FOUR NEW SPECIES OF *TRAGIA* (EUPHORBIACEAE) FROM THE TEHUANTEPEC REGION OF MEXICO

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ABSTRACT

Four new species of *Tragia* sect. Tragia (Euphorbiaceae) are here described from the Mexican states adjoining the Isthmus of Tehuantepec. **Tragia acahualicola** Urtecho, sp. nov., has ovaries that are densely stipitate-glandular. This species is widely distributed throughout southern Mexico. **Tragia catemacoensis** Urtecho, sp. nov., has very distinctive pistillate and staminate flowers. It is limited in distribution to an area in Veracruz in the vicinity of Lake Catemaco. **Tragia maculata** Urtecho, sp. nov., is similar to *T. nepetifolia* var. *setosa*. It differs from this taxon in having a much less papillate stigma, wider, narrowly-triangular leaves, and prominent white spots on the seed. **Tragia chiapensis** J-B. Urtecho & Urtecho, sp. nov., is similar to *Tragia affinis* Rob. & Greenm. in leaf shape and in possessing more than three stamens per staminate flower. It differs from this species in stigma texture, uniform stamen number (6), and smaller seeds.

Key Words: *Tragia*, Mexican Euphorbiaceae, new species, Isthmus of Tehuantepec

RESUMEN

Se describen cuatro nuevas especies de *Tragia* sect. *Tragia* (Euphorbiaceae) de los estados mexicanos adyacentes al istmo de Tehuantepec. **Tragia acahualicola** Urtecho, sp. nov., presenta ovarios densamente -estipitado-glandulares. Esta especie está ampliamente distribuida por el sur de Mexico. **Tragia catemacoensis** Urtecho, sp. nov., presenta flores muy distintivas de pistilado y estaminas. Su distribución se limita a una zona de Veracruz en las proximidades del lago Catemaco. **Tragia maculata** Urtecho, sp. nov., es similar a *T. nepetifolia* var. *setosa*. Se diferencia de este taxon por tener estigma poco papilado, hojas más anchas y estrechamente triangulares, y manchas blancas prominentes en la semilla. **Tragia chiapensis** J-B. Urtecho & Urtecho, sp. nov., es similar a *Tragia affinis* Rob. & Greenm. en forma de hoja y en poseer mas de tres estambres por flor estaminada. Se diferencia de esta especie por la textura del estigma, el numero uniforme de estambres (6) y las semillas mas pequeñas.

INTRODUCTION

Mexico is known as one of the global hotspots of plant biodiversity (Tietje et al. 2023). The Euphorbiaceae are among the significant contributors to Mexico's botanical richness (McVaugh 1961; Steinman & Felger 1997; Martinez-Gordillo et al. 2002, 2015). Among the Euphorbiaceae present, *Tragia* and its related genera are well established in a broad range of biomes (Urtecho 1996; Steinman & Felger 1997; Martinez-Gordillo et al. 2015). Mexico has 17 accepted species of *Tragia* that range from the northern Sonoran and Chihuahuan deserts to the tall evergreen and deciduous tropical forests of the south (Urtecho 2022; POWO 2025). Of the five known endemic *Tragia* species, four are found in the tropical regions of the country. Tietje et al. (2023) considers the southwestern corner of Mexico, a region well represented in *Tragia*, one of the richest in both species and phylogenetic diversity. It is thus not surprising that there are additional undescribed species from tropical Mexico.

Tragia is a large genus of 157 accepted species that have a worldwide distribution (POWO 2025). The genus is known for its large number of vines and sun shrubs that bear urticating trichomes (Miller & Webster 1967; Cardinal-McTeague & Gillespie 2016). Lacking showy flowers such as those of *Dalechampia* (Euphorbiaceae), most of the characters used to distinguish one species from another involve the minutiae of reproductive characters, foliar morphology and trichome distribution.

An unusual plant among these new species is *Tragia chiapensis* which consistently has 6 stamens (Fig.

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12B). The use of stamen number to distinguish between sections of *Tragia* has been the source of much debate (Mueller 1966; Pax & Hoffman 1919; Johnston 1962; Miller & Webster 1967; Mulgura & Romero 1989; Gillespie 1994; Cardinal-McTeague & Gillespie 2016). Gillespie (1994) observed that there are no consistent differences between plants in section *Leucandra* (*Tragia* with more than 3 stamens) and those of section *Tragia* (3 staminate species). Recent phylogenetic work by Cardinal-Teague and Gillespie (2015), as well as Wurdack et al. (2005), confirmed this observation.

The present study is derived from research performed as part of a dissertation on Mexican *Tragia* (Urtecho 1996) which revealed that there was much more species diversity in Mexico than had been previously recognized. Those studies also revealed the importance of seed surface characters as a useful tool for distinguishing between some of the species.

TAXONOMIC TREATMENT

Tragia catemacoensis Urtecho, **sp. nov.** (**Figs. 1, 2**). TYPE: MEXICO. VERACRUZ: Mpio. Catemaco: Bastonal, 10 km E de Lago Catemaco, Selva Alta Perennifolia Primaria, 22 Mar 1972, *Beaman 05849* (HOLOTYPE: F! 1876399; ISOTYPES: MEXU!, XAL!).

Diagnosis.—*Tragia catemacoensis* Urtecho is similar to *Tragia affinis* Rob. & Green. in its liana habit and absence of glandular ovaries. It differs in its longer pistillate pedicel, larger seeds, pistillate calyx basally connate up to 1/3 of its length, and staminate flowers with broad sepals and three, thin, strap-like stamens.

Stems woody, few to many from a woody taproot, 2–2.5 mm, dark-brown to tan, high climbing woody vine to 6 m in length, 2–4 mm in diameter, villose with long spreading hairs; upper internodes 1.2–6.5 cm, lower internodes 5–12 cm. **Leaves** ovate, oblong to lanceolate, 3.5–15 cm long, 1.8–9.25 cm broad, apically acuminate, basally cordate, margins dentate, crenate or serrate, teeth often gland-tipped, simple hairs rare on adaxial surface, urticating trichomes and long spreading simple hairs confined to larger veins of the abaxial surface, silver-gray abaxially, dark-green to brownish-green adaxially, young leaves densely hairy; petioles 1.5–7 cm long, covered with long, stiff hairs; stipules lanceolate, 3.5–5 mm long, 2–2.25 mm broad, ciliate, brown to copper-brown. **Inflorescence** racemose, 10–12 cm long, densely covered with long spreading hairs, with a single pistillate flower at the lowest node, peduncle 1.7–2 cm long, occasionally branching from a short shoot, 50–80 staminate flowers per raceme; bracts of pistillate flowers lanceolate, 3.5-4 mm long, ciliate margined, acute, abaxial surface with long spreading hairs, located 1–2 mm below the pedicel; bracts of staminate flowers lanceolate, sub-cucullate, 1.5–2 mm long, margins serrate-dentate, ciliate. **Staminate flowers:** slender, pedicels 3.5–6 mm long, persistent base 1.25–4 mm long, significantly exceeding the subtending bract, sepals 3, flat, ciliate margined, ovate, 1.75–2.25 mm long, 1–1.25 mm broad; stamens 3; filaments 1–1.5 mm long, strap-like, connate at base, pistillode present, buds globose, densely hairy. **Pistillate flowers:** pedicels 3–7 mm long in flower 14–17 mm long in fruit; sepals 6, connate at the base, ovate to rotund, tip acuminate, ciliate margined, 6–8 mm long, 3–5 mm broad; styles united from 2/3–3/4 their length, 4–5.7 mm long, stigma surface smooth. **Fruit** ca. 6 mm long, 12 mm wide, columella ca. 5 mm long; seeds nearly spherical, 6 mm in diameter, mottled with alternating long brown streaks, ridge and facet cells poorly defined.

Distribution.—*Tragia catemacoensis* is known only from the vicinity of the type locality in primary, tall, evergreen, tropical forest east of Lake Catemaco, Veracruz (Fig. 3). This is at the northern extent of the evergreen neotropical forest (Rzedowski 1988) and is in proximity of the Los Tuxtlas Ecological Preserve operated by UNAM. Although the area has been disturbed by agricultural pursuits (Guevarra & LaBorde 2014), large tracts of land have been preserved and maintain tremendous biological diversity. Vines and lianas, such as *Tragia*, are well represented in the flora of this area (Guevarra & LaBorde 2014).

Representative collections: **MEXICO. Veracruz.** Mpio Catemaco: 8 km SE de El Bastonal, 18 Sep 1985, *Cedillo Trigos 3418* (UNAM 603671, internet image!); Mpio. Catemaco: Ejido López Mateos, entrada por Coyame, 8 km al E de Coyame, 4 Apr 2002, *Campos V. 5789* (UNAM 1321794, internet image!); Mpio. San Andrés: Recorrido al Volcán San Martín llegando por la ladera S-SO, entrando por Tapalapa-Xogapan, 400–1100 m, Feb 2003, *Campos V. 5864* (UNAM 1318420, internet image!).

Tragia catemacoensis has several features that separate it from other species of *Tragia*. The staminate flowers of this species are considerably larger than all other Mexican species with three stamens. The flowers also have

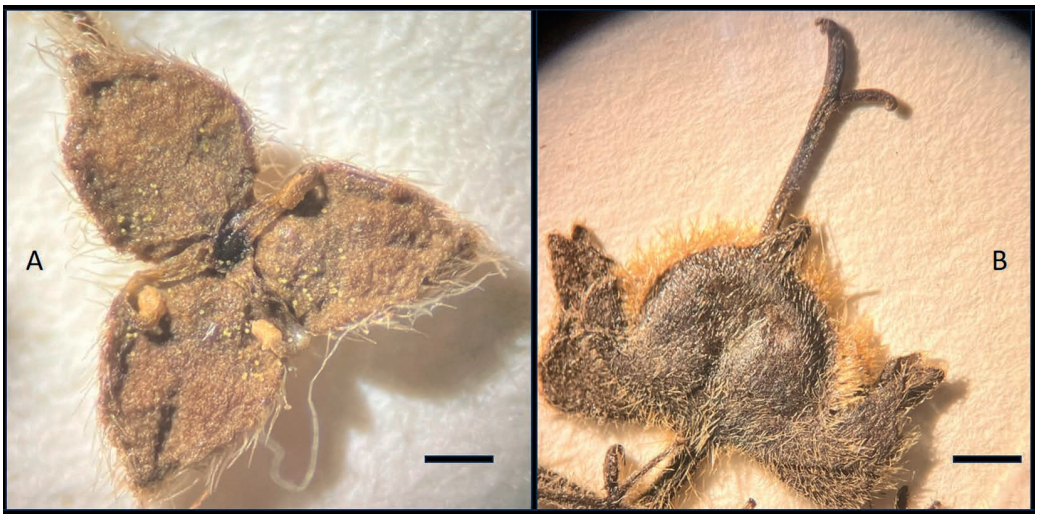

Fig. 1. *Tragia catemacoensis.* **A.** Staminate flower (Bar = 0.65 mm). **B.** Pistillate flower (Bar = 0.88 mm) (*Beaman 5849*).

the longest filaments of *Tragia* species with three stamens (Fig. 1A). These filaments superficially resemble those of *Zuckertia cordata* Baill. (formerly *Tragia bailloniana*) in narrowness, albeit not in length or quantity. Additionally, unlike the primitive reticulate pollen grains of *Z. cordata*, the pollen of *T. catemacoensis* is of the *Tragia tristis* type found in other species in *Tragia* sect. *Tragia* (Urtecho 1996; Gillespie 1994).

Another unique feature of this species is the wide sepals of the pistillate calyx, the widest among all of the Mexican species of this genus. (Fig. 1B), and are connate at their bases, creating a cup-like structure. The length of the pistillate flower pedicel is also very long and approaches the lengths usually seen in *Tragia volubilis* (Table 1). It is interesting to note that the seeds of *Tragia catemacoensis* and *Zuckertia cordata* Baill. (formerly *Tragia bailloniana*) are similar in texture as observed using the light microscope. The seeds of *T. catemacoensis* are larger than those of *T. affinis* and approach the seed diameter (~6 mm) of *T. mexicana*. Like many other plants found in evergreen tropical forests, the leaves of this species are thick and waxy above and are often covered with epiphytic lichen and bryophytes (Fig. 2).

2. Tragia acahualicola Urtecho, **sp. nov.** (**Figs. 4, 5, 6**). Type: MEXICO. Tabasco. Mpio. Jalapa: Ejido Fernández Manero, km. 12.1 del camino hacia Cacaos de la desviación km 32 de la carretera Villahermosa hacia Escárcega, 18 Mar 1980, *Cowan 2816* (holotype: DAV 91743!; isotype: CAS!).

Diagnosis.—*Tragia acahualicola* Urtecho is similar to *Tragia gentryi* Urtecho in possession of an ovary with acicular-subulate glands and large leaves with basilaminar glandular hairs. This species differs in its twining habit, eglandular peduncles, larger seed diameter, sub-spathulate leaves, and shorter pistillate pedicels.

Stems much branching from a woody taproot, to 3 m in length, woody, green to tan, glandular, climbing or trailing; upper internodes 2–3.5 cm, lower internodes 4.4–9 cm. **Leaves** oblong to sub-spathulate, 3–12 cm long, 1.5–4 cm broad, apically acuminate, basally cordate, margins usually serrate but occasionally dentate or crenate, adaxial surfaces with scattered simple hairs throughout, abaxial veins covered with stinging hairs, with glands occasional at the junction with petiole; petioles 0.5–3.5 cm long; stipules lanceolate to triangular, 3–4 mm long, 1.5–2 mm broad, ciliate with spreading hairs. **Inflorescence** racemose, to 10 cm in length, peduncles 1–1.5 cm long with a single pistillate flower at the lowest node, 20–60 staminate flowers per raceme; bracts of pistillate flowers lanceolate and three-lobed, central lobe 2.5–3 mm long, lateral lobes to ca. 2 mm long, ciliate, acute; bracts of staminate flowers ovate, sub-cucullate, 1–1.5 mm long, ciliate, entire margined. **Staminate flowers:** pedicels 1–1.5 mm long, persistent base 1.8–2 mm long; sepals 3–4, ciliate, ovate,

Fig. 2. Holotype: *Tragia catemacoensis* Urtecho (*Beaman 5849*). Courtesy of the Field Museum of Natural History (F) (CC BY-SA).

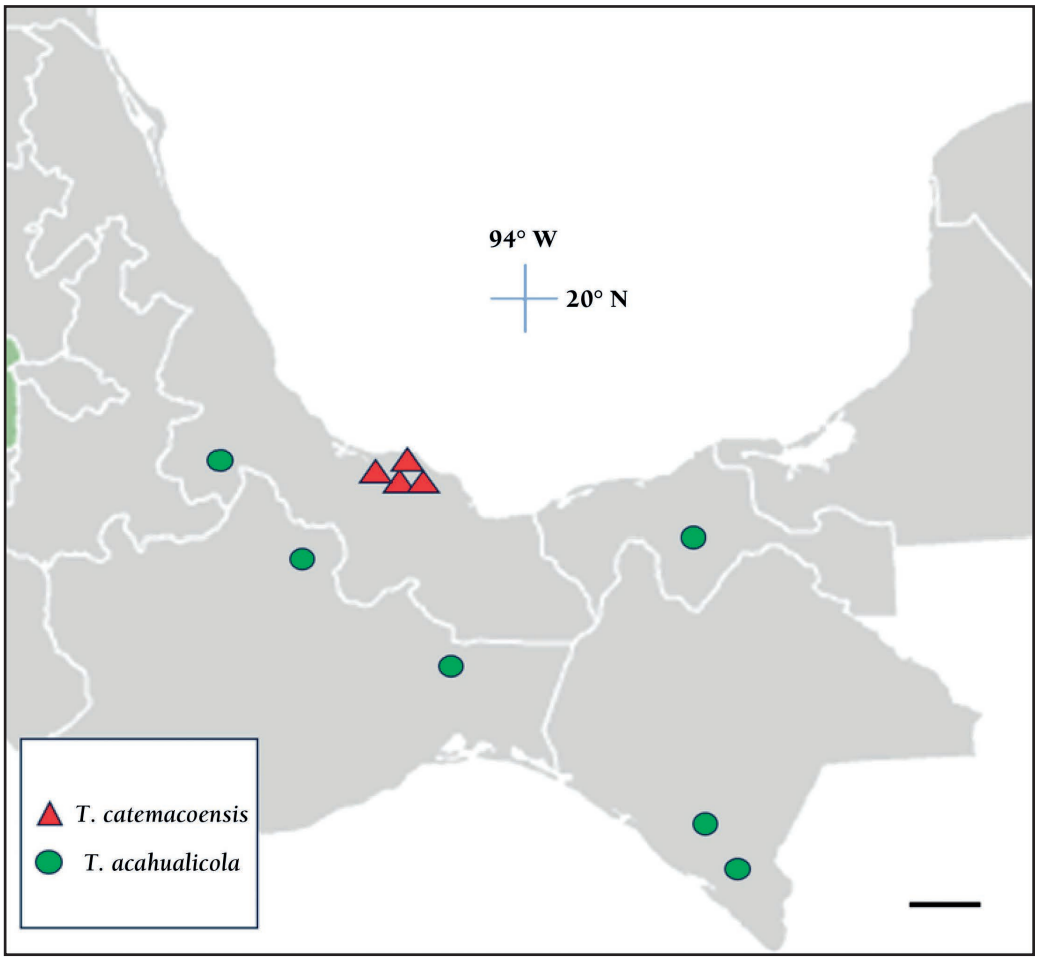

Fig. 3. Distribution map of *Tragia acahualicola* and *Tragia catemacoensis* in the Isthmus of Tehuantepec region of Mexico (Bar = 50 km). Map created with basemap by Jacob Rus, CC BY-SA 3.0.

0.5–1 mm long; stamens 3; filaments fleshy, length variable, ± 0.5 mm long, connate at base. **Pistillate flowers:** pedicels 1.5 mm long in flower 2–2.5 mm long in fruit; sepals 6, lanceolate, oblanceolate to linear, ciliate, 4–5 mm long, 1–1.5 mm broad; ovary covered with stipitate glands and urticating hairs; styles united from 2/3–3/4 their length, stigma surface smooth. **Fruit** 4–5 mm long, 7–8 mm wide, densely covered with long, acicular-subulate glandular hairs 0.5–1 mm long, columella 2.5–3 mm long; seeds nearly spherical, ca. 4 mm in diameter, mottled yellow-orange.

Distribution.—*Tragia acahualicola* is found in forest gaps and secondary growth of evergreen and montane tropical forests of Chiapas, Oaxaca, Tabasco, and Veracruz (Fig. 3). It has been recorded to occur at altitudes of 1000 M above sea level.

Representative collections: **MEXICO. Chiapas:** Escuintla, Mt. Ovando, 14 Nov 1945, *Matuda 16238* (MEXU, MO, US); Mpio. Mapastepec: Reserva El Triunfo, Polígono 1, Limonar (Pacific Slope), 1250 m, 23 Apr 1990, *Heath 897* (CHIP, MEXU). **Oaxaca:** Mpio. Sta. María Chimalapa: Cafetales cerca de Sta. María, 300 m, 4 Apr 1986, *Hernández 2158* (LSU, internet image!); Mpio. Chiltepec: Tuxtepec, 23 Jan 1966, *Martínez* 693 (CAS, MEXU). **Veracruz:** Motzorongo, 11 Feb 1892, *Smith 239* (MO).

Table 1. Twining *Tragia* species of Tropical Mexico. A comparison of salient taxonomic characters between species found in the Tehuantepec region.

Character	T. acahualicola	T. affinis	T. catemacoensis	T. mcvaughii	T. mexicana	T. pacifica	T. volubilis
Height (m)	3 m	2 m	6 m	2 m	5 m	2.5 m	4 m
Leaf Shape	OBL/LAN/SPA	COR	OBL/LAN/OVT	LAN/OVA	OBL	LAN/COR	LAN/OVT/OBL
Stamens	3	10	3	3	3	3	2–3
GLAN-INFL	YES	NO	NO	YES	YES	YES	NO
GLAN OVA	YES	NO	NO	NO	NO	YES	NO
PIST PED (mm)	2–2.5	6–14	14–17	2–6	7–12	2.5–4.5	15–35 (45)
STIGMA	SM	SM	SM	UND/SuP	SM	SM	UND
SEED DIA (mm)	4	4	6	2–2.5	5-6	3–3.5	2.2–3

GLAN= glandular; INFL = Inflorescence; OVA = Ovary; PIST = Pistillate; PED = Pedicel; STIGMA = Stigmatic Texture; OBL=Oblong; LAN=Lanceolate; OVT=Ovate; COR=Cordate; SPA= Spathulate; SM=Smooth; UND= undulate; SuP = subpapillate.

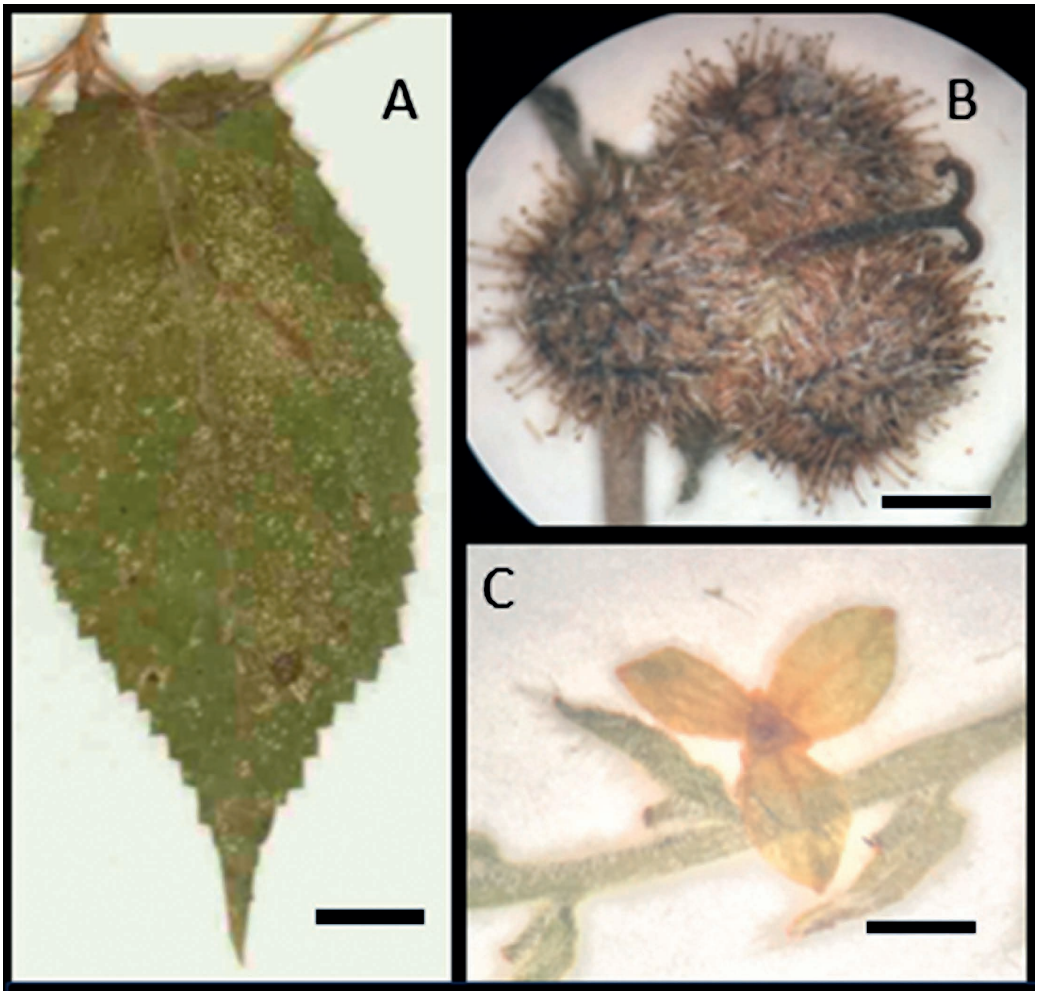

Fig. 4. *Tragia acahualicola:* **A.** Sub-spathulate leaf (Bar = 0.9 cm) (*Martinez 693*); **B.** Ovary densely covered with stalked glandular hairs (Bar = 2 mm); **C.** Staminate Flower (Bar = 1 mm) (*Cowan 2816*).

Fig. 5. Holotype: *Tragia acahualicola* Urtecho. Image courtesy of UC Davis Herbarium (DAV).

Fig. 6. *Tragia acahualicola* Urtecho (*Hernández 2158*). Image courtesy of the Louisiana State University Herbarium (LSU) (CC BY-SA).

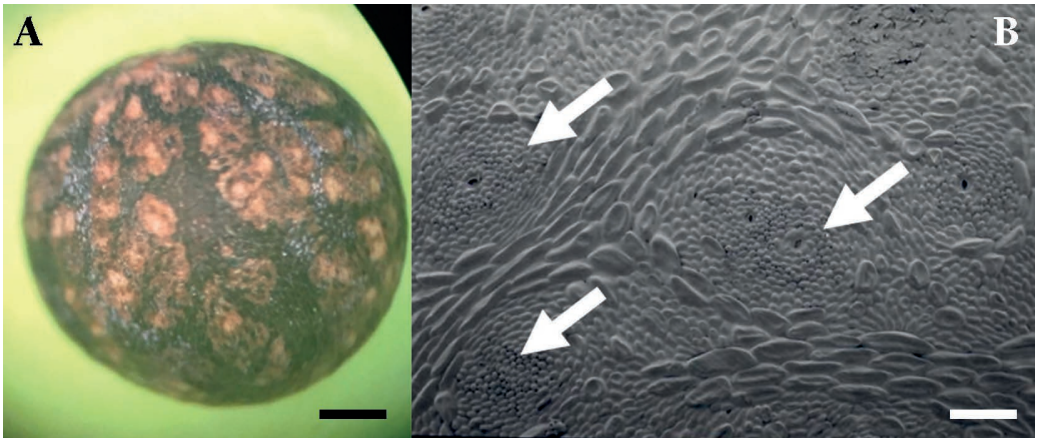

Fig. 7. *Tragia maculata* seed: **A.** LM showing distinctive white spots (Bar = 0.8 mm, *Breedlove 26933*); **B.** SEM 102X, seedcoat microsculpture, stomata in center surrounded by small facet cells forming the white, colliculate, 'maria' regions of the seeds (Bar = 98 µm, *Breedlove 10323*).

The specific epithet of this species is a neologism composed of the prefix *acahual* (sunflower, Nahuatl) and the suffix *-icola* (dweller, Latin) (Stearn 1983). The term *acahual* is most commonly used to describe secondary growth in the parts of Mexico with warm climates (Rzedowski 1988). Many of the cited collections of *Tragia acahualicola* specifically describe the location as acahual or secondary growth.

Tragia acahualicola has been misidentified as *T. mexicana* in many collections. It differs principally by having smaller, oblong leaves with dentate-crenate margins and a glandular ovary (Fig. 4, Table 1). The densely stipitate-glandular ovary (Fig. 4B) suggests an affinity to *T. pacifica* McVaugh and *T. gentryi* Urtecho (Urtecho 1996, 2022). It differs from these species by having only acicular, non-cristate glands on the ovary and a non-glandular peduncle. The seed coat microsculpturing of this species is unknown. The leaves of this plant superficially resemble *T. yucatanensis* in its well-defined parallel tertiary veins (Urtecho 1996). It differs from the latter taxon in being more densely glandular, with exclusively twining stems, oblong to sub-spathulate, basally cordate leaves, and much larger seeds and fruits (Figs. 5, 6).

3. Tragia maculata Urtecho, **sp. nov.** (**Figs. 9, 10, 11**). Type: MEXICO. Chiapas: roadside, 43 mi W of Tuxtla Gutiérrez, 23 Jun 1962, *G.L. Webster, K. & L. Miller 11656* (holotype: DAV 49387!; isotypes: MEXU!, TEX, internet image!).

Diagnosis.—*Tragia maculata* is similar to *T. nepetifolia* var. *setosa* S. Wats. in its erect habit and leaves that narrow toward the plant apex. It differs from this taxon in having mildly papillate to undulate stigmas, wider, narrowly-triangular leaves, and prominent white spots on the seed.

Stems one to few from a woody taproot, ribbed, 3–4 mm in diameter at base, 19–40 cm tall, green to yellow-green, erect to twinning; upper internodes 1–3.6 cm, lower internodes 0.9–3.5 cm. **Leaves** narrowly elliptic to narrow lanceolate, 28–65 mm long, 9–22 mm broad, apically acute, basally shallowly cordate, truncate, margins serrate, secondary veins each terminating at a tooth, scattered stinging hairs throughout upper surface, especially on the abaxial veins and petiole; light green adaxially, white-green abaxially, occasionally red-green; petioles 8–20 mm long; stipules persistent, lanceolate, 3–6.5 mm long, 0.9–2 mm broad, ciliate margined. **Inflorescence** racemose, with single pistillate flower at lowest node, staminate flowers 20–25 per raceme, peduncle 0.9–1.5 cm long; bracts of pistillate flowers three lobed, the lobes lanceolate, 2–3 mm long, 0.8–1 mm broad, ciliate, acute, sparsely pubescent; bracts of staminate flowers lanceolate to ovate, 1.5–2.25 mm long, 0.5–0.75 mm wide, margins entire, with long, stiff hairs. **Staminate flowers:** bud globose, with apical, glandular protuberance, pedicels 2.75–4 mm long, persistent base 0.25–1 mm long; sepals 3(4–5), ovate, 1–2 mm long, 0.8–1 mm wide, narrow at base, apical gland present; stamens 3(–5); filaments fleshy, wide at base,

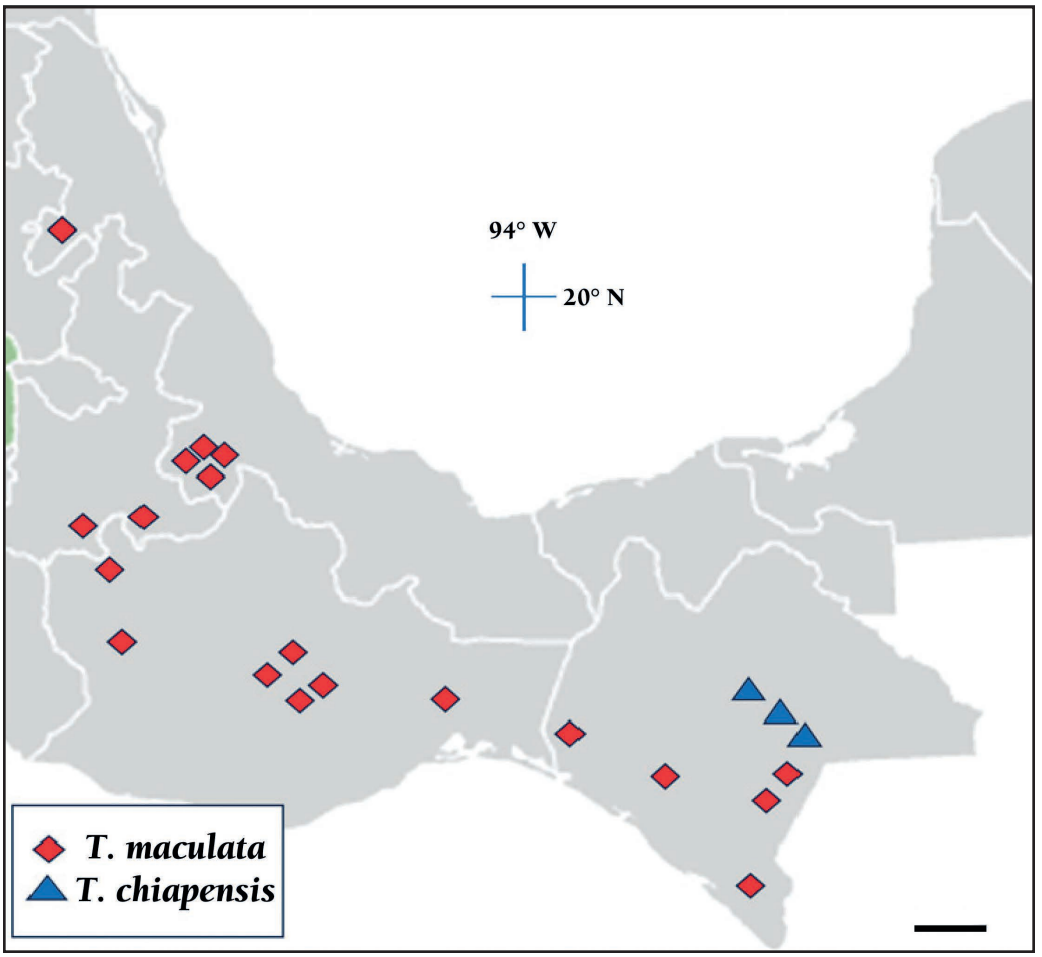

Fig. 8. Distribution of *Tragia maculata* and *Tragia chiapensis* in the Isthmus region of Mexico (Bar = 50 km). Map created with basemap by Jacob Rus, CC BY-SA 3.0.

0.25–0.4 mm long, pistillode present, triangular. **Pistillate flowers:** pedicels distally flattened, 1.25–4 mm long in flower 3.5–4 mm long in fruit; sepals 6, lanceolate, apex acute, glandular, margins ciliate, 2.5–3 mm long, 0.8–1 mm broad; styles united from 1/4 to 1/2 their length, stigma surface mildly papillate, undulate. **Fruit** 7–8 mm long, 7–9 mm broad, columella 3–4 mm long, seeds spherical, 3–3.8 mm in diameter, mottled dark-brown with prominent lighter colored patches of facet cells.

***Distribution.*—**Low deciduous tropical forest, margins of oak forest, secondary growth, occasionally ruderal, from Chiapas, Oaxaca, Puebla, Veracruz at altitudes ranging from 800 to 1700 m (Fig. 8). Recent recordings of this species are from fallow fields (acahual) and other disturbed habitat.

Representative collections: **MEXICO. Chiapas:** Chicomuselo 14–20 Jul 1941, *Matuda 4497* (MEXU); Mpio. Jiquipilas: 8 mi E of Cintalapa, along Mex. Hwy 190, wooded slope, 12 Jun 1965, *Breedlove 10323* (CAS, MICH, US); Mpio. Chiapa de Corzo: above El Chorreadero, Steep walled canyon, 800 m, 16 Jul 1981, *Breedlove 51575* (CAS); Mpio. Arriaga: 6 km N of Arriaga, 250 m, 14 Aug 1972, *Breedlove 26933* (CAS); along edge of highway about 10 mi. W of Ciudad Cuauhtemoc near the Guatemalan border on Route 190, 27 Jul 1984, *Wilbur 35794* (CAS). **Oaxaca:** Mpio. San Juan Mixtepec: Rio Azucena, a 15 km N de San Juan Mixtepec, 7 Jul 1988, *Geronimo 271* (MEXU, DAV); 5 km al S de Cacaloxtepec, brecha Huajuapan-Tezoatlan, Distrito de Huajuapan, 7 Jun 1985, *Garcia 1477* (DAV, MEXU); Cerros Oaxaca, 19 Jun 1894,

Fig. 9. A. Leaf of *Tragia chiapensis* (Bar = 5 mm, *Breedlove 12116*); B.–C. *Tragia maculata*: Source: iNaturalist Mexico (B. Edith Belén Jiménez Díaz, 416294737; C. Alexis López Hernández, 310636187) CC BY-NC 4.0.

Pringle 5745 (MEXU); Logunes: 5 Jun 1895, *Nelson* 2649 (US); Valley of Oaxaca 2 Oct 1885, *González* 831 (GH); Entre Tlacolula y Oaxaca, 2 Feb 1966, *Delgadillo* 199 (CAS, MEXU); Valley of Oaxaca, N of Tlacalula and S of Tule, Mitla vicinity, 2 Feb 1966, *Ernst 2423* (MEXU). **Puebla:** Mpio. Caltepec: 19 Nov 1990, *Tenorio 17334* (MEXU, TEX); Matamoros: 26 May 1943, *Miranda 2752* (MEXU). **Veracruz:** along route 150, about 20 mi. E of Cuitlahuac, 6 Jun 1960, *King 2681* (MICH, US); La Pulga, 12 Feb 1867, *Gouin 19* (P); Mpio. Emiliano Zapata, Faldas del cerro de Chavarrillo, 15 Apr 1979, *Castillo 00579* (MEXU, XAL); Zacuapan, Jun 1906, Purpus *2092* (US); San Marcos, 25 Mar 1910, *Orcutt* 3439 (CAS).

Tragia maculata has leaves that superficially resemble *T. urticifolia* (Fig. 9 B–C) and thus has been mistaken for this species. The confusion may have been exacerbated by the erroneous inclusion of *T. urticifolia* Michx. in the Mexican flora in *Plantas Hartwegianas* (Bentham 1839). It is worth noting that the reproductive structures are considerably different between these two species: *T. urticifolia* has very long persistent staminate pedicels that far exceeds the subtending bracts (Miller & Webster 1967), has strongly papillate stigmas, and is found in sandy soils in open forests of central and eastern U.S. (Miller 1964; Urtecho 2016). Perhaps the species most closely related to *T. maculata* is *T. nepetifolia var. setosa* (Urtecho 1996). The presence of an apical gland on the pistillate calyx lobes suggests some relationship with the *T. nepetifolia* complex. It differs, however, in bearing wider, unlobed leaves, longer petioles, less papillate stigmas, smaller, distinctive seeds and occasional glandular trichomes. The seeds bear prominent 'maria' that regularly appear white under the light microscope (Fig. 7). Although white spots are seen on other taxa, the white spots on the seeds of *T. maculata* do not have interspersed insular ridge cells, tend to be more rounded and are surrounded by ridges that are 3–5 cells wide (Urtecho 1996).

A few collections of plants that superficially resemble this species have been found in Queretaro, Nuevo

Fig. 10. Holotype: *Tragia maculata* Urtecho (*Webster, Miller & Miller 11656*). Courtesy of the J.M. Tucker Herbarium (DAV).

Fig. 11. *Tragia maculata* Urtecho (*Wilbur 35795*). Courtesy of the California Academy of Sciences Herbarium (CAS).

Leon and Tamaulipas. Several of these collections represent intermediates between *Tragia brevispica* and *T. maculata*. These have been omitted from this study but merit further investigation to determine if these represent the northernmost populations of this taxon or possibly a different closely related taxon. Collections of *T. nepetifolia* var. *angustifolia* Muell. Arg. such as *Berlandier 2542* (NY, internet photo!) also superficially resemble *T. maculata,* although Miller and Webster (1967) considered these specimens to be a robust form of *T. ramosa* Torr.

4. Tragia chiapensis J-B. Urtecho[2] & Urtecho, **sp. nov.** (**Figs. 12, 13, 14**). Type: MEXICO. Chiapas. Mpio. Amantenango de Valle: Slope with *Quercus* along creek near the center of Amatenango, 5900 ft, 23 Aug 1965, *Breedlove 12116* (holotype: CAS 535206!).

Diagnosis.—*Tragia chiapensis* is similar to *Tragia affinis* Rob. & Greenm. in leaf shape and in possessing more than three stamens per staminate flower. It differs from this species by having more strongly papillate stigmatic surfaces, much smaller seeds, and in consistently having six stamens per staminate flower.

Stems few to many from a woody taproot, 1–2 mm in diameter, 20–90 cm tall or greater, light green to tan, erect to twinning; upper internodes 2.25–4 cm, lower internodes 2–3.5 cm. **Leaves** narrow cordate, ovate to triangular-ovate, 2.5–4 cm long, 1.5–2.5 cm broad, apically acute, basally cordate, margins serrate to weakly dentate, with scattered stinging hairs on the upper surface, dark green above, light green to pale below, petioles 15–30 mm long, with indumentum of spreading simple and stinging hairs; stipules lanceolate, 2.5–3.5 mm long, 1.5–2.5 mm broad, ciliate margins with wide sub-cordate base. **Inflorescence** racemose, 1.2–3 cm long, peduncle 0.5–2 cm long to the first node, glabrous with a single pistillate flower at the lowest node, 4–8 staminate flowers per raceme; bracts of pistillate flowers ovate, 2.5–3 mm long, ciliate, acute; bracts of staminate flowers lanceolate, sub-cucullate, 1.5–1.7 mm long, acute, ciliate margined. **Staminate flowers:** pedicels 1–2 mm long, persistent base shorter than the subtending bract, 0.2–0.5 mm long, with scattered spreading and stinging hairs; sepals 3, ciliate, ovate, 1.5–1.8 mm long; 0.7–0.8 mm wide; stamens (5)6; filaments fleshy, ca. 0.5 mm long, connate at base, narrowing at the attachment to the anther; anthers erect. **Pistillate flowers:** pedicels 0.8–1 mm long in anthesis, 2.5–3 mm long in fruit; sepals 6, lanceolate to spathulate, 2.5–4 mm long, 1–2 mm broad; apex glandular, acute, ciliate margined, covered with scattered simple and stinging hairs, styles united from 1/3 their length, stigma surface roughly papillate. **Fruit** 5–7 mm long, 8–9 mm broad, columella ca. 3–4.3 mm long, densely covered with stinging hairs; seeds nearly spherical, ca. 2.5–6.5 mm in diameter.

Distribution.—Pine and oak forests of the Sierra de San Cristóbal and south (Fig. 8).

Representative collections: **MEXICO. Chiapas:** en el km 18 al NW del camino a Laguna Chamula, en el km 1–3 sobre el camino a Napite que sale al E de Tulanca, 24 Sep 1983, *Téllez 7223* (RSA, UNAM); Mpio. Comitán: Rancho Yerbabuena; Bosque de pino-encino, 16°28′36″N, 92°17 54″W, 2150 m, 10 Jul 1994, *Martínez Icó 90* (TEX, UNAM); Laguna Chamula Microwave Tower, between Amatenango del Valle and Comitán, 24 Sep 1988, *Breedlove 70062* (CAS, MEXU, internet image!).

The leaves of *Tragia chiapensis* (Figs. 9A, 13, 14) are very similar to those of *T. cordata* and *T. affinis*. *Tragia cordata* is found in the deciduous forests of the United States, from Texas to Ohio (Miller & Webster 1967; Urtecho 2016). Although *T. cordata* shares a papillate stigma with *T. chiapensis*, it is a high climbing vine with very large leaves and only three stamens—characters that easily separate it from *T. chiapaensis*. *Tragia affinis* is unique among the Mexican *Tragia*. It is a climbing vine whose flowers have 10–18 stamens as well as smooth stigmatic surfaces (Table 1)—two characters not shared with *T. chiapensis* (Fig. 12).

Two collections identified as *Tragia affinis* from the Sierra de Manantlán, Jalisco (*Cochrane et al. 10802; Cuevas, 1584*); (GUADA, WIS) appear to be closely related to *T. chiapensis*. The plants not only have smaller, cordate leaves, but also between 8–10 stamens per staminate flower. These plants are recorded to inhabit gallery or pine-oak forest and have thinner, more elongate cordate leaves and fewer stamens than typical *T. affinis*. It is plausible that these are related to *T. chiapensis*, but until more collections are made north of Chiapas, these collections should be considered variants of *T. affinis*.

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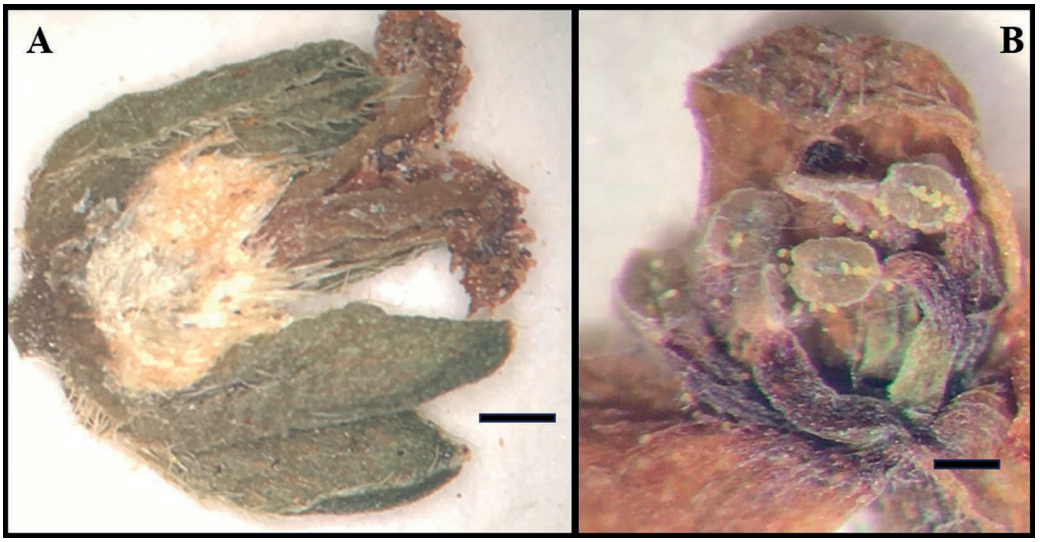

Fig. 12. *Tragia chiapensis*. **A.** Pistillate flower with papillate stigma (Bar = 0.3 mm; *Breedlove 12116*). **B.** Staminate flower with 6 stamens, (Bar = 0.25 mm; *Tellez 7223*).

KEY TO *TRAGIA* (EUPHORBIACEAE) OF THE TEHUANTEPEC REGION OF MEXICO

1. High climbing (>1 m) tropical vines or lianas.
   2. Inflorescences with stalked or sessile glands.
      3. Ovaries and fruits with stalked glands.
         4. Stalked ovary glands thin and needle-like _____ **Tragia acahualicola**
         4. Stalks of ovary glands fused to form a strap-like compound structure; ovary glands darken with aging _____ **Tragia pacifica**
      3. Ovaries and fruits without stalked glands.
         5. Stalked and sessile glands on peduncle and pedicels, leaves oblong with entire margins; high climbing liana _____ **Tragia mexicana**
         5. Stalked and sessile glands scattered in inflorescence, leaves ovate with serrated margins; low climbing vine _____ **Tragia mcvaughii**
   2. Inflorescences non-glandular.
      6. Stamens 10 or more _____ **Tragia affinis**
      6. Stamens 3.
         7. Pistillate pedicels 14–17 mm; stamen filaments long and strap-like, 1–1.5 mm _____ **Tragia catemacoensis**
         7. Pistillate pedicels 15–35 (45) mm; stamen filaments short and broad, 0.3–0.75 mm _____ **Tragia volubilis**
1. Low growing (<1 m) erect shrubs or shrublets, often with flexuous tips.
   8. Inflorescence covered with sessile and stalked glands _____ **Tragia glanduligera**
   8. Inflorescence without stalked glands.
      9. Staminate flowers with 6 stamens _____ **Tragia chiapensis**
      9. Staminate flowers with 3 stamens.
         10. Leaves narrow oblong, elliptic to narrow lanceolate.
            11. Stigmatic surfaces very papillate; leaves serrate with long simple hairs at tooth apex; seeds dark and mottled _____ **Tragia nepetifolia** var. **setosa**
            11. Stigmatic surface undulate to mildly papillate; leaves serrate without hairs on tooth apex; seeds with prominent white spots _____ **Tragia maculata**
         10. Leaves not narrow, triangular lanceolate to ovate.
            12. Petioles 2.9–5.8 cm; peduncle 1.5–6.5 cm _____ **Tragia chiltepeca**
            12. Petioles 0.6–1.8 cm; peduncle 0.51 cm _____ **Tragia yucatanensis**

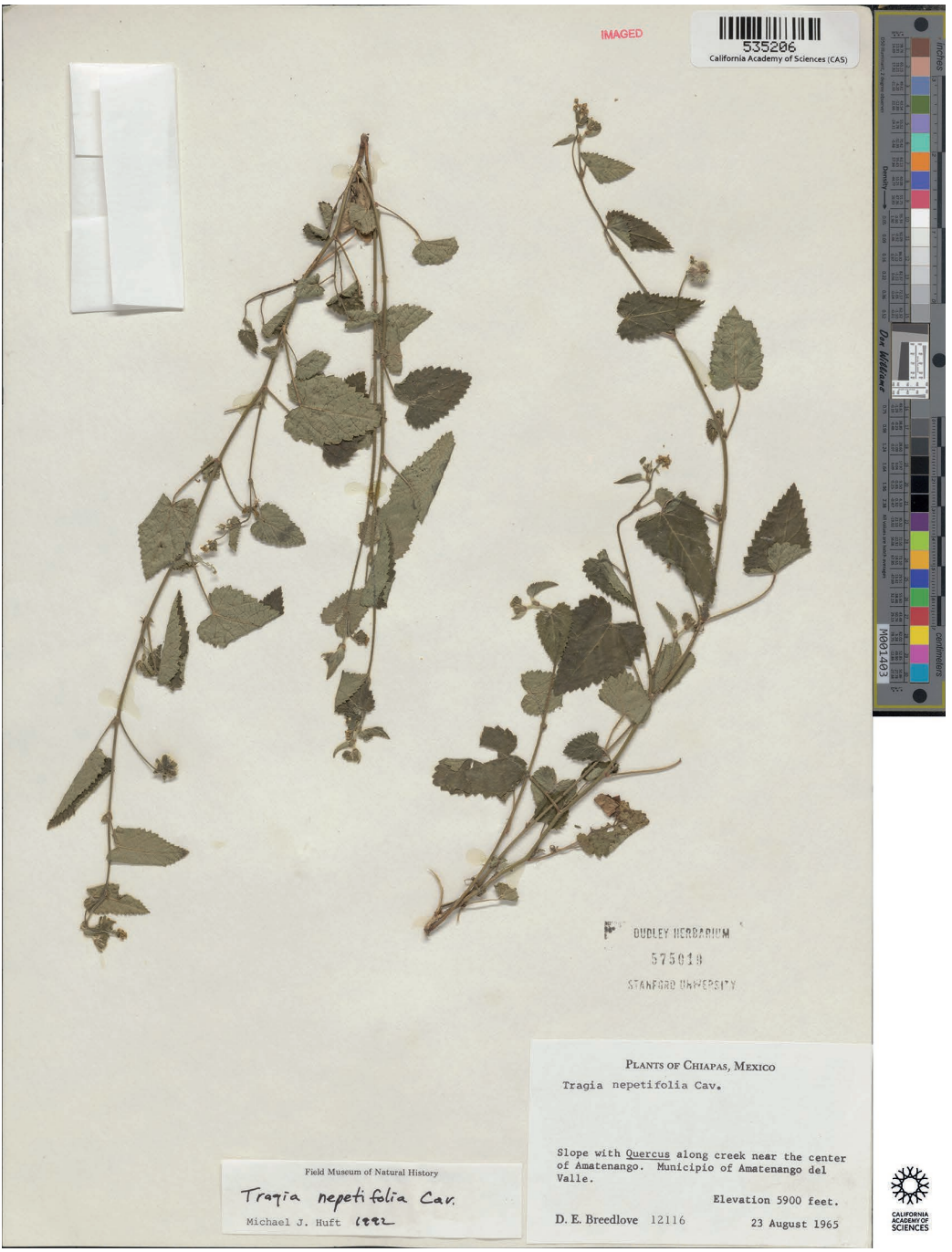

Fig. 13. Holotype: *Tragia chiapensis* J-B. Urtecho & Urtecho (*Breedlove 12116*). Courtesy of the California Academy of Sciences (CAS).

Fig. 14. *Tragia chiapensis* J-B. Urtecho & Urtecho (*Martinez-Icó 90*). Courtesy of the University of Texas Herbarium (TEX).

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