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REVISION OF *IPOMOEA* SERIES TYRIANTHINAE (CONVOLVULACEAE)

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Abstract: *Ipomoea* series *Tyrianthinae* (House) D.F. Austin is revised in light of recent systematic surveys of New World morning glories. The group includes two species of vines and three highly derived shrubs. Four varieties of *I. orizabensis* (Ledeb.) Pelletan are recognized for the first time; two are new to science, *I. orizabensis* vars. *austromexicana* and *novogaliciana*, and one requires a new combination, *I. orizabensis* var. *collina* (House) J.A. McDonald. Molecular studies indicate that *Ipomoea* ser. *Tyrianthinae* shares close phylogenetic affinities with *Ipomoea* sects. *Calonyction* and *Tricolores*, yet few morphological features support this arrangement. It is assumed, therefore, that highly derived elements of the tyrianthina complex have undergone rapid morphological change in the arid environments of central and northern Mexico.

Keywords: Convolvulaceae, *Ipomoea*, *Tyrianthinae*.

House (1908) first defined *Ipomoea* subsection *Tyrianthinae* House on the basis of two combined floral features: 'herbaceous sepals' (i.e., green and foliaceous) and 2-locular capsules. He placed the group in *Ipomoea* section *Pharbitis* (Choisy) Griseb. with subsections *Cephalanthae* Choisy, *Heterophyllae* House, *Hederaceae* House and *Cissoides* House (= *Merremia pro parte*), and distinguished the latter four groupings collectively on the basis of their 3-locular capsules. Subsequent studies have dealt with *Pharbitis* groupings in various ways (Matuda 1963, 1964, 1965, McPherson 1979, McDonald 1991, McDonald & Mabry 1992, Austin & Huaman 1996, Wilkin 1999), the most comprehensive of which (Austin & Huaman 1996) recognizes three of House's subsections at the series level [i.e., *Ipomoea* sers. *Tyrianthinae* (House) D.F. Austin, *Heterophyllae* (House) D.F. Austin and *Pharbitis* (Choisy) D.F. Austin].

House initially included nine species within series *Tyrianthinae*, but most original members have since been transferred to other infrageneric groups or lumped under a broadened concept of *I. orizabensis* (Pelletan) Ledeb. ex Steud. [i.e., *I. tyrianthina* House and *I. longepedunculata* M. Martens & Galeotti *pro syn.* (McDonald 1994; Austin

& Huaman 1996)]. Former subsectional associates such as *I. portoricensis* (Spreng.) G. Don [= *I. indica* (Burm.) Merr.] and *I. venusta* (M. Martens & Galeotti) Hemsl. (= *I. marietii* Choisy) are now known to have 3-locular capsules, and therefore key to *Ipomoea* sers. *Hederaceae* and *Pharbitis*, respectively (Austin & Huaman 1996). Chloroplast-DNA studies (McDonald & Mabry 1992) indicate that *I. variabilis* and *I. isostemma* [= *I. meyeri* (H.B.K.) G. Don] are nested within *Ipomoea* sect. *Exogonium* (Choisy) Griseb., while *I. silvicola* House is now associated with *I. crinicalyx* S. Moore and *I. pedicellaris* Benth. (*Ipomoea* subg. *Eriospermum*) on the basis of its setaceous sepals and tomentose seeds (McDonald 1991, Austin & Huaman 1996).

The idiosyncratic treatments of Matuda (1963, 1964, 1965) abandoned most of House's taxonomic constructs, but provide few legitimate taxonomic alternatives due to the author's adoption of informal groupings. Matuda's inordinate reliance on the *a priori* weighting of sepal characters tends to reduce the significance of his contributions, but useful insights can still be gleaned from his comprehensive consideration of most known Mexican species. Matuda allied, for example, two vining xerophytes, namely *I.*

collina House [= *I. tyrianthina* var. *collina* (House) J. A. McDonald] and *I. jacalana* Matuda, with the widespread mesophyte, *I. orizabensis* (s. str.), thereby forming the core of his 'ampli-tomentosi-sepalas group.' The present treatment adopts this scheme, but rejects Matuda's inclusion of other disparate elements which have since been relegated to a wide variety of subgeneric groupings: i.e., *I. igualensis* House [*Ipomoea* ser. *Pharbitis* (Choisy) D.F. Austin], *I. suaveolens* [*Ipomoea* ser. *Eriospermum* (Hallier f.) D.F. Austin], *I. suffulta* [*Ipomoea* sect. *Exogonium* (Choisy) Griseb.], and *I. leonensis* House [*Ipomoea* sect. *Jalapae* (House) D.F. Austin; McDonald 1991, Austin & Huaman 1996].

McPherson (1979) later adopted Matuda's perspective in part, but recognized two highly derived shrubs, *Ipomoea sescossiana* Baill. and *I. stans* Cav., as close relatives of *I. orizabensis* (s. str.) and *I. collina*, based primarily on their shared floral features (see below). While most of McPherson's groups, like those of Matuda, were adopted on an informal basis, his interpretations set an important taxonomic precedent by recognizing that erect growth habits have multiple origins in the genus. Prior to McPherson's study, all self-supporting shrubs were lumped with arborescent elements of the genus [i.e., *I. arborescens* (H.B.K.) G. Don, *I. murucoides* Roem. & Schultz and allies; Don 1838; Choisy 1845], resulting in an unwieldy group that included a heterogenous array of flower and fruit types. McPherson's (1979) novel refinements were later supported by anatomical and DNA studies of Mexican *Ipomoea* (McDonald 1992; McDonald & Mabry 1992; Miller & McDonald, in prep).

McPherson included yet other morphologically discordant elements in his 'Tyrianthinae group,' such as *I. longifolia* Benth. and *I. simulans* D. Hanb., but these have since been transferred to alternative subgeneric groups. The former species is now associated with *I. leptophylla* Torr. [*Ipomoea* ser. *Jalapae* (Austin 1978, 1986; Mill-

er et al. 1999)] on the basis of its sprawling shrubby habit, narrowly elliptic, glabrous leaves, and subdehiscent fruits, whereas *I. simulans* is allied with *I. caudata* Fernald of *Ipomoea* sect. *Exogonium* (McDonald 1987). Due to these newly proposed associations, *Ipomoea* series *Tyrianthinae* is left with a mere five species. The type species of this complex, *I. orizabensis*, is presently divided into four geographically defined varieties.

The tyrianthinas as a whole are endemic to Mexico and Guatemala, and usually prefer high altitudinal regions and seasonally arid environments. Vining habits in the group are generally considered to be plesiomorphic, and shrubby habits as apomorphic (McDonald & Mabry 1992). Although recent authors (McPherson 1979, Austin & Huaman 1996) have aligned shrubs such as *I. durangensis* House, *I. lenis* House, *I. petrophila* House and *I. ciervensis* Painter ex House with the self-supporting elements of series *Tyrianthinae* (i.e., *I. ancisa* House, *I. stans* Cav. and *I. sescossiana* Baill.), I consider the former species complex to be phylogenetically distant due to their densely sericeous foliage and comose seeds. The erect growth habits of these distantly related congeners must therefore be interpreted as analogous. Indeed, preliminary cpDNA evidence confirms that the hairy-seeded shrubs fall within *Ipomoea* subgen. *Eriospermum* (unpubl. data), and consequently far removed from *Ipomoea* sers. *Tyrianthinae* of subgenus *Quamoclit* (McDonald 1991; Miller et al. 1999).

In light of the above interpretations, it seems probable that Mexican *Ipomoea* have lost their twining habits on at least six different occasions, as exemplified by the following species: *I. capillacea* (*Ipomoea* ser. *Leptocallis*), *I. leptophylla* (*Ipomoea* ser. *Jalapae*), *I. stans* (*Ipomoea* ser. *Tyrianthinae*), *I. arborescens* (*Ipomoea* ser. *Arborescentes*), *I. lenis* (ser. undetermined), and *I. carnea* (ser. undetermined). This same trend has been recognized in various shrubby species complexes that have arisen independently in arid terrains of South America, Africa

and Australia. One may surmise that erect growth habits have arisen in Mexico during episodic periods of drought since the Eocene, for all these species prosper in deserts and sparsely vegetated dry-monsoon forests, where the adaptive behavior of clinging to tall plants confers few advantages.

MORPHOLOGY

Growth habits are variable and highly diagnostic at the species level in *Ipomoea* ser. *Tyrianthinae*. *Ipomoea orizabensis* s. lat. and *I. jacalana* are typical morning glory vines, as they climb by slender stems that twine at their supple tips. This growth habit contrasts remarkably, however, with the shrubby growth habits of *I. ancisa*, *I. sescossiana* and *I. stans*, whose stems are straight, comparatively short in stature (1–2 m long), ascendent, and only sparingly ramified. The stalks of these shrubs arise in fascicles from large (1–50 cm diam.), woody, resinous roots, growing rapidly during the onset of the rainy season (Jun–Dec) and dying back to the ground level during the onset of the dry season (Jan–May).

Leaf size and shape in *Ipomoea* ser. *Tyrianthinae* are equally variable and diagnostic at the species level, each specific type generally correlating with a particular growth habit. Vines such as *I. orizabensis* vars. *orizabensis*, *austromexicana* and *novogaliciana* usually have cordiform leaf blades (Figs. 1A; 4A,B), while the leaves of the vining xerophyte, *I. orizabensis* var. *collina*, are either 3-, 5- or 7-lobate (Fig. 1B). The highly derived laminae of *I. jacalana* and *I. stans* resemble holly leaves in their presentation of elliptic blades with strongly developed teeth (Fig. 1C), whereas leaves of *I. ancisa* and *I. sescossiana* are further derived, exhibiting pseudo-compound blades that are pinnatifid or irregularly dissected (Figs. 1D,E). Their leaf segments are either linear or filiform. Although various distantly related *Ipomoea* of Mexico exhibit dissected leaves of similar type, such as *I. quamoclit* [sect. *Mina* (Cerv.) Griseb.] and members

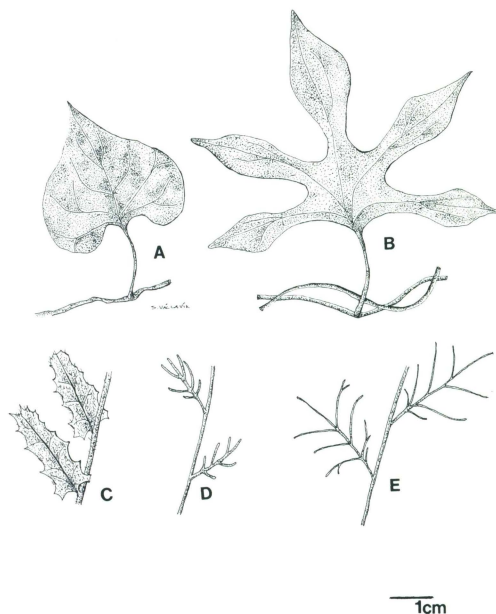


FIG. 1. Leaf variation in *Ipomoea* ser. *Tyrianthinae*. A. Leaf of *I. orizabensis* var. *orizabensis*. B. Leaf of *I. orizabensis* var. *collina*. C. Leaf of *I. stans*. D. Leaf of *I. sescossiana*. E. Leaf of *I. ancisa*.

of *Ipomoea* section *Leptocallis* (G. Don) J.A. McDonald (McDonald 1995), their distinctive blades are apparently of independent origin, as noted early on by Asa Gray (1887). As interpreted here, linear leaf segments of *I. ancisa* (Fig. 1E) and *I. sescossiana* (Fig. 1D) are thought to be homologous with the laminar teeth of *I. jacalana* and *I. stans* (Fig. 1C). And it is assumed that the serial reduction in leaf surface area resulted as an adaptive response to arid environments.

Like most *Ipomoea* groups, the sepals of *Ipomoea* ser. *Tyrianthinae* are highly diagnostic, generally exhibiting either a foliaceous condition, as observed in calices of *Ipomoea orizabensis* vars. *orizabensis* and *collina* (Figs. 4C,D), or a coriaceous, two-toned aspect (best observed on the inner sepals). The latter condition derives from the exaggerated development of a fleshy midrib and broad hyaline margins (Figs.

4E,F). The two-toned sepals of the tyrianthinas are somewhat reminiscent of sepals in *Ipomoea* sect. *Tricolores*, as exemplified by those of *I. tricolor* and *I. cardiophylla*. Sepals of the latter species are, however, relatively small (< 6 mm long) and deltate in shape, whereas those of *Ipomoea* ser. *Tyrianthinae* are broadly to narrowly elliptical shapes and generally larger in size [(4-) 6-17 mm long, 3-9 mm wide].

KEY TO *IPOMOEA* SECTS. *CALONYCTION*,
TRICOLORES AND SERIES *TYRIANTHINAE*

1. Corollas white, crepuscular, usually salverform, the outer sepals often bearing a singular, subterminal, carnosous appendage *Ipomoea* sect. *Calonyction*
1. Corollas red, blue or purple-pigmented, always diurnal, infundibular; the sepals lacking carnosous appendages.
 2. Plants vining; leaf blades always cordiform; inner sepals <6 mm long, deltate or broadly elliptic; inner base of corolla tube yellow *Ipomoea* sect. *Tricolores*
 2. Vines or suffrutescent shrubs; leaf blades variable, cordate, 5,7-lobed, elliptic, or pinnatifid; inner sepals > 6 mm long, elliptic, broadly or narrowly elliptic to lanceolate; corollas lacking yellow pigmentation *Ipomoea* ser. *Tyrianthinae*

IPOMOEA ser. *TYRIANTHINAE* (House) D.F. Austin. TYPE: *Ipomoea tyrianthina* Lindl. [= *I. orizabensis* (Pelletan) Ledeb. ex Steud. var. *orizabensis*]. *Ipomoea* subsect. *Tyrianthinae* House, 1908, Ann. New York Acad. Sci. 18:206.

Perennial VINES and suffrutescent SHRUBS; stems slender and twining or straight, ascendent, herbaceous or lignescent; roots tuberous, lignescent, starchy and resinous; LEAVES variable, cordiform, broadly or narrowly elliptic, pinnatifid or irregularly dissected, margins entire or large-dentate; INFLORESCENCE a simple or compound cyme or reduced to a single flower, the peduncles variable in length (1-25 cm); sepals variable, herbaceous or green-fleshy along midrib with hyaline

margins, broadly or narrowly elliptic, rarely ovate, apex acute or acuminate; corollas infundibular, the limb broadly developed, bluish, magenta, pale pink or white; FRUIT a 2-locular, subovate capsule, the seeds ob-elliptic, short-pubescent or rarely glabrous.

DISTRIBUTION: Northern Mexico to Guatemala.

KEY TO *IPOMOEA* SECTION
TYRIANTHINAE

1. Vines, stems twining and contorted.
 2. Leaf blade margin dentate-crenulate. *I. jacalana*
 2. Leaf blade margin entire.
 3. Leaves always ovate; sepals ovate or broadly elliptic, <1.5 times as long as wide, 4-10 mm long, apex of inner sepals usually obtuse or broadly emarginate; corollas 3-6 cm long . . . 3d. *I. orizabensis* var. *novogaliciana*
 3. Leaves ovate or 3,5,7-lobate; sepals narrowly elliptic or lanceolate, 1.5-3 times as long as broad, (7-) 9-14 mm long, apex of inner sepals usually acute; corollas 5-8.5 cm long.
 4. Xerophytes, leaves always 5- or 7-lobed, the middle lobe elliptic, the apex and base of leaf segments attenuate 3c. *I. orizabensis* var. *collina*
 4. Mesophytes, leaves usually ovate, or if rarely 3-5-sublobed, then middle segment ovate-elongate to lanceolate, but generally not narrowed at base.
 5. Stems conspicuously pubescent; leaves pubescent; sepals herbaceous, lanceolate or narrowly elliptic, ca. 3 times as long as broad, 9-18 mm long, usually conspicuously pubescent 3a. *I. orizabensis* var. *orizabensis*
 5. Stems glabrous or sparingly pubescent; leaves glabrous; sepals narrowly elliptic, 1.5-2 times as long as broad, (7-) 9-11 mm long, glabrous or sparingly puberulent at base 3b. *I. orizabensis* var. *austromexicana*
 1. Suffruticose shrubs, stems erect, self-supporting, ascendent or decumbent, not twining.
 6. Leaves elliptic, usually puberulent below, the margins crenulate-dentate 5. *I. stans*
 6. Leaves pinnatisect, glabrous below, the margins entire.
 7. Plants 1-1.5 m tall, leaf segments 10-60 mm long; peduncles 3-12 cm long during anthesis; corolla limb white or pale lavender 1. *I. ancisa*

7. Plants to 1 m tall, leaf segments 3–25 mm long; peduncles 0.8–3.5 (–8) cm long; corolla limb dark blue
 4. *I. sescossiana*

1. IPOMOEA ANCISA House, Ann. New York Acad. Sci. 18:187. 1908. TYPE: MEXICO. Chihuahua: between Colonia García and Pratt's Ranch below Pacheco, 1899, *Nelson 6276* (HOLOTYPE NY!; ISOTYPE GH!)

Erect, suffrutescent, glabrous SHRUBS, 1–1.5 m tall; stems erect, straight, terete, occasionally moderately striate, hollow, deciduous, to 2 m long, 2–15 mm in diam.; internodes 1–6 cm long. LEAVES pinnatisect or irregularly dissected, 3.5–11 cm long, 2–5 cm wide; petiolate, petioles terete 7–15 mm long, 1–2 mm in diam., green, smooth, glabrous; leaf lobes 6–9, filiform, 1–6 cm long, 1–2 mm wide, green, smooth, glabrous. INFLORESCENCE bearing solitary flowers; peduncle terete, 3–12 cm long, 1–2 mm in diam. during anthesis, extending to 16 cm long and 4 mm in diam. in fruit, green, glabrous, smooth or minutely striate, secondary peduncles similar, to 2 cm long; pedicel terete or slightly angled, erect, 10–15 mm long, 2–3 mm in diam. during anthesis, recurved and to 27 mm long, 4 mm in diam. in fruit, green, smooth, glabrous; sepals unequal, broadly elliptic to ovate, 6–10 mm long, 4–8 mm wide, the outer somewhat shorter and more coriaceous than the inner, smooth, glabrous, the midrib green and coriaceous, the margins conspicuously hyaline, the apex obtuse or truncate, rarely acute; corolla infundibular, glabrous, white or pale lavender, 5–7 cm long, the basal tube 1–2 cm long, 4–7 mm in diam., the throat and limb expanding gradually, the limb 7–8 cm wide during anthesis; stamens subequal, white, 4–5 cm long, the filaments basally glandular-pubescent; style white, surpassing the stamens, 5–6.5 cm long, glabrous. FRUIT a pyriform capsule, 2-locular, 1.5–1.8 cm long, 1.1–1.7 cm wide at base, tan or pink, glabrous, the pericarp with observable reticulate vena-

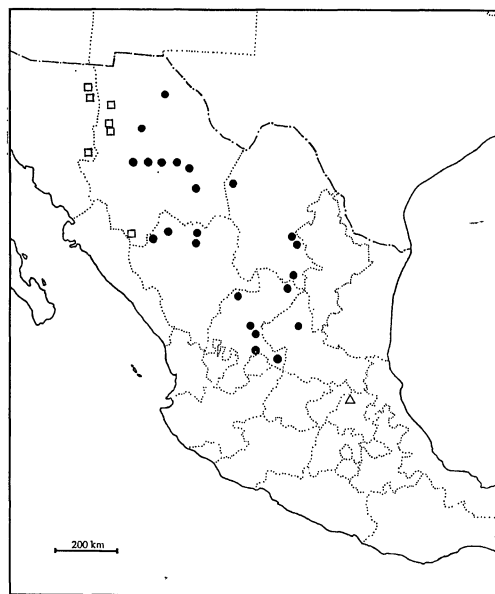


FIG. 2. Natural distributions of *Ipomoea ancisa* (open squares), *I. jacalana* (open triangle) and *I. sescossiana* (closed circles).

tion, the style base often persistent and ca. 5 mm long; seeds 4, ellipsoid, 3-angled, 7–10 mm long, 5–7 mm wide, gray-brown, puberulent.

COMMON NAME: Romería de la Sierra.

DISTRIBUTION (Fig. 2) AND HABITAT: A narrow endemic of juniper-oak forests that interface the northeastern slopes of the Sierra Madre Occidental and the arid altiplano of Mexico.

FLOWERING AND FRUITING: July to September.

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Chihuahua: La Cienegita, Río Mayo, 10 Sep 1936, *Gentry 2648* (CAS,F,GH,MEXU,US); Río Gavilán, 7 mi SW of Pacheco, ca. 2000 m, 26 Jul 1948, *Leopold 136* (CAS); Chuhuichupa, Aug–Sep 1936, *LeSueur 850* (CAS,F,GH,MEXU,TEX); Río Negro, 1 Sep 1937, *LeSueur s.n.* (CAS); NW of Yepomera on hwy 180 between San Jose and Bavicora, 2100 m, 31 Aug 1989, *Mayfield et al. 275* (TEX); Madera, 2150–2200 m, 25 Sep 1934, *Pennell*

19251 (GH,US); Río Negro, 22 Jul 1964, *Walker ELS-15* (NY); Mpio. de Janos, Carretas, border of Chihuahua and Sonora, 2320 m, 26–28 Aug 1939, *White 2552* (GH,MEXU,US), 2578 (GH,MEXU), 2598 (GH,MEXU). **Sonora:** Arroyo Agua Caliente, 8 km S of Maycoba on road to Moris, 1500 m, *Van Devender & Reina 97-1263* 26 Sep 1997 (TEX); Rio de Bavispe, Baburia, N of Aribabi, Cañón de Hueparí, 1500 m, 2–3 Sep 1939, *White 2691* (GH,MEXU); 2692 (GH,MEXU); Río de Bavispe, Piedra Parada, 2–3 Sep 1940, *White 3672* (GH,MEXU).

Ipomoea ancisa is distinguished by its relatively tall stature (to 1.5 m tall), filiform leaf segments to 6 cm long (Fig. 1E), white or pinkish corollas, and long peduncles (3–12 cm). *Ipomoea ancisa* is probably reproductively isolated from its sister species, *I. sescossiana*, since it exhibits nocturnal anthesis (*Van Devender 97-1263*). In contrast, flowers of *I. sescossiana* open during early daylight hours. *Ipomoea ancisa* generally undergoes rapid growth during the onset of rains, and quickly develops fruits before the rapid onset of the dry season from July to September.

2. **IPOMOEA JACALANA** Matuda, *Anales Inst. Biol. Univ. Nac. Autón. México, Bot.* 35:58. 1964. TYPE: MEXICO. **Hidalgo:** Cumbre de Jacala, 18 Sep 1962, *Matuda 37288* (HOLOTYPE MEXU!).

Climbing woody VINES; stems twining, contorted, angled, 4–5 mm in diam., puberulent, hollow, with internodes ca. 2.2 cm long. LEAVES simple, petiolate; petioles terete, 2–5 cm long, ca. 1.5 mm in diam., puberulent; leaf blades ovate, 4–9 cm long, 2.5–7 cm wide, membranous, green on both surfaces, the undersurface venation prominent, with primary and secondary veins pubescent, the margins dentate-crenulate, the teeth ca. 1 mm long and wide, the apex obtuse and mucronate, the base acute or moderately auriculate. INFLORESCENCE a simple, monochasial, 2-flowered

cyme; peduncle terete, ca. 10 cm long, 2 mm in diam., first ramification subtended by 2 foliar bracts, these ca. 4 cm long, 2.5 cm wide; secondary peduncles ca. 7 cm long, 1 mm in diam.; pedicels terete, gradually expanding into receptacles, 14–20 mm long, 1–2 mm in diam., striate, puberulent, subtended by foliar bracts, these 1–1.5 cm long, 4–13 mm wide, the margins dentate-crenulate; sepals imbricate, subequal, narrowly elliptical, 1.5–1.7 cm long, ca. 6 mm wide, glabrescent, green and coriaceous along midrib, the margins entire, hyaline, the apex apiculate or caudate, occasionally foliaceous and expanded; corolla infundibular, ca. 6 cm long, the tube ca. 1.5 cm wide at base, ca. 2 cm wide at throat, the limb convolute-duplicate during aestivation, glabrous, the limb red-purple, ca. 6 cm wide; stamens unequal, 2.5–3 cm long; style ca. 3 cm long. FRUIT not seen.

DISTRIBUTION (Fig. 2) AND HABITAT: Known only from the type locality in Hidalgo.

FLOWERING: September to October.

Ipomoea jacalana is morphologically intermediate between *I. stans* and *I. orizabensis*, and perhaps of hybrid origin. The species retains the vining habit of *I. orizabensis* but produces a highly derived leaf blade with crenulate-dentate margins.

1. **IPOMOEA ORIZABENSIS** (Pelletan) Ledeb. ex Steud.

Twining VINES from woody, resinous roots; stems climbing or occasionally repand, herbaceous or lignescent, terete, ribbed or irregularly angled, 1–5 m long, 2–6 mm in diam., branching, smooth or rough, the new growth green, the old growth stramineous, pilose, hirsute, glabrescent or glabrous. LEAVES variable, simple, lobed or not, deciduous, petiolate; petioles green, 2.8–7 cm long, 1–2 mm in diam.; leaf blades ovate, ovate-elongate, occasionally 3-, 5- or 7-lobed, 3–15 cm long, 2.5–12 cm wide, green, membranous, strigose, puberulent or glabrous, the margins entire, the apices acute, acuminate, the base

cordate, basal lobes 0.4–2.3 cm long, 1.5–5.5 cm wide; venation palmi-pinnate. INFLORESCENCES of mono- or dichasial cymes, flowers 1–5; peduncles usually surpassing leaves, terete, 2–24.5 cm long, 1–2.5 mm in diam., stramineous, strigose, puberulent or glabrous; secondary peduncles reduced, to 7 mm long, subtended by 2 opposite, lanceolate or ovate herbaceous bracts, 3–20 mm long, 1–8 mm wide; pedicels erect during anthesis, recurved in fruit, terete, 1.3–1.6 cm long, 1–2 mm in diam., pilose or hirsute; sepals variable, subequal or unequal, imbricate, dark green along midrib, stramineous or hyaline margins, ovate, ovate-elongate, elliptic or broadly deltoid, 4–18 mm long, 3–7 mm wide, the exterior herbaceous-coriaceous or coriaceous, pubescent or glabrous, the interior ones more membranous, glabrous or pubescent along midrib, the margins entire, scarios, the tips acute, attenuate, obtuse or emarginate; corolla infundibular, 3–8.5 cm long, the tube ca. 8 mm in diam. at base, ca. 15 mm in diam. at throat, the limb sub-entire, scantily 10-lobate, magenta-purple, glabrous, aestivation convolute-duplicate, 4–6 cm wide during anthesis; stamens subequal, included, 1.8–2.5 cm long, the filaments white, the base glandular-pubescent; style white, surpassing stamens, 2.3–3.2 cm long, glabrous, the stigma white, glabrous. FRUIT a globose capsule, brown, 1–1.3 cm in diam., dehiscent, chartaceous, glabrous; seeds 4, black, subglobose, 3-angled, ca. 5 mm in diam., puberulent or glabrous.

Four regionally distinctive morphotypes of *I. orizabensis* s. lat. are encountered in the tropical and temperate mountains of Mexico; these are hereby recognized as varieties. The type variety of the species is common and widespread, ranging from the northern extensions of the Sierra Madres Occidental and Oriental to the Sierra Soconusco of Chiapas and Guatemala (Fig. 3). This variety is readily distinguished by its pubescent foliage and calices, and by relatively long (9–18 mm), foliose sepals (Fig. 4C). The Chihuahuan Desert endemic, *I. or-*

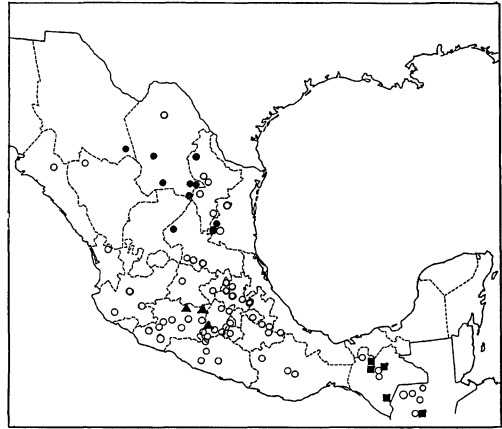


FIG. 3. Natural distributions of *Ipomoea orizabensis* vars. *orizabensis* (open circles), *austromexicana* (closed squares), *collina* (closed circles), and *novogaliciana* (closed triangles).

izabensis var. *collina* House, is distinguished by deeply lobed leaf blades (Fig. 1B), whereas two newly described varieties, *I. orizabensis* vars. *austromexicana* and *novogaliciana*, exhibit glabrous foliage and calices, and relatively small sepals (usually <8 mm long). Since the latter characteristics may vary somewhat within each variety, and occasionally intergrade between sympatric varieties, they are regarded as racial attributes of a polymorphic species.

IPOMOEA ORIZABENSIS (Pelletan) Ledeb. ex Steud. var. *ORIZABENSIS*, Nom. ed. 2:818. 1841.

Convolvulus orizabensis Pelletan, J. Chem. Tox. 10:1. tab. 2. 1833. TYPE: MEXICO. Veracruz: near Orizaba. (LECTOTYPE: illustration of protologue!; McDonald 1994, Fl. Veracruz 77:85).

Convolvulus serotinus DC., Catal. Pl. Hort. Bot. Monsp. 97. 1813.—*non I. serotina* Willd. ex Roem. & Schultz, 1819. TYPE: MEXICO (HOLOTYPE G-DC!).

Convolvulus superbus H.B.K., Nov. Gen. Sp. Pl. 3:103. 1818. TYPE: MEXICO. between Aguasarco and mountains of Jorullo, Sep

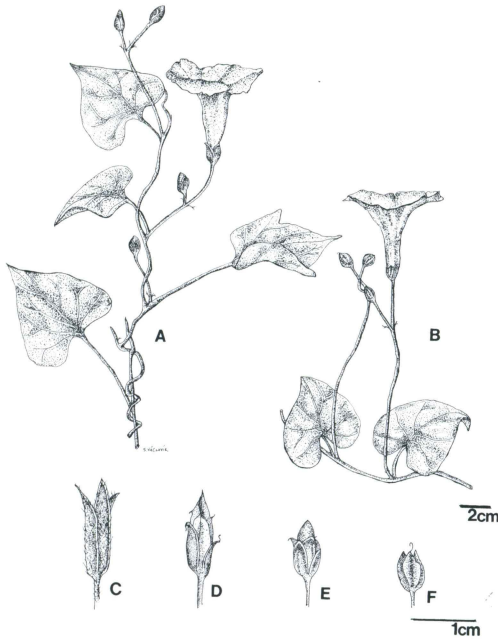


FIG. 4. Newly described and known varieties of *Ipomoea orizabensis*. A. Growth habit of *I. orizabensis* var. *austromexicana*; note reduced sepal size and incipient development of leaf lobes. B. Growth habit of *I. orizabensis* var. *novogaliciana*; note that sepals are reduced in size and two-toned in aspect. C. Calyx of *I. orizabensis* var. *orizabensis*; note foliose nature of sepals. D. Calyx of *I. orizabensis* var. *collina*; note narrow sepals and apiculate apices. E. Calyx of *I. orizabensis* var. *austromexicana*; note that scarious margins are much reduced in this variety. F. Calyx of *I. orizabensis* var. *novogaliciana*; note reduction in sepal size and the prominent two-toned coloration of both inner and outer sepals.

1803, *Humboldt & Bonpland* 25 (HOLOTYPE P!; photo F!)

Convolvulus sanguineus Willd. ex Roem. & Schultz, *Syst. Veg.* 4:302. 1819.—*non I. sanguinea* Vahl, 1794. TYPE: **MEXICO**. **Mexico**: Jonello and Toluca, 1803, *Humboldt & Bonpland* s.n. (HOLOTYPE P!)—*non I. sanguinea* Vahl, 1794.

Ipomoea superba (H.B.K.) G. Don, *Gen. Syst.* 4:275. 1838.—*non I. superba* Ledeb. 1822.

Quamoclit serotina (DC.) G. Don, *Gen. Syst.* 4:259. 1838.

Ipomoea tyrianthina Lindley, *Bot. Reg.* 24: 97. 1838. TYPE: Seeds from **MEXICO**, *Dickson* s.n. (HOLOTYPE OXF!; ISOTYPE K!)

Pharbitis longepedunculata M. Martens & Galeotti, *Bull. Roy. Acad. Bruxelles* 12: 271. 1841. TYPE: **MEXICO**. **Hidalgo**: Ixmiquilpan, El Sabino, Oct 1836, *Galeotti* 1387 (HOLOTYPE BRI; ISOTYPE K!).

Ipomoea longepedunculata (M. Martens & Galeotti) Hemsl., *Biol. Centr. Amer. Bot.* 2:289. 1882.

COMMON NAMES: Mechoacan, Tlaxcan, Correhuela, Rompeplatos.

DISTRIBUTION (Fig. 3) AND HABITAT: Throughout Mexico and Guatemala, preferring wet or dry montane habitats from 800–2000 m.

FLOWERING AND FRUITING: July–December; a secondary flush occurring in the tropical mountains of Chiapas and perhaps Guatemala from March to June.

REPRESENTATIVE SPECIMENS EXAMINED: **MEXICO**. **Chiapas**: Mpio. Tenejapa, trail from Tenejapa to Pokolum, 1900 m, 9 Jul 1964, *Breedlove* 6058A (F,MEXU); Mpio. Teopisca, NW edge of Teopisca along hwy. 190, 1900 m, 25 Jun 1965, *Breedlove* 10517 (F); Mpio. San Cristóbal Las Casas, S end of the valley of San Cristóbal, 2200 m, 22 May 1972, *Breedlove* 25286 (LL); 3 km al N de carr. San Cristóbal de las Casas-Comitán, rumbo a Ocozingo, 19 Jun 1982, *Cabrera & Cabrera* 2790 (MEXU). **Coahuila**: Mpio. Múzquiz, Rincón de María, 23 Aug 1975, *Wendt et al.* 1298 (TEX). **Distrito Federal**: Pedregal de San Angel, Cerro Zacayuca, Jardín Botánico, U.N.A.M., 2450 m, 11 Nov 1980, *Madero* 331 (MEXU); 1 km al S de Ixtapalapa, 2350 m, 4 Aug 1970, *Magaña* 206a (ENCB); Del. de Ixtapalapa, Sierra de Santa Catarina, 2600 m, 10 Jul 1975, *Rzedowski* 333850 (MEXU); Del. Milpa Alta, San Lorenzo, 26 Jun 1976, 2550 m, *Ventura* 1670 (ENCB,MEXU); Del. Xoch-

imilco, desviación del Conejo, 2400 m, 8 Aug 1976, *Ventura 2008* (ENCB,MEXU). **Durango:** Aug 1897, *Rose 2228* (NY); 16 km al W de Las Cruces, camino Tepehuanes-Tabahueto, 28 Aug 1983, *Torres et al. 3524* (MEXU). **Guanajuato:** NE slopes of mountains NE of Guanajuato, 19.4 mi W of Dolores Hidalgo, 2380 m, 7 Aug 1968, *Anderson & Anderson 5058* (ENCB); 20 Aug 1947, *Kenoyer 2230* (GH). **Guerrero:** 32–40 km W of Chilpancingo on road near lumber town Omiltemi, 2100–2325 m, 4 Dec 1966, *Anderson & Laskowski 4366* (ENCB); ca. Los Tojocodes, on summit of mountains, 27 Dec 1947, *Correll 14404* (LL); Desviación de carretera a Chichihualco a la carretera Filo de Caballo-Cruz de Ocote, 3 Dec 1976, *Halbinger s.n.* (MEXU); Manchón, 1200 m, 10 Sep 1936, *Hinton et al. 9645* (NY); Tierras Blancas, 1400 m, 10 Oct 1936, *Hinton et al. 9728* (F,GH,LL,NY); Teotepec, 2800 m, 18 May 1939, *Hinton et al. 14269* (NY). **Hidalgo:** 20 mi N of Zimapán, 1900 m, 27 Jul 1956, *Fearing & Thompson 57* (TEX); Durango, 2300 m, 13 Aug 1937, *Fisher 3751* (F,GH); San Vicente, 2500 m, 8 Aug 1946, *Fisher 46119* (F); Mpio. Cardonal, 14 km al E de Ixmiquilpan, 26 Aug 1965, *Gonzalez 26*; barranca de los Marmoles, 15 Aug 1964, *González 1275* (ENCB); Coanacapa, 14 Oct 1943, *Lundell 12559* (LL); Paxtepec, 6 km al W de Tulancingo, 2370 m, *Hernández 3279* (ENCB); Minas Viejas, near km 255 on hwy. between Zimapán and Jacala, 1800 m, 10 Jul 1948, *Moore & Wood 3849* (AA); km 43 al e de Pachuca, sobre carretera a Huauchinango-Tulancingo, 2800 m, 10 Sep 1966, *Saucedo 43* (MEXU); San Vicente, 12 Aug 1937, *Taylor 841* (TEX). **Jalisco:** Top of Sierra de Manantlán, at Zarzamora, 2 km E of Las Joyas, 1900 m, 6 Jan 1979, *Iltis et al. 1290* (ENCB); 22 km SE of hwy. 110 on a lumber road leaving the hwy. 12 km SSW of Tecalitlán, 1700 m, 25–26 Sep 1965, *Roe & Roe 2117* (LL); Concepción de Buenos Aires, 13 Aug 1972, *Díaz 3442* (ENCB). **México:** 4.5 mi NE of Temascaltepec on road to Toluca, 1850 m, 11 Oct 1966, *Anderson & Laskowski 3933* (ENCB); Mt. Te-

lixtlahuaca, 2500 m, 27 Jul 1895, *Conzatti 473* (GH); Mpio. Tejupilco, Almoloya de las Granadas, 28 Oct 1978, *Guizar 299* (ENCB); Mpio. Sultepec, 3 km al NE de Capula, 2400 m, 6 Jul 1968, *García 165* (ENCB); Dist. Temascaltepec, Tejupilco, 5 Sep 1935, *Hinton et al. 8417* (GH); Dist. Tenango del Aire, Rancho San Luis Aculco, 2300 m, 14 Sep 1980, *Hinton 18023* (ENCB,TEX); 4 km al E de Santiago Tlazala, sobre el camino a Villa Nicolás Romero, 2570 m, 12 Sep 1971, *Jiménez 156* (ENCB); Amecameca, 2550 m, Aug 1904, *Kuntze 23659* (NY); Pedregal Ajusco-Tlalpan, 2500 m 16 Jul 1950, *Matuda 19190* (F); Pedregal de Tlalpan, Zacatepec, 2400 m, 5 Aug 1951, *Matuda 21380* (ENCB); Decani, S de Jilotepec, 29 Nov 1960, *Matuda 37262* (GH); Texcoco, 1990 m, 30 Sep 1960, *Matuda 37276* (MEXU); Charma, 2000 m, 30 Aug 1960, *Matuda 37279* (MEXU); Palmar Chico, 27 Aug 1950, *Matuda 37281* (GH,MEXU); 1 km al SE de Santa Ana, cerro de la Tijera, 20 Jul 1969, *Pineda 773* (ENCB); Chapingo, terreno de la E.N.A., 2240 m, 20 Aug 1974, *Quezada s.n.* (ENCB); 4 km al W de Cuautitlán, 2500 m, 22 Jun 1967, *Rocha s.n.* (ENCB); Calixtlahuaca, 2750 m, 23 Jul 1969, *Singer M-8628* (F). **Michoacán:** ca. Morelia, 1950 m, 18 Aug 1910, *Arsène 5843* (GH); Zitácuaro to Rincón, 2140 m, 6 Jun 1938, *Hinton et al. 11922* (GH); Distr. Arteaga, Fresnal, 1770 m, 27 Sep 1939, *Hinton et al. 15226* (CAS,F,GH,LL,NY); Sierra Torrecillas, Coalcomán, 5 Oct 1939, *Hinton et al. 15283* (GH,LL); Tancítaro, 2100 m, 4 Oct 1940, *Hinton 15461* (ENCB,LL,NY); Uruapan, 2200 m, 13 Oct 1962, *Matuda 37286* (MEXU); En Triguillos, 30 km al E de Morelia, carretera a Toluca por Mil Cumbres, 2225 m, 30 Sep 1977, *Soto 397* (MEXU); 2 km al S de Villa Madero, carretera a Nocupétaro, 2260 m, 30 Sep 1982, *Soto 4714* (MEXU); arriba de Tacámbaro, Rancho Las Cascadas, 1500 m, 24 Oct 1978, *Ramos & Kishler 524* (ENCB,MEXU); km 213 on hwy. 15 from Morelia to Toluca, near sign to El Salto, 2100 m, 1 Nov 1980, *McDonald*

165 (TEX). **Morelos:** Aug 1909, *Arsène* 26 (F); km 61 carretera autopista Mexico-Cuernavaca, 2100 m, 30 Oct 1966, *Gold* 350 (MEXU); 1.5 mi SE of Huitzilac, 2 Aug 1949, *McAdams* 67 (MEXU); Rincón del Bosque, 12 Oct 1966, *Vázquez* 1819 (MEXU); **Nayarit:** Ca. Santa Teresa, top of Sierra Madre, 13 Aug 1897, *Rose* 2228 (US). **Nuevo León:** Dist. Galeana, ca. Puerto Pastores, 1810 m, 24 Sep 1979, *Hinton* 17667 (ENCB); Dist. Zaragoza, El Salto, 1475 m, 9 Aug 1979, *Hinton* 17645 (ENCB,TEX); Dulces Nombres, 1690 m, 16 Jul 1948, *Meyer & Rogers* 24 (GH); ca. Monterrey, La Mina, Jul 1933, *Mueller & Mueller* 178, 179 (F); Chipinque Park, SW of Monterrey, N facing slope, 11 Jun 1978, *Poole & Watson* 1381 (TEX); canyons of the Sierra Madre above Monterrey, 100 m, 27 Aug 1903, *Pringle* 8737 (CAS,F,GH,NY,US). **Querétaro:** Sierra de Mastranzo, ca. Tequisquiapan, 18 Sep 1957, *Paray* 2494 (ENCB). **Oaxaca:** Cerro de San Felipe, 2000 m, 29 Aug 1897, *Conzatti & González* 447 (GH); al SW de Suchixtlahuaca por la terracería rumbo a Tejuapan, 2100 m, 28 Sep 1985, *Dorado & Salinas* 2911 (MEXU); Dist. Teposcolula Mixteca Alta, 500 m al SW de Teposcolula, 2200 m, 17 Jul 1981, *García* 542 (ENCB,MEXU); Dept. de Coixtlahuaca, camino a Coixtlahuaca, 8 Aug 1985, *Lorence & García* 4761 (MEXU); 6 km al NW de San Pedro Nopala, Cerro Pericon, 2445 m, 6 Jul 1986, *Salinas et al.* 3308 (MEXU); Dist. Mixe, 26 km al N de Yacochi, 1900 m, 8 Aug 1985, *Torres & Torres* 7070 (MEXU); Distr. de Tlacolula, 12 km al NE de Mitla, camino a Totontepec, 1960 m, 7 Aug 1985, *Torres et al.* 2680 (MEXU). **Puebla:** Alta Luz, Sep 1907, *Purpus* 2698 (CAS); Tepeaca, en barranca, 24 Jul 1955, *Medellín & García s.n.* (ENCB); along Tehuacan-Orizaba hwy. on W slopes below Puerto del Aire, 1800–2200 m, 18 Jul 1961, *Smith et al.* 3890 (F,MEXU); 5 mi NE of Chapulco, 2500 m, 21 Aug 1975, *Webster et al.* 20076 (MEXU); Mpio. Felipe Los Angeles, La Candelaria, 2250 m, 24 Aug 1970, *Ventura* 2151 (ENCB); Mpio. de Esperanza, El Cimarrón, 2385 m, 29 Jul 1971, *Ventura* 3965 (MEXU). **San Luis Potosí:** Ca. 1 km E of mine smelter on hwy. 70 between San Luis Potosí and Cd. Valles, 2300 m, 24 Jun 1982, *Diggs & Nee* 2533 (F); Alvarez, Sierra de Alvarez, 2300–2500 m, 30–31 Jul 1934, *Pennell* 17802 (GH); 3 km al E de Altamira, km 40 de carretera San Luis Potosí a Río Verde, 2400 m, 18 Aug 1956, *Rzedowski* 7975 (ENCB). **Sinaloa:** Sierra Surotato, Ocurahui, 2000–2300 m, 1–10 Sep 1941, *Gentry* 6220 (GH,NY). **Tamaulipas:** Mpio. de San Carlos, Sierra de San Carlos, Cerro del Diente, 1000 m, 20 Aug 1985, *Jiménez* 281 (MEXU); ca. Gómez Farías, between shrine and Aguacates turnoff, 24 Nov 1968, *Richardson* 974 (TEX). **Tlaxcala:** ca. Tlaxcala, 2250 m, 18 Jun 1938, *Balls* B4837 (CAS); 2 km NE of Apetatitlán, on bank of road 1 km SW of San Bernabé, 2280 m, 23 Aug 1955, *Clausen s.n.* (NY); 13 km SE of Tlaxcala, 2600 m, 19 Jul 1942, *Weaver* 810 (TEX). **Veracruz:** 4 km antes de Acultzingo, rumbo a Orizaba, 2000 m, 28 Jul 1971, *Nevling & Gomez-Pompa* 2214 (F); Alta Luz stations, ca. Orizaba, 31 Oct 1895 m, *Pringle* 7053 (GH); Mt. Orizaba, 3000 m, 8 Aug 1891, *Seaton* 256 (F,GH,NY). **GUATEMALA.** Dept. Huehuetenango: Sierra Cuchumatanes, km 101 between El Mirador and Chintla, 2000 m, 17 Nov 1967, *Molina* 21191 (F,GH,NY); Puente Negro on way to Aguacatán, 1600 m, 16 Sep 1971, *Molina & Molina* 26538 (F); trail between Tunima and Quisil, Sierra de los Cuchumatanes, 2500–3100 m, 8 Jul 1942, *Steyermark* 48435 (F); along trail between San Juan Atitán and San Sebastián, via Santa Isabel, 1800–2800 m, 9 Sep 1942, *Steyermark* 52031 (F,NY); Cerro Pixpax, above San Ildefonso Ixtahuacan, 1600–2800 m, 15 Aug 1942, *Steyermark* 50564 (F,NY); ca. 3 km N of Chiantla, 2800 m, 26 Nov 1962, *Williams & Williams* 21734 (F); Dept. Quiché, San Miguel Usupantán, 2000 m, Apr 1892, *Heyde & Lux* 3189 (F,GH); N of Nebaj, 2450 m, 16 Nov 1934, *Skutch* 1690 (F); Dept. Sololá: 10 mi E of Nahuala, 2400 m, 3 Sep 1965, *Arnold* 105 (CAS).

The long list of synonyms for *I. orizabensis* var. *orizabensis* may be attributed to the polymorphic nature of the variety and to the numerous collections that were distributed throughout Europe during the 19th century. The variety is often identified in the literature and in herbaria as *I. tyrianthina*, a synonym. Populations of *I. orizabensis* var. *orizabensis* are generally distinguished by their pubescent stems, leaves and sepals, and by outer sepals that are foliose and either ovate-elongate or narrowly elliptic. They normally present cordiform laminas, although a few aberrant populations in the Sierra de Manantlán of Jalisco exhibit 5- or 7-lobate blades. These leaves are apparently convergent with those of the xerophytic vine, *Ipomoea orizabensis* var. *collina* (Fig. 1B), whose leaf segments invariably taper at the base. The rare leaf-segment bases of *I. orizabensis* var. *orizabensis* generally do not taper.

Resins from the roots of *Ipomoea orizabensis* have been employed as purgatives throughout Mexico since pre-colombian times, and were marketed abroad along with other *Ipomoea* species during the colonial era under the trade names of 'Mechoacan' or 'Jalap' (McDonald 1982).

3b. IPOMOEA ORIZABENSIS (Pelletan) Ledeb. ex Steud. var. AUSTROMEXICANA J. A. McDonald, var. nov. (Figs. 4A,E).

Differt a *I. orizabensis* var. *orizabensis* foliis glabris sepalis coriaceis late ellipticis vel deltoideis.

TYPE: MEXICO. Chiapas: Mpio. San Andrés Larrainzar summit of Chuchil Ton, NE of Bochil, 2700 m, 17 Oct 1972, *Breedlove* 29283 (HOLOTYPE: MEXU!).

DISTRIBUTION (Fig. 3) AND HABITAT: This variety is endemic to the Sierra Madre del Sur and Sierra Soconusco, extending from the Mayan highlands of central Chiapas to the border of Guatemala.

FLOWERING AND FRUITING: October to February (and May).

REPRESENTATIVE SPECIMENS EXAMINED: MEXICO. Chiapas: Mpio. Tenejapa, barrio of Yashanal, along the river of Chik Ha, 1900 m, 2 Oct 1965, *Breedlove* 12640 (F); Mpio. Amatenango del Valle, ca. Amatenango del Valle 2000 m, 27 Jul 1966, *Breedlove* 14642 (F,LL); Mpio. Chiapa de Corzo, adjacent to hwy. 190 near Zinacantán, 1000 m, 29 Nov 1971, *Breedlove* 22912 (LL); 3 km NW of Pueblo Nuevo Solistahuacán, 1700 m, 14 Dec 1971, *Breedlove* 23203 (LL); Mpio. La Independencia, 6–10 km NNE of La Soledad along logging road from Las Margaritas to Campo Alegre, 1600 m, 17 Feb 1973, *Breedlove* 33479 (MEXU); Mpio. Oxchuc, below Oxchuc Center along road to Ocozingo, 1600 m, 26 Sep 1976, *Breedlove* 40516 (MEXU); Mpio. Chenalho, paraje Los Angeles Chiste, 1700 m, 22 Oct 1976, *Breedlove* 40914 (MEXU); Mpio. Zinacantán, hwy. 190 at paraje Sekemtik, 5200 m, 4 Sep 1966, *Laughlin* 1813 (F); Pinabeto, Motozintla, 2586 m, 9 May 1945, *Matuda* 15477 (F); Mpio. Amatenango del Valle, ca. Amatenango del Valle, 1900 m, 5 Jan 1967, *Ton* 1843 (F); 11 Nov 1966, *Ton* 1485 (LL). GUATEMALA. Dept. Sacatepequez, along Río Guacalate, NW of Antigua, 1620–1710 m, 6 Feb 1939, *Standley* 64686 (F).

Ipomoea orizabensis var. *austromexicana* occurs as a narrow endemic in southern Mexico, and is distinguished from the type variety of this species by glabrous foliage and short, glabrous, broadly deltate or elliptical sepals. Outer sepal margins of this variety are only scarcely hyaline (Fig. 4E), and thus contrast markedly with the broadly developed hyaline sepal margins of *I. orizabensis* vars. *orizabensis* and *novogalicana*. Populations of *I. orizabensis* var. *austromexicana* might represent a cryptic species, as they occasionally occur in close proximity to populations of *I. orizabensis* var. *orizabensis* without demonstrating any evidence of hybridization. The co-occurrence of these taxa may be, however, of very recent origin, owing to the ongoing extension of

roadways and opening of agricultural lands in the Mayan highlands of central Chiapas.

3c. *IPOMOEA ORIZABENSIS* (Pelletan) Ledeb. ex Steud. var. *COLLINA* (House) J. A. McDonald comb. nov.

Ipomoea collina House, Bot. Gaz. 43:412. 1907. TYPE: **MEXICO. Coahuila:** San Lorenzo Canyon, 6 mi E of Saltillo, 22–23 Sep 1904, *Palmer 396* (HOLOTYPE: US!; ISOTYPES: CAS!,GH!,NY!,US!,photo F!).

DISTRIBUTION (Fig. 3) AND HABITAT: An endemic of the greater Chihuahuan Desert region, usually occurring in ravines and seasonal washes on rocky mountain slopes.

FLOWERING AND FRUITING: July to September.

REPRESENTATIVE SPECIMENS EXAMINED: **MEXICO. Coahuila:** 14 mi S of Saltillo, 2 Jul 1947, *Barkley et al. 7196* (TEX); Sierra de Jimulco, 3 km N of Mina San José, 8 km NE of Estación Otto, 1800–3138 m, *Chiang et al. 9551d* (LL); NW of Yepomera on hwy 180 between San Jose and Bavicora, 2100 m, 31 Aug 1989, *Mayfield et al. 275* (TEX); **Sonora:** Arroyo Agua Caliente, 8 km S of Maycoba on road to Moris, 1500 m, *Van Devender & Reina 97-1263* 26 Sep 1997 (TEX); Sierra Mojada, S of Esmeralda, 1600–2463 m, 27 Sep 1972, *Chiang et al. 9099A* (LL); ca. 12 air mi E of Saltillo along dry river margin W of hwy. 57 in lower portion of Cañon de Chorro, 1900 m, 27 Sep 1980, *Henrickson & Bekey 18646* (TEX); Sierra Arteaga, 1800 m, 28 Aug 1949, *Hinton et al. 16838* (GH); Sierra de la Madera, ca. La Cueva in Corte Blanco fork of Charretera Canyon, 1430–2160 m, 11–15 Sep 1941, *Johnston 8904* (GH,LL); Sierra de Pararas, Aug 1910, *Purpus 4975* (CAS,F,GH). **Chihuahua:** Sierra del Diablo, 4 km SSW of Cerro del Gringo, 1800–2050 m, 30 Aug 1972, *Chiang et al. 9015* (LL). **Nuevo León:** Aramberri, 1790 m, *Hinton 23668* (TEX); Mpio. Villaldama, summit of Sierra Gomas,

15 Aug 1988, *Patterson 6781* (TEX); Chipinque Park, SW of Monterrey, 11 Jun 1978, *Poole & Watson 1381* (TEX). **Tamaulipas:** ca. 46 km WNW of Jaumave, 6.5 road km W of Miquihuana on road to La Perdida, ca. 1850 m, 3 Oct 1982, *Henrickson & Hess 19135* (TEX); Gomez Farias, Rancho del Cielo, near Aguacates turnoff, 24 Nov 1968, *Richardson 974* (TEX). **Zacatecas:** 15 air mi NE of Estación Camacho on NW slopes of Pico de Teyra, 2220 m, 23 Sep 1973, *Henrickson 13415* (TEX).

Ipomoea orizabensis var. *collina*, formerly recognized at the species level, is distinguished from *I. orizabensis* sens. lat. by its 3-, 5-, or 7-lobate leaves (Fig. 1B). Leaf primordia exhibit deep sinuses at their inception, suggesting a stabilized genetic condition rather than a phenotypic plasticity to their arid environments. Fresh corollas of *I. orizabensis* var. *collina* also tend to exhibit pale coloration along the plical zones of the limb, but this feature is never apparent on dried herbarium materials. The variety is a narrow endemic of the Chihuahuan Desert (Fig. 3).

3d. *IPOMOEA ORIZABENSIS* (Pelletan) Ledeb. ex Steud. var. *NOVOGALICIANA* J. A. McDonald, var. nov. (Figs. 4B,F).

Differt a *I. orizabensis* var. *orizabensis* foliis glabris sepalis ovatis vel late ellipticis 4–10 mm longis apice obtuso vel emarginato sepalis.

TYPE: **MEXICO. Michoacán:** Carretera de Periban a Buenavista, 3 km al SW de Copetiro, 1560 m, 24 Aug 1980, *Soto 2451* (HOLOTYPE: MEXU!; ISOTYPE ENCB!).

DISTRIBUTION (Fig. 3) AND HABITAT: A narrow endemic to northern Michoacan and the southwestern district of Temascaltepec in the state of Mexico.

FLOWERING AND FRUITING: July to September.

REPRESENTATIVE SPECIMENS EXAMINED: **MEXICO. Mexico:** Dist. Temascal-

tepec, Ipericones, 23 Jul 1935, *Hinton et al.* 8083 (LL,NY). **Michoacán:** Punguato, 2000 m, 18 Aug 1910, *Arsène* 5467 (MEXU); ca. Rincón, 1950 m, 14 Aug 1910, *Arsène* 5489 (MEXU); ca. Morelia, Loma Santa Maria, 28 Aug 1910, *Arsène* 5843 (NY); ca. Morelia, N de Zapote, 1950 m, 6 Aug 1910, *Arsène* 5946 (GH,MEXU,NY); Mpio. Tzitzio, 1820 m, El Puerto de Arumbaro, 12 km al S de Temascal, 19 Jul 1982, *Soto & Martínez* 4212 (MEXU).

Ipomoea orizabensis var. *novogaliciana* includes populations that are restricted to cool, montane regions of northern Michoacán and vicinity (Fig. 3). Their flowers are relatively small (3–6 cm long), as are their sepals [4–6 (–10)], the latter of which are ovate to broadly elliptic, with a narrow, dark-green midrib and broad scarious margins (Fig. 4F).

4. IPOMOEA SESCOSSIANA Baill., Bull. Soc. Linn. Par. 1:385. 1883. TYPE: **Mexico. San Luis Potosí:** Charcas, collector and date not indicated. (HOLOTYPE P!; ISOTYPE US!, photo K!).

Ipomoea pringlei A. Gray, Proc. Amer. Acad. Arts 22:307. 1887. TYPE: **MEXICO. Chihuahua:** foothills of Santa Eulalia and Mapula Mountains, 7 Sep 1886, *Pringle* 782 (HOLOTYPE GH!; ISOTYPES F!,LL!,MEXU!,NY!,US!).

Suffrutescent, glabrous SHRUBS to 1 m tall; roots tuberous, woody; stems erect, straight, branching, terete, green, glabrous, deciduous. LEAVES pinnatisect or irregularly dissected, 2–4 cm long, 0.5–2 cm wide, petiolate; petioles terete, 3–15 mm long, ca. 1 mm in diam., green smooth, glabrous; leaf blade lobes 5–9, filiform, 3–25 mm long, 1–2 mm wide, green, glabrous. INFLORESCENCE a 1–2 flowered cyme; peduncles terete, 0.8–3.5 cm long, 2–2.5 mm wide, green, glabrous, secondary peduncles usually lacking, sometimes to 1 cm long, 1 mm in diam.; pedicels terete, 6–15 mm

long, 2–3 mm in diam. during anthesis, extending to 2.5 cm in fruit, green, smooth or moderately striate, glabrous; sepals subequal, outer slightly shorter than inner, ovate or broadly elliptic, 5–9 mm long and wide, glabrous, the midribs green and coriaceous, the margins hyaline, the tips acute or obtuse; corollas infundibular, 5–6 cm long, the basal tube 5–6 mm in diam., white, dilating into a throat 1.5–1.8 cm in diam., the limb purple, glabrous, ca. 6 cm wide; stamens subequal, 3–4 cm long, white, glandular-pubescent at base; style surpassing stamens, 3.5–4.0 cm long, white, glabrous. FRUIT of broadly pyriform capsules, 11–14 mm long, 7–12 mm wide near base, dehiscent, stramineous, glabrous; seeds 4, ellipsoid, 6–8 mm long, ca. 4 mm wide, 3-angled, brown or black, puberulent.

COMMON NAME: Espanta Vaquero.

DISTRIBUTION (Fig. 2) AND HABITAT: Occurring in deserts and arid grasslands of the central and northern Mexican plateau.

FLOWERING AND FRUITING: (June–) July to September.

REPRESENTATIVE SPECIMENS EXAMINED: **MEXICO. Durango:** Mpio. Villa Hidalgo, 5.1 mi by hwy. 45 NNW of Esperanza, 1900 m, 5 Jul 1983, *Corral & Worthington* 10791 (NY); ca. 30 mi N of La Zarca along hwy. 45, 24 Jul 1972, *McGill et al.* 9305 (ENCB); El Orto to Guanacevi, 14–16 Aug 1898, *Nelson* 4729 (US); Inde, 2000 m, Jul 1927, *Reko* 5169 (US). **Chihuahua:** 1 mi W of Cuauhtémoc, 12 Jul 1964, *Chemsak* 420 (CAS); W of Cd. Chihuahua, 43.6 mi W of General Trias along hwy. 16, 2600 m, 3 Aug 1977, *Dunn et al.* 22587 (NY); 20 mi N of Los Encinillos, 1550 m, 9 Sep 1948, *Gentry* 8218 (CAS,GH,MEXU,US); 41 mi S of Villa Ahumada on hwy. 45, 1430 m, 21 Aug 1971, *Henrickson* 5867 (TEX); 27 km al N de Chihuahua, 1550 m, *Jiménez* 109 (MEXU,NY); 4 km E of Rancho Chupaderos, 1590 m, 29 Aug 1972, *Johnston et al.* 8973 (LL,MEXU); Sierra del Roque, N of Julimes, NNW of Rancho El Sauz, 1450–2150 m, 24 Aug 1973, *Johnston et al.* 12323

(LL,NY,MEXU,TEX); Santa Clara Cañon, Aug 1936, *LeSueur 854* (CAS,MEXU,TEX); 4.6 mi NE of Buenventura, ca. km 100, 1530 m, 27 Aug 1967, *Oliver, Austin & MacBryde 508* (US); Alberto, SE of Chihuahua, 1450–1500 m, 10 Sep 1934, *Pennell 18622* (GH,NY,US); Madera, 2150–2200 m, 25 Sep 1934, *Pennell 19251* (NY); Sierra Mapula, W base of Pico Chihuahua Viejo, 1700 m, 20 Jul 1977, *Pinkava et al. s.n.* (MEXU); 17 mi SE of Minaca, 2300 m, 25 Jul 1937, *Shreve 8014* (GH,US); 4 km al E de la carretera Panamericana, Rancho Experimental 'La Campana,' 1600 m, 5 Sep 1973, *Valdés 66* (ENCB); 10 km N of Panal, 2000 m, 24 Jul 1978, *Walker 78H24* (NY); km 120 on Rt. 45, N of Chihuahua, 20 Aug 1980, *Warnock et al. 2112* (TEX); 7.5 mi W of Bella Vista, 2000 m, 16 Jul 1981, *Ward & Worthington 81-389* (MEXU); Santa Eulalia hills, 1885, *Wilkins s.n.* (US). **Coahuila:** 8.4 mi S of Moctezuma on hwy. 45, 1300 m, 15 Jul 1981, *Worthington 7284* (TEX); SE side of Sierra San Marcos, W of Reynolds Mine Headquarters, W of San Lazaro Pass on hwy. 57, 12 Jul 1974, *Engard & Getz 336* (LL); Cañon de Tinaja Blanca, central mass of Sierra de las Cruces W of Santa Elena Mines, 14 Aug 1940, *Johnston & Muller 308* (GH,LL); Mina El Aguirreño, N side of Sierra de la Paila, 140–2200 m, 5 Jul 1973, *Johnston et al. 11690* (LL,MEXU); Mpio. Castaños, Puerta de San Lázaro, Sierra de San Laázaro, 31 Aug 1939, *Muller 3090* (CAS,GH); 22 km NW of Fraile, 2500 m, 17 Jul 1941, *Stanford et al. 466* (GH,NY); 15 km W of Concepción del Oro on Coahuila-Zacatecas border, 2300 m, 20 Jul 1941, *Stanford et al. 534* (NY). **San Luis Potosí:** Mpio. Villa de Santo Domingo, 15 km al N del Centro Ovino Juan Sarabia, al W de Charcas, 2100 m, 7 Sep 1975, *Becerra s.n.* (ENCB,MEXU). **Zacatecas:** 3 km W of Salaverna, 2450 m, 17 Jun 1972, *Chiang et al. 7934* (LL,MEXU,NY,TEX); Mpio. Cuauhtémoc, 7 km al N de Cd. Cuauhtémoc, Aug 1975, *González 6478* (ENCB); 4.6 mi NE of hwy. 49 along hwy. 54 towards Concepción del Oro, 2200 m, 21 Sep 1978, *Lee 17507*

(TEX); 0.5 mi S of Fresnillo, 5 Aug 1954, *Linsley et al. 15* (CAS); La Honda, 6 Aug 1891, *Pringle 4070* (MEXU); ca. Zacatecas, Aug 1903, *Purpus 457* (CAS); Mpio. Villa de Cos, 5 km al NNE de San Andrés, 2100 m, 8 Oct 1957, *Rzedowski 9322* (ENCB,MEXU); Mpio. Pinos, Salinas Tecomate, 2165 m, 27 Julio 1973, *Villa V. s.n.* (ENCB); 14 mi SE of Sombreto, 14 Aug 1957, *Waterfall 13809* (US); 5 mi SE of Zacatecas, 26 Aug 1947, *Wheeler 1788B* (F,TEX).

Ipomoea sescossiana, much like its sister species *I. ancisa*, is a perennial shrub with herbaceous stems and pinnatifid leaf blades (Fig. 1D). The species is distinguished from *I. ancisa* by its relatively short leaf segments (-2.5 cm long), short peduncles to 3.5 cm long, and brilliant blue-purple corollas that open during early morning hours.

5. *IPOMOEA STANS* Cav., Icon. 3:26. 1795. TYPE: Cultivated in gardens of Madrid (LECTOTYPE MA!; McDonald 1994, Fl. Veracruz 77:115).

Convolvulus stans (Cav.) H.B.K., Nov. Gen. Sp. Pl. 3:96. 1819.

Convolvulus firmus Spreng., Syst. 1:613. 1825. *nom. superfl.* for *I. stans* Cav.

Convolvulus sinuatus Sessé & Moc., Fl. Nov. Hisp. 1:24. 1887. TYPE: **MEXICO. Queretaro:** Sessé & Mociño 117 (LECTOTYPE MA! (here designated): Several Sessé and Mociño accessions at MA could serve as LECTOTYPE; I have chosen the above).

Ipomoea stans var. *hirsuta* Rob., Proc. Amer. Acad. Arts 29:319. 1892. TYPE: **MEXICO. Jalisco:** ca. Guadalajara plains, 30 Aug 1892, *Pringle 4488* (LECTOTYPE, here designated, US!; ISOLECTOTYPES CAS!,F!,GH!,US!).

Ipomoea jaliscana House, Muhlenbergia 3: 39. 1907. *nom. et stat. nov.* for *I. stans* var. *hirsuta* Rob.

Suffrutescent SHRUBS to 1 m tall; stems erect, occasionally somewhat decumbent,

deciduous, angled, 0.5–1 m long, 1–5 mm in diam., branching from and above base, smooth, green, puberulent; roots woody, resinous. LEAVES simple, petiolate; petioles terete, to 6 mm long, 0.5–1 mm in diam., puberulent; leaf blades narrowly or broadly elliptic, sublanceolate, 2.5–7 cm long, 6–30 mm wide, pinnately veined, subcoriaceous, glabrous, scabrous or occasionally puberulent, the margins dentate-sinuate, the tips obtuse, acute, the bases truncate, subauriculate, the basal lobes to 5 mm long, 1.5 cm wide. INFLORESCENCE of solitary flowers; peduncle erect, terete, 1.5–8.5 cm long, 1–2 mm in diam., puberulent; pedicels terete, 5–12 mm long, accrescent in fruit, puberulent, subtended by 2 opposite bracts; bracts elliptic, 6–10 mm long, 2–4 mm wide, herbaceous, membranous, with sinuate margins, obtuse tips; sepals unequal, imbricate, dark green along midrib, the outer ones elliptic with scarious margins, acute tips, 1–2.3 cm long, 4–4.5 mm wide, coriaceous, pubescent, the interior ones narrowly elliptic, 1.4–2 cm long, 6–7 mm wide, membranous, glabrous or puberulent, with entire and hyaline margins and acute tips; corolla infundibular, 6.5–7.5 cm long, the tube white or pink, 2.8–3.4 cm long, 1–1.6 cm in diam., glabrous, the limb subentire, scantily 10-lobed, aestivation convolute-duplicate, purple, glabrous; stamens unequal, white, included, 2–3 cm long, the filaments glandular-pubescent at base; style white, 2.5–3 cm long, usually as long or longer than longest stamen. FRUIT of broadly pyriform capsules, brown or irregularly purple-pigmented, 1–1.2 cm long and wide at base, dehiscent, glabrous; seeds 4, brown or black, ellipsoid, 3-angled, 6–8 mm long, 4–5 mm wide, pubescent, the hairs short and dark.

COMMON NAMES: Cacatlapa, Correhuela, Espanta Lobo, Limpia tunas, Pegajosa, Tanibata, Tlaxcan, Tumbavaqueros.

DISTRIBUTION (Fig. 5) AND HABITAT: A widespread xerophyte from various semi-desert regions of Mexico, also occurring

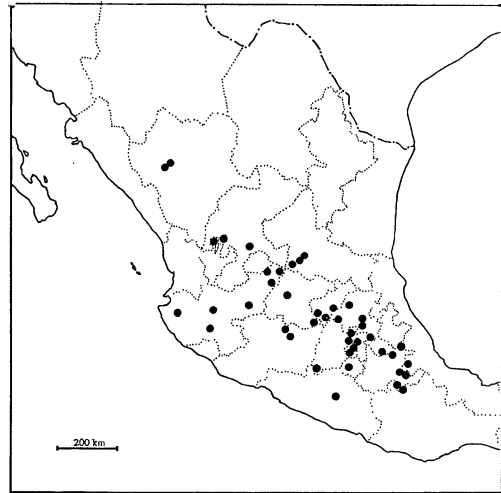


FIG. 5. Natural distribution of *Ipomoea stans*.

among basaltic substrates in the arid zones of South-central Mexico.

FLOWERING AND FRUITING: June to September.

REPRESENTATIVE SPECIMENS EXAMINED: **MEXICO. Distrito Federal:** Cerro del Chiquihuite, ca. Cuauhtepac, 6 Aug 1972, *Arraguín 316* (ENCB); Sierra de Guadalupe, 2300 m, 1951, *Balls 4948* (US); Del. Coyoacán, U.N.A.M., Jardín Botánico, 24 Jun 1983, *Bye 12190* (MEXU); Sierra Sta. Catarina, Tláhuac, a 1.5 km de la cima del volcán, 2300 m, 11 Jul 1985, *Castañeda 2* (MEXU); Cerro Xochitepec, ca. Xochitepec, 2300 m, 20 Jul 1967, *Jiménez R. 139* (ENCB); SW of Mexico City, 6 Aug 1938, *Kenoyer A-345* (F); Cerro San Cristobal, ca. Tepexpan, 2350 m, 2 Jul 1950, *Matuda 19026* (CAS,F,MEXU); Pedregal de San Angel, ca. la pirámide de Cuicuilco, 15 Jul 1951, *Rzedowski 289* (MEXU). **Durango:** Mpio. Santiago Papasquiario, 3.5 km al W de La Soledad, 11 km NW Santiago Papasquiario, 1900–2100 m, 22 Aug 1983, *Corral & Worthington 445* (NY,TEX); Mpio. Tepehuanes, 13 km al W de Tepehuanes, por la brecha a Guanacevi, 20 Jul 1982, *Tenorio 1129* (ENCB,MEXU). **Guerrero:** S of Chil-

pancingo, 22 Jun 1935, *Clark 7149* (NY). **Guanajuato:** Camino de Amealco a Acámbaro, 2400 m, 9 Aug 1976, *Arguelles 489* (ENCB,MEXU); ca. Guanajuato, 1909, *Furness s.n.* (F); ca. Guanajuato, 7 Aug 1947, *Kenoyer 1772* (TEX); en vía a Juventino Rosas, ca. parada Los Robles, un cerro en San Juan Allende, 2100 m, 1 Aug 1978, *Kishler 289* (MEXU). **Hidalgo:** Pachuca, 23 Jun 1947, *Davis s.n.* (TEX); Mpio. Tolcayuca, W de Tolcayuca, 2540 m, 4 Jun 1978, *Equihua 64* (ENCB); 10 mi S of Actopan, 2100 m, 28 Jul 1956, *Fearing & Thompson 83* (TEX,US); Mpio. Epazoyucan, El Ocote, 2600 m, 7 Sep 1963, *Galvan s.n.* (TEX); Mpio. Real del Monte, Peñas Largas, 16 Aug 1975, *García 99* (ENCB); 6 km al S de Huichapan, 2000 m, 16 Jul 1965, *González Q. 2721* (ENCB); Cerro de los Pitos, 2600 m, 22 Jul 1951, *Matuda 21544* (MEXU); SE de Molanguito, cerro Grande de Tolantongo, 5 Aug 1976, *Medrano et al. 9532* (MEXU); Volcanic hills to the E of Guadalupe, 21 Aug 1929, *Mexia 2751* (CAS,F,NY); Cerro del Xihuingo, ca. Tepeapulco, 28 Jun 1964, 2600 m, *Montoya s.n.* (TEX); 12 km ESE of Apam, Cerro Jaltepec, S of Hacienda Tetlapayac, 2600–2650 m, 24 Jul 1966, *West S-7* (LL); Mpio. Zempoala, ladera N del Cerro del Tecajete, ca. Santa María Tecajete, 20 Sep 1981, 1550 m, *Zuñiga 25* (ENCB,MEXU). **Jalisco:** 5 mi E of Tepatitlán, 18 Jul 1960, *Knobloch 1651* (MEXU); Huejuquilla, Aug 1897, *Rose 2541* (F,GH,NY,US); ca. Colotlán, 28 Aug 1897, *Rose s.n.* (US); 5 mi S of Guadalajara, 1700 m, 12 Aug 1947, *Barkley et al. 7501* (F,TEX); ca. 24 km S of Cocula on hwy. 80, 1800 m, 5 Sep 1971, *Burch 5322* (ENCB); ca. 10 km N of Sayula on new road to Tapalpa, overlooking Laguna Sayula, ca. 2100 m, 8 Aug 1960, *Iltis et al. 811* (ENCB); 12.9 mi S of Arandas by secondary road connecting with hwy. 110, 12 Aug 1966, *Kral 27599* (US); Mpio. Ojuelos, 8 km al SW de Ojuelos, Vaquerías, 2100 m, 29 Jul 1985, *Santana 1537* (ENCB); al W de Guadalajara, Cerro del Tepopote, Sierra de la Primavera, 1750 m, 3 Sep 1967, *Villarreal de*

Puga 1348 (ENCB); 13 km al S de Teocaltiche, Rancho Pila Blanca, 1700 m, 8 Sep 1973, *Villarreal 5329* (ENCB). **Mexico:** Mpio. Nicolás Romero, 1 km al SW de Cahuacán, 2600 m, 21 Jul 1968, *Brizuela 345* (ENCB); Otumba, Cerro Gordo, 27 Jul 1980, *Castilla & Tejero 517* (ENCB); Hwy. 57 ca. 70 mi NW of D.F., ca. 4 mi S of Encinillas, 2400 m, 25 Aug 1977, *Croat 44064* (MEXU); 21 mi NW of Tula turnoff between Querétaro and Mexico City, 12 Aug 1972, *Dzieskanowski et al. 1825* (ENCB); 1 km al SE de Cocalco, 2300 m, 24 Aug 1969, *Ortiz 25* (ENCB,F,MEXU); Mpio. Tepozotlán, Presa de la Concepcion, 2400 m, 7 Aug 1968, *Rodríguez s.n.* (ENCB); Mpio. Huehuetoca, ladera W del cerro Mesa La Ahumada, 2450 m, 30 Aug 1980, *Romero 332* (ENCB). **Michoacán:** Punguato, 2200 m, 11 Aug 1910, *Arsène 2904* (GH,NY,US) 5967 (GH,MEXU,NY,US); Chemin des Parcs, 1950, 1 Aug 1909 (US); Mpio. Villa Morelos, 5 km al N de Villa Morelos, 2280 m, 5 Jul 1975, *Puig 6067*; along hwy. 15, 12.5 mi W of La Eslerña, W of Zamora, 1800 m, 26 Jul 1975, *Torke et al. 287* (MEXU). **Morelos:** Cuernavaca, Salto de San Antonio, 1700 m, 5 Aug 1951, *Matuda 21627* (MEXU). **Oaxaca:** Tehuacán, 2000 m, 24 Jun 1896, *Conzatti 164* (GH). **Puebla:** San Antonio, Atzizintla, Mt. Orizaba, 3000 m, 13 May 1938, *Balls B-4510* (CAS,US); Totalco, ca. Volcán Pizarro, 21 Jun 1976, *Calzada & Lozano 2469* (F); Mpio. Tepeyahualco, orilla de la Laguna de la Preciosa, 2300 m, Sep 1981, *Cházaro & Padilla 2007* (MEXU); 5 mi NW of Zacatepec, 2600 m, 5 Sep 1963, *Gentry et al. 20424* (TEX); ca. San Luis Tultitlanapa, Jun 1908, *Purpus 3367* (CAS,F,GH,NY,US); ca. Calchicomula, 27 Jul 1901, *Rose & Hay 5784* (US); Mpio. Caltepec, Cerro El Gavilán al SE de Caltepec, 2100 m, 13 Aug 1984, *Tenorio & Romero 6828* (MEXU); 3.8 km al S de Nicolás Bravo, 2480 m, 23 Sep 1984, *Tenorio & Romero 7334* (MEXU); Mpio. Alchichica, 4 km al SW de Alchichica, 2200 m, 19 May 1975, *Vázquez V-1960* (ENCB,MEXU); Mpio. Esperanza, Esperanza, 2375 m, 29 Jul

1971, *Ventura* 3961 (ENCB). **Querétaro:** 15 mi SE of Querétaro on hwy. 15, 2000 m, 3 Aug 1956, *Fearing & Thompson* 150 (TEX); 14 mi SE of San Juan del Río, 17 Aug 1957, *Waterfall & Wallis* 13949 (F,GH); Mpio. de Cadereyta de Montes, 2 km al S de Vizarón, 2190 m, 13 Aug 1977, *Zamudio* 2345 (MEXU). **San Luis Potosí:** Mpio. Villa Arriaga, Tepetate, 2200 m, 3 Sep 1964, *Cabrera* 103 (ENCB,MEXU); Mpio. Guadalcázar, 5 km of Guadalcázar, ca. Realejo, 22 Jun 1982, *Diggs & Nee* 2492 (F); Mpio. Mexquitic, La Campana, ca. 12 km al NW de Cd. San Luis Potosí, sobre la carretera a Torreón, 19 Jul 1964, *García* 14 (ENCB); ca. San Luis Potosí, 24 May 1905, *Palmer* 613 (US); ca. San Luis Potosí, 200–2600 m, 1878, *Parry & Palmer* 627 (F,GH,NY); San Pedro, 2100–2250 m, 11 Aug 1934, *Pennell* 18076 (GH,US). **Tlaxcala:** 4 mi NW of Huamantla, 29 Jun 1955, *Selander & Selander* 10-55, (F). **Veracruz:** Lago Atitzcac, carretera a Xalapa, 2300 m, 20 May 1972, *Goege* 2203 (MEXU); Mpio. Perote, adelante de Totoalco rumbo a Pizarro, Jun 1980, *Cházaro & Domínguez* 2146 (ENCB,MEXU); Llanos de Alchichica, 2200 m, 20 Jul 1968, *Gómez-Pompa* 3830 (MEXU); Pico de Orizaba, 1855, *Muller s.n.* (NY); San Isidro en el camino entre La Gloria y Quechulac, 22 Jul 1967, *Ramos* 1 (GH,MEXU). **Zacatecas:** 7.9 mi SW of Valpariso, 2000–2400 m, 11 Sep 1966, *Anderson & Laskowski* 3599 (ENCB,GH,NY,US); La Encantada, 9 Aug 1948, *Dressler* 71 (GH); on road from hwy. 45 to La Bufa, ca. 2500 m, 21 Sep 1978, *Henrickson & Lee* 17492b (TEX); 4 mi N of Zacatecas, 2700 m, 24 Sep 1959, *Soderstrom* 722 (US); 9.7 mi NW of Cuautémoc, 2700 m, 9 Aug 1969, *Taylor & Taylor* 5998 (NY).

Ipomoea stans is unique in its shrubby growth habit and holly-like leaves (i.e., elliptic leaf blades with crenulate-dentate margins; Fig. 1C). Roots of this widespread xerophyte are collected throughout its range for medicinal purposes, being sold in local markets under the name of 'tumba-

vaqueros' as a therapeutic for epilepsy and as a purgative.

UNCERTAIN SPECIES

IPOMOEA HARTWEGII Benth., Pl. Hartw. 15. 1839. TYPE: MEXICO. *Hartweg* 96 (HOLOTYPE K!; ISOTYPES BM!,GH!,P!,NY!).

Ipomoea hartwegii, a narrow endemic of Jalisco and Querétaro, is almost indistinguishable from *I. orizabensis* var. *orizabensis* in vegetative and floral features; yet the species is probably phylogenetically distant. *Ipomoea hartwegii* is distinguished by white or occasionally pinkish corollas, relatively small cordiform laminae, and a scandent growth habit. The fruits of the species are particularly distinctive, differing from those of *I. orizabensis* by their narrow-fusiform shape, a hardened, subdehiscent pericarp, and orangish, narrow-ellipsoid seeds that produce long and white hairs along the outer margins. DNA analyses of this species would prove useful in resolving whether or not this plant is convergent with *I. orizabensis* or prototypic to the tyrianthinas as a whole.

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