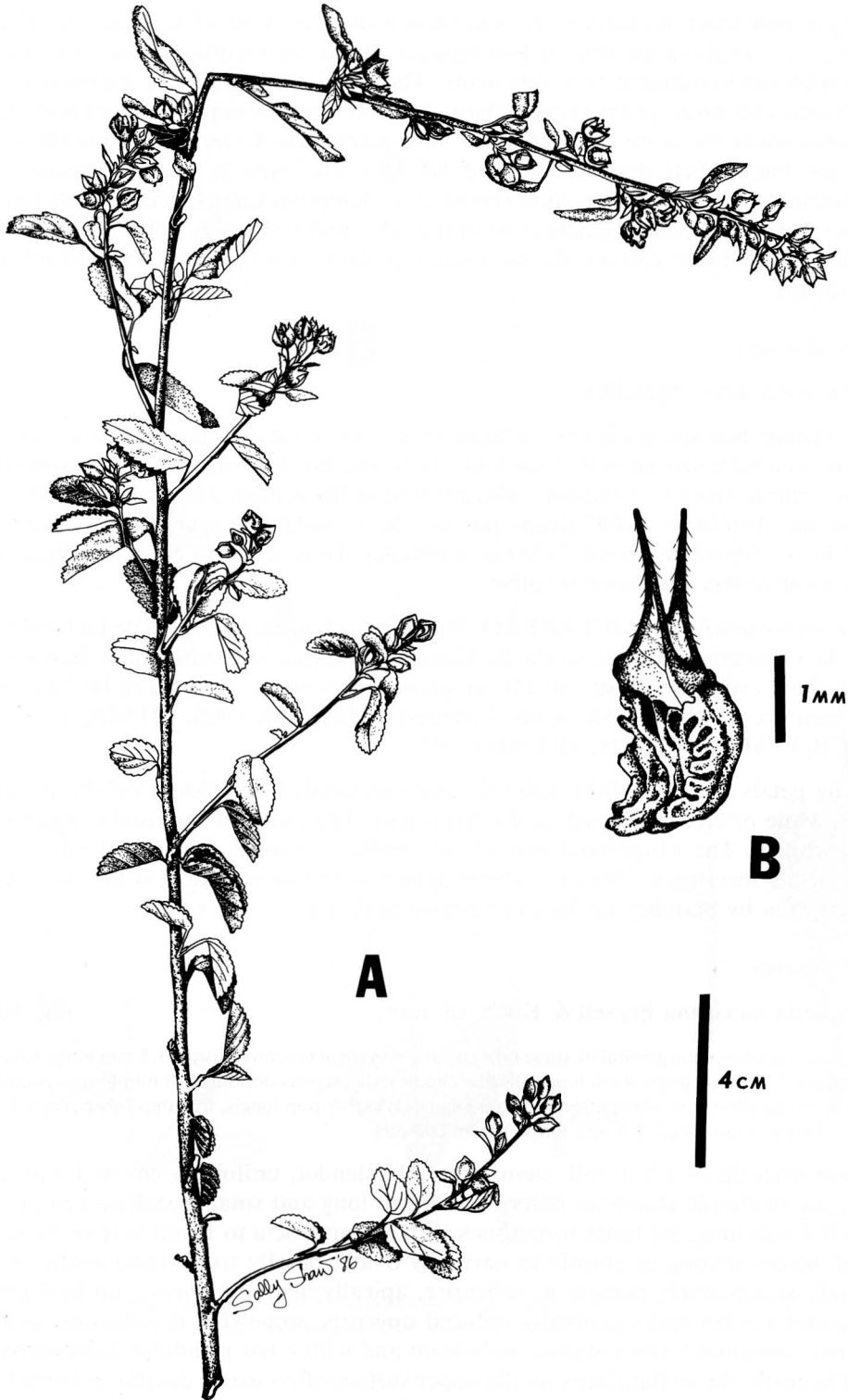


Fig. 9. *Sida prolifica*.—A. Flowering and fruiting branch.—B. Individual mericarp. (Koch and Fryxell 77458)

densely pubescent, its hairs more than twice as long as those of *S. salviifolia*. The leaves of *S. prolifica* are shorter and broader, elliptic rather than narrowly ovate, and subacute to obtuse rather than acute. The stipules of *S. prolifica* are narrower (filiform) and more prominently ciliate (hairs 0.5 mm long). In *S. prolifica* the inflorescences are more crowded, with more numerous flowers and fruits (hence the specific epithet) than in *S. salviifolia*. In some respects the new species is reminiscent of the Brazilian *Sida cerradoensis* Krapovickas, especially in its tendency toward purplish pigmentation in the calyx and leaf margins, but *S. prolifica* differs in its shorter calyces, shorter mericarp spines, finer pubescence, and other characters.

### *Sterculiaceae*

#### HELICTERES REKOI Standley

Although this species is known from Jalisco to Oaxaca, as far as we are aware it has been collected no more than four times, and for this reason is poorly known (pers. comm. from C. Cristóbal, who is revising the genus). The previous collections are: *McVaugh 20997* (from Jalisco), *Reko 3443* (the type, from Oaxaca), and *Koch, Fryxell & Wendt 79531* (a topotype). Thus, a fourth collection from a new locality was a pleasant surprise.

*Specimen examined*.—GUERRERO: Mpio. de La Unión, 8 km al N de La Unión, por la terracería a Coahuayutla de Guerrero, bosque subcaducifolio, bastante perturbado, suelo arcilloso, alt. 150 m; escaso sobre suelo expuesto en las laderas del camino, 13 Nov. 1983, *Koch & Fryxell 83121* (BM, CAS, CHAPA, CTES, ENCB, F, MEXU, MICH, MO, RSA, pf).

The petals are large, fully reflexed, and bicolored, rose-colored on the distal part, white or cream-colored on the basal part. The exerted staminal column is also whitish. The white basal part of the corolla is more than half its length, its free petals forming a "throat." These details were not included in the original description by Standley for lack of suitable material.

### *Turneraceae*

#### ***Piriqueta mexicana* Fryxell & Koch, sp. nov.**

Fig. 10

*Piriqueta pubescentia glandulari atque pilis stellatis minutis seta centrali usque 1.5 mm longi, foliis oblongis vel ellipticis usque 4 cm longis, floribus homostylis, sepalis deciduis 5–8 mm longis, petalis 15 mm longis persicinis, filamentis 5–5.5 mm longis, stylis 8–9 mm longis, fructibus tuberculatis, 5–8 mm longis, seminibus 2–2.5 mm longis parum curvatis.*

Subshrub up to 0.5 m tall; stems greenish, slender, uniformly covered with a mixture of simple glandular hairs ca. 0.5 mm long and smaller stellate hairs ca. 0.2–0.4 mm long, the latter sometimes with a central seta to 1 mm long or more. Leaf blades oblong or elliptic to narrowly ovate, basally truncate to acute, obscurely and coarsely crenate to subentire, apically acute to obtuse, up to 4 cm long and 1.5 cm wide, gradually reduced upwards, somewhat discoloured, with pinnate venation, evenly stellate-pubescent and with a few glandular hairs above and beneath, the stellate hairs on the upper surface often with a central, antrorsely oriented seta 0.5–1.5 mm long; petioles of larger leaves ca. 0.5 cm long, with pubescence like that of stem, becoming shorter (leaves even sessile) upwards.

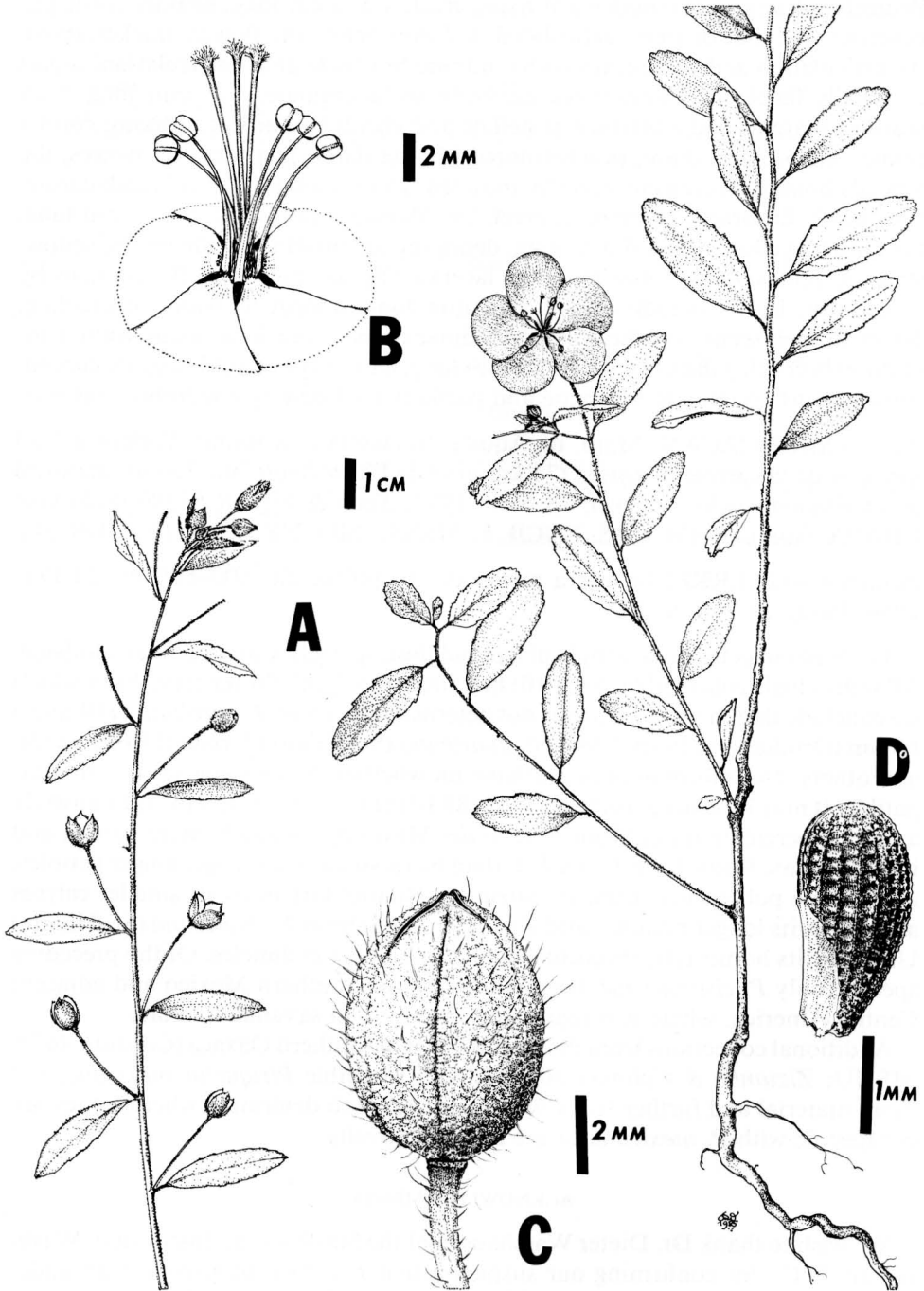


Fig. 10. *Piriqueta mexicana*. —A. Branches, showing disposition of flowers and fruits and an open flower.—B. Detail of anthers and styles (blades of petals removed).—C. Fruit.—D. Seed. (Koch and Fryxell 83190)

Pedicels solitary in the upper leaf axils, erect, 1.5–3 cm long, slender, with pubescence like that of stem, articulated 4–7 mm below the flower, thicker above the articulation and sometimes with a minute bracteole at the articulation; sepals 5, usually lanceolate, sometimes narrowly so, acuminate, 5–8 mm long, with scarious margins and a mixture of stellate and glandular hairs, deciduous; corolla rotate, 3–3.5 cm in diam, peach-colored (drying darker) with darker nerves, the 5 petals broadly obcuneate, apically rounded, 15 mm long, 10 mm broad; corona very short, fimbriate; stamens 5, erect, the filaments yellowish, 5–5.5 mm long, the anthers yellow, 1.1–1.4 mm long, dehiscing longitudinally, the pollen yellow; styles 3, yellowish, 8–9 mm long, the lacerate stigmas exceeding the stamens by 3–3.5 mm. Fruits broadly ovoid, 5–8 mm long, almost as wide, tuberculate, 3-valved, dehiscent, with scattered glandular hairs 1 mm long; seeds white (immature) becoming dark brown, 2–2.5 mm long, narrowly obovoid, slightly curved, conspicuously reticulate-foveolate and partially enclosed by a membranous aril.

*Type*.—MICHHOACÁN: Mpio. de Aquila, terracería a la mina "Varicosta," 13 km al N de la carretera costera (73 km al O de Playa Azul), alt. 750 m; matorral de *Dodonaea*; suelo arcilloso; 18 Nov. 1983, Koch & Fryxell 83190 (holotype: CHAPA; isotypes: BM, CAS, ENCB, F, MEXU, MO, NY, RSA, TEX, US, pf).

*Paratype*.—GUERRERO: sierra arriba de Acapulco, alt. 500–600 m, 20 Dic. 1956, Paray 2340 (ENCB).

The type collection is a sample of a population sparsely scattered over a hillside. All individuals collected (at least 10) had the same "pin" flower type, from which we conclude that the new species is not heterostylous, as are *P. caroliniana* (Walter Urban (Ornduff and Perry 1964), *P. duarteana* (St.-Hilaire) Urban (Urban 1883), and others. No information is available on whether the new species is self-compatible. It may be distinguished (Urban 1883) from *P. caroliniana* by its homostyly and its tuberculate fruits; from *P. cistoides* Meyer by its much larger corolla and its tuberculate fruits; from *P. nitida* Urban by its spreading foliage, longer petioles, and stellate pubescence; from *P. aurea* (St.-Hilaire) Urban by its smaller calyces and fruits, its longer petioles, and glandular hairs; from *P. duarteana* (St.-Hilaire) Urban by its homostyly, its corolla color, and longer peduncles. Of the preceding species, only *P. cistoides* has been reported from southern Mexico and adjacent Central America, where it is reasonably common in savanna habitats.

Additional collections from the Pacific coast of southern Oaxaca (*Conzatti 3674*, MEXU; *Zizumbo & Colunga 307*, MEXU) resemble *Piriqueta mexicana*, but more material and further study will be necessary to determine whether they are conspecific with *P. mexicana* or are another novelty.

#### ACKNOWLEDGMENTS

We wish to thank Dr. Dieter Wasshausen of the Smithsonian Institution, Washington, D.C., for confirming our suspicion that *Elytraria mexicana* is an undescribed species. We are also grateful to Karin Douthit (Figs. 2–7 and 10) and to Sally Shaw (Figs. 8 and 9) for their excellent drawings.

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