

# A Synopsis of *Pterostemon* (Iteaceae), a Group Endemic to Mexico

Judith Márquez Guzmán<sup>1</sup>, Martha Martínez Gordillo<sup>2</sup>, Ramiro Cruz Durán<sup>2\*</sup>,  
Jaime Jiménez Ramírez<sup>2</sup>, María Cristina Pérez-Amador<sup>3</sup>

<sup>1</sup>Laboratorio de Desarrollo en Plantas, Facultad de Ciencias, Universidad Nacional Autónoma de México, México D. F., México;

<sup>2</sup>Departamento de Biología Comparada, Facultad de Ciencias, Universidad Nacional Autónoma de México, México D.F., México;

<sup>3</sup>Laboratorio de Química, Facultad de Ciencias, Universidad Nacional Autónoma de México, México D. F., México.

Email: \*ramcrudur@yahoo.com

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## ABSTRACT

The genus *Pterostemon* Schauer (Iteaceae), is a group of three species restricted in distribution to Mexico. It includes: *Pterostemon mexicanus* Schauer, *P. rotundifolius* Ramírez, and *P. bravoanus* J. Jiménez-Ram. & Martínez Gordillo. On the basis of field observations and herbarium specimens, we review the morphology (vegetative and reproductive), and distribution to give an updated taxonomic treatment for the genus. Additionally the utility of morphological characters is evaluated for taxonomic use, and detailed taxonomic descriptions and ecological associations are given for each species.

**Keywords:** Endemic; Mexico; *Pterostemon*; Iteaceae

## 1. Introduction

*Pterostemon* Schauer is a small genus of three species endemic to arid and semi-arid regions of central and southern Mexico [1]. Schauer (1847) [2] first described *Pterostemon mexicanus*. Schauer placed this species in its own family, Pterostemonaceae. Since then the position of the genus has been questioned and it has been placed in different families including Saxifragaceae by Baillon (1872) [3], Engler and Prantl (1928) [4], Erdtman (1952) [5] and Schulze-Menz (1964) [6], Grossulariaceae by Cronquist (1981) [7], and Escalloniaceae by Thorne (1992) [8]. Small (1905) [9], Hutchinson (1967) [10], Dahlgren (1989) [11], Takhtajan (1988) [12], and Pérez-Cálix (2003) [13] and the Angiosperm Phylogeny Group (2009) [14] support its placement as the only genus in the family Pterostemonaceae, as first proposed by Schauer (1847). Embryological and phylogenetic analyses [15-17] have provided additional evidence in support of the recognition of the family Pterostemonaceae which has been shown to be closely related to the Iteaceae; nevertheless, according to the Angiosperm Phylogeny Group or APG III (2009) classification, *Pterostemon* is included into the

family Iteaceae.

*Pterostemon* is distinguished primarily by the combination of its woody habit, pubescent stems with lenticels, leaves with stipules, production of resin, the presence of a pubescent hypanthium, 10 stamens (5 fertile and 5 staminodia) with flattened filaments and toothed apices, and the capsular fruit containing one or rarely two seeds with endosperm. The most important characters to separate different species are the shape of the leaves, the size of the petioles, the number of flowers per inflorescences, the petals and their position during anthesis.

Natural populations of the three species of *Pterostemon* are usually small and highly localized, and even though usually a large proportion of flowers can be seen, in at least one of the species the production of seeds is very scarce and the establishment of seedlings is over all very low.

## 2. Material and Methods

In order to review and consolidate the taxonomic information available for the genus, herbarium material was reviewed from the herbaria ENCB, FCME, IEB, MEXU, MO, TEX, and XAL. In addition, field work was conducted to allow for collection of fresh material as well as

\*Corresponding author.

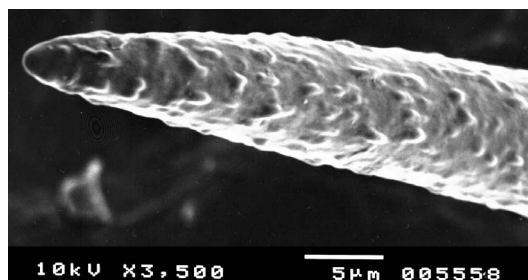
recording of direct observations of the species in the wild. The field work was conducted in the states of Puebla, Hidalgo, Oaxaca, and Guerrero. Plant material was collected for further analysis under the Scanning Electron Microscope, phytochemical as well as embryological studies. For all the species in the genus, a taxonomic description, as well as phenological and environmental data are included.

### 3. Results

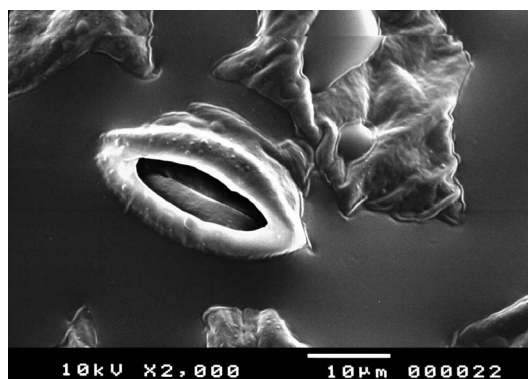
#### 3.1. The Genus *Pterostemon*

*Pterostemon* Schauer, *Linnaea* 20:736. 1847. Type: *Pterostemon mexicanus* Schauer, *Linnaea* 20: 736. 1847. crescit in montosis Mexici, ad Zimapan, *Aschb.* 259.

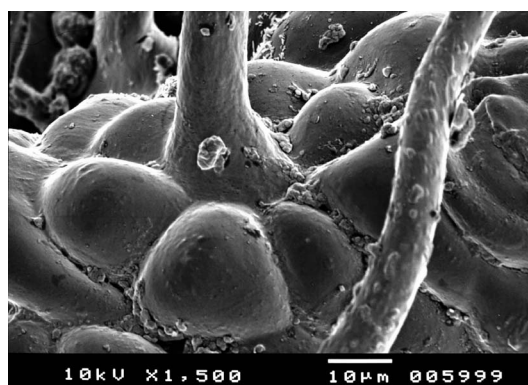
**Shrubs** or small trees; stems cylindrical; cortex fissured, gray or maroon, smooth or ribbed, glabrescent, lenticels present, maroon or dark gray; indumentum of simple trichomes, generally with a base of 5 - 7 cells, sometimes very conspicuous, usually papillated (**Figure 1**), and with spherical glands (**Figures 2-7**). **Leaves** petiolate, reddish with age, hypostomatic; petioles usually pubescent; stipules small, usually deciduous; blades orbiculate, sub-orbiculate, oblog-orbiculate, widely elliptic, obovate or widely obovate, membranaceous or coriaceous, apex obtuse or rounded, sometimes notched, margin crenated-toothed or toothed, sometimes revolute, glandular teeth, base rounded or cuneiform, sometimes slightly oblique or subcordate; adaxial surface green, pubescent or glabrous, abaxial surface pale, glabrous or pubescent; 3 - 6 pairs of secondary nerves. **Inflorescence** terminal or subterminal (**Figure 8**), peduncle and rachis usually pubescent, (1-)5 to more than 50 flowers; bracteoles small, pubescent, with spheric glands on the margins. **Flowers** generally pedicelate (**Figure 9**); pedicel pubescent; hypanthium conspicuous, pubescent; calyx with 5 sepals, connate at the base; lobules linear-lanceolate, deltate-lanceolate or deltate, erect, pubescent with spheric glands, valvate, persistent, adaxial surface pubescent or glabrous, abaxial surface pubescent, usually glandular; corolla with 5 petals, free, oblong or elliptic, apex usually rounded, sometimes emarginated, base unguiculate to straight, white or pink, adaxial surface glabrous or pubescent, abaxial surface pubescent, margin usually involute with erect or reflexed spherical glands; stamens 10, 5 fertile, 5 staminodia, erect; filaments flattened, apex denticulate, pubescent on both sides; anthers glabrous, connective tissue apiculate (**Figure 10**); pollen tricolporoidate or tricolporate, bicellular or tricellular at the time the monads are freed; exine tectate, perforate, sometimes suprarrugulate. Gynoecium syncarpic, ovary inferior, 5(-6)-carpels, 4 - 8 ovules per locule; pubescent on the exterior surface, styles 5, connate at different degrees, stigmas 5, lobed, glabrous; ovules crassinucelated, ana-



**Figure 1.** Surface of the trichome of *Pterostemon bravoanus* (from Cruz & Ponce 5899 at FCME).



**Figure 2.** Stomata of *Pterostemon rotundifolius* (Vega 2 at FCME).



**Figure 3.** Cellules at the base of the trichomes of *Pterostemon mexicanus*, adaxial surface (from Cruz 5999 at FCME).

tropous, bitegmic; tegmens of epidermic origin, tristratified. **Fruit** an indehiscent capsule, floral whorls persistent (**Figure 11**). **Seeds** 1, rarely 2, ovoid, maroon.

**Distribution and habitat.** *Pterostemon* along with the family Iteaceae is a paleo-endemic restricted to Mexico. It is found in arid and semi-arid regions of central and southern Mexico. It comprises three species with narrow and scattered populations in the states of Querétaro, Hidalgo, Puebla, Oaxaca, Guerrero and San Luis Potosí. It can be found growing in well drained calcareous soils, in dry scrublands, tropical deciduous forest, *Quercus* forest, and *Pinus* and *Juniperus* forest between 500 and 2350 meters above sea level.

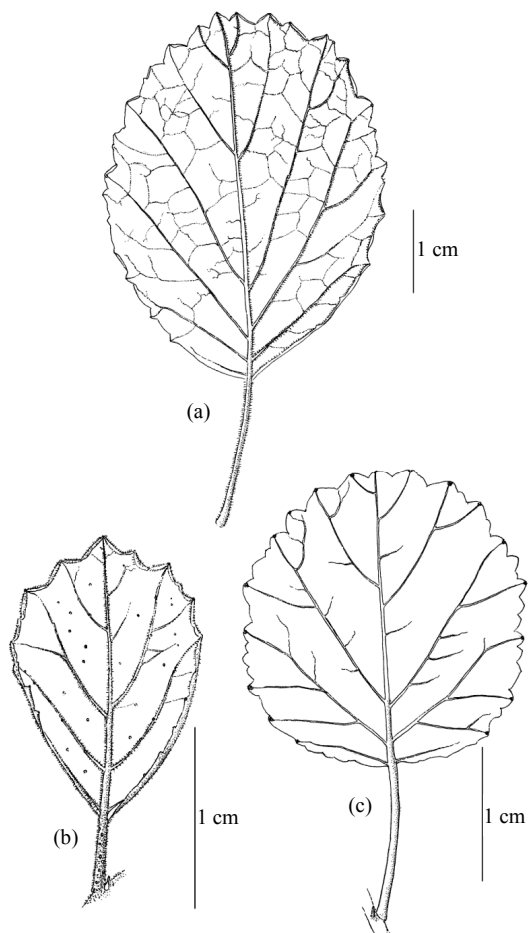


Figure 4. Leaves of *Pterostemon*. A. *P. bravoanus* (from Cruz & Ponce 5899 at FCME). B. *P. mexicanus* (from Simón s.n. at FCME). C. *P. rotundifolius* (from Vega s.n. at FCME). Drawings R. Cruz.

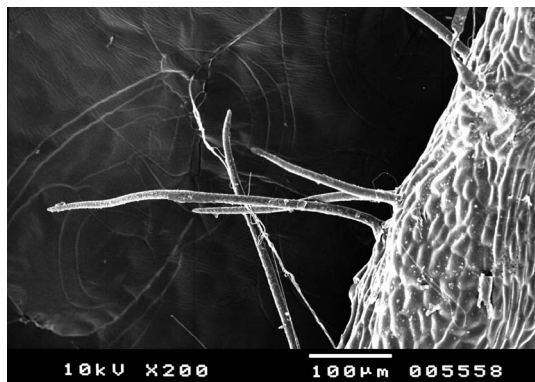


Figure 5. Margin of the leaf of *Pterostemon bravoanus* (from Cruz & Ponce 5899 at FCME).

### 3.2. Key to Species

- 1) Leaves obovate, petiole 0.4 - 0.6 cm long; inflorescences usually with 20 flowers or less; Guanajuato, Querétaro, Hidalgo, San Luis Potosí, and Northern Puebla..... *P. mexicanus*

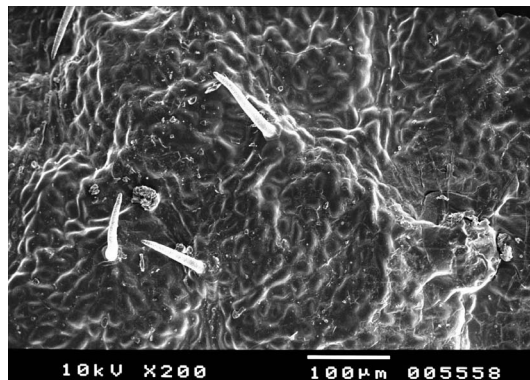


Figure 6. Exudates from glands in the adaxial surface of the leaf of *Pterostemon bravoanus* (from Cruz & Ponce 5899 at FCME).

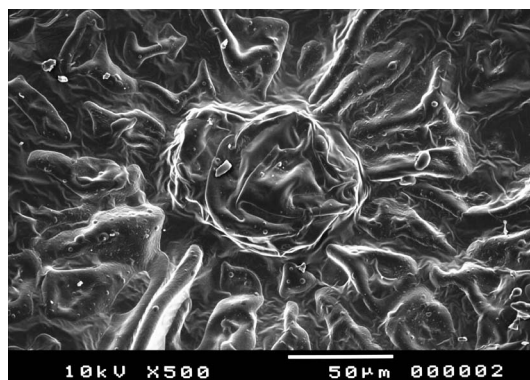


Figure 7. Spherical gland in the adaxial surface of the leaf of *Pterostemon rotundifolius* (from Vega 2 at FCME).

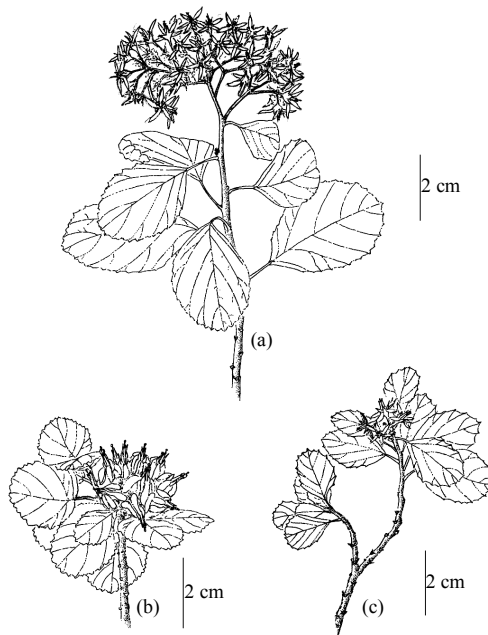
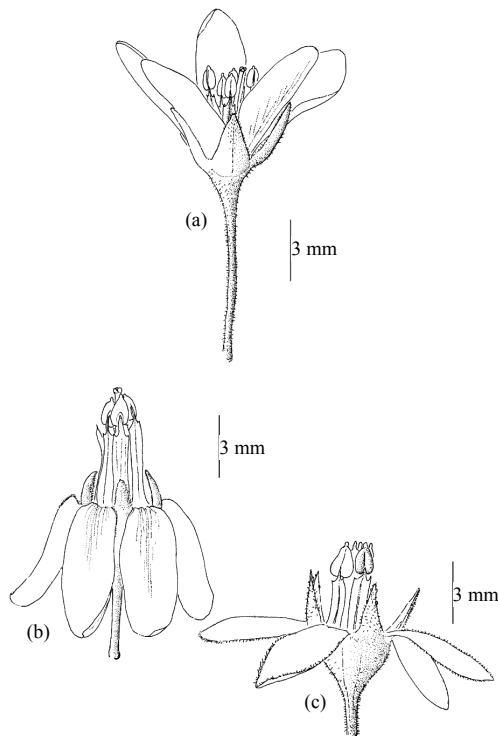


Figure 8. Inflorescences of *Pterostemon*. A. *P. bravoanus* (from Cruz & Ponce 5899, FCME). B. *P. rotundifolius* (from Vega 3, FCME). C. *P. mexicanus* (from Cruz 5998, FCME). Drawings R. Cruz.



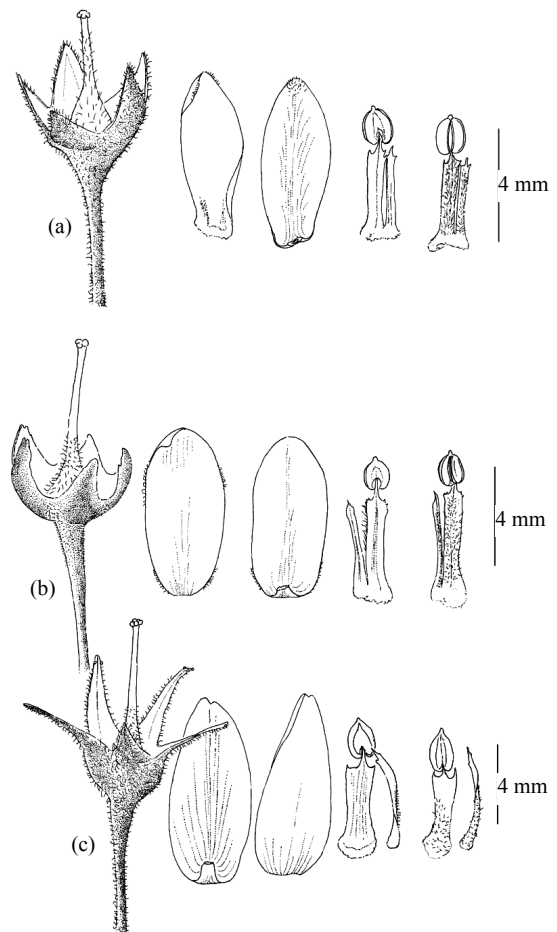
**Figure 9.** Flowers of *Pterostemon*. A. *P. bravoanus* (from Carreto 678 at FCME). B. *P. rotundifolius* (from Vega 3 at FCME). C. *P. mexicanus* (from Cruz 5998 at FCME). Drawings R. Cruz.

- 1) Leaves elliptic, oblong-orbiculate, suborbiculate or orbiculate, petiole 0.7 - 3.5 cm long; inflorescences usually with more than 20 flowers; Oaxaca, Guerrero, and Southern Puebla.
- 2) Inflorescences with less than 50 flowers; petals 7 - 8 mm long, 3 - 4 mm wide, oblong, reflexed; Oaxaca and Southern Puebla..... *P. rotundifolius*
- 2) Inflorescences with more than 50 flowers; petals 4 - 6.5 mm long, 2 - 2.5 mm wide, elliptic, erect; Guerrero..... *P. bravoanus*

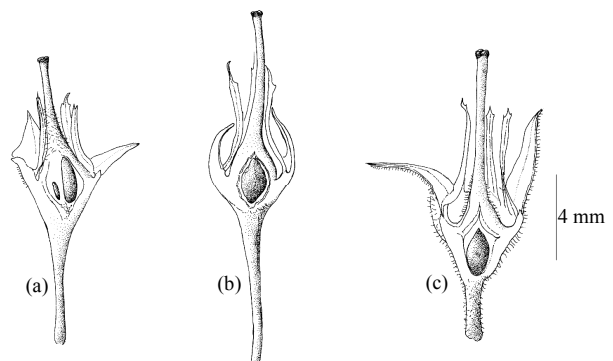
### 3.3. Description of Species

**3.3.1. *Pterostemon bravoanus* J. Jiménez-Ram. & Martínez Gordillo. *Acta Bot. Mex.* 41: 21-24. 1997. TYPE: MEXICO. Guerrero: Mun. Eduardo Neri, 8 km NE of Carrizalillo, on Road to Mezcala, 7 Oct. 1996, Cruz & García 975 (Holotype: FCME!; Isotypes: IEB!, MEXU!).**

**Shrubs** or small trees, 1 - 8 m tall; cortex smooth, young branches pubescent. **Leaves** petiolated; petiole 1.4 - 3.5 cm long, pubescent; stipules 1.5 - 2 mm long, linear, pubescent, persistent; blade 3.5 - 9 cm long, 4 - 7 cm wide, membranaceous, widely elliptic to orbicular, apex rounded, margin crenate-toothed, flat, base rounded to obtuse, adaxial surface glabrous, abaxial surface pubescent, secondary veins 5 - 6 pairs, the most proximal pair



**Figure 10.** Floral parts of *Pterostemon*. A. *P. bravoanus* (from Cruz & Ponce 5899 at FCME). B. *P. rotundifolius* (from Vega 3 at FCME). C. *P. mexicanus* (from Castrejón 1334 at FCME). Drawings R. Cruz.



**Figure 11.** Fruits of *Pterostemon*. A. *P. bravoanus* (from Cruz & Ponce 5899 at FCME). B. *P. rotundifolius* (from Vega 3 at FCME). C. *P. mexicanus* (from Cruz 5999 at FCME). Drawings R. Cruz.

suprabasal. **Inflorescences** 5 - 10 cm long, in subterminal cymes with 50 flowers or more, peduncle pubescent; bracteoles 2 - 2.5 mm long, linear, pubescent. **Flowers** pedicellate; pedicel 4 - 6 mm long; sepals 5, 1.3 - 3 mm

long, 1.4 - 1.8 mm wide, deltate, apex acute, adaxial surface glabrous, abaxial surface pubescent; petals 5, 4 - 6.5 mm long, 2 - 2.5 mm wide, elliptic, apex rounded, base straight, white, erect, adaxial surface glabrous, abaxial surface pubescent; stamens 5, staminodia 5; filaments flattened, wide and winged, pubescent abaxially; anthers elliptic, apiculate; pollen tricolporate, spheroidal; exine tectate, perforated (**Figure 12**), bicellular when freed; ovary 5-locular, pubescent, 4 - 6 ovules per carpel; styles 5, pubescent, slightly free at the distal end; stigmas 5-lobed, free. **Fruit** an indehiscent capsule. **Seed** usually one per fruit, ovoid, maroon.

**Phenology.** Flowering from March to November.

**Distribution and habitat.** In *Quercus* forest and tropical deciduous forest between 1300 and 1600 m above sea level.

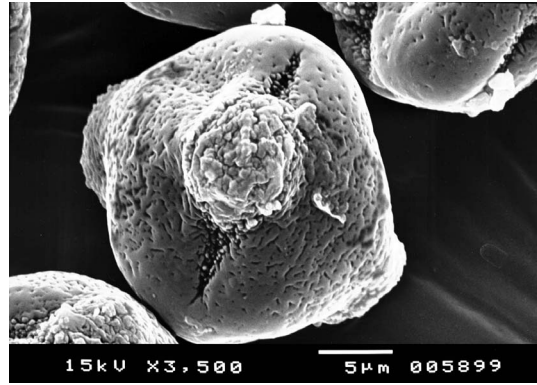
**Additional Specimens Examined. MEXICO. GUERRERO:** Mun. Ahuacotzingo, Ajuatetla, Peasant Reserve, 14 Mar 1999, *Casarrubias* 44 (FCME); aprox. 20 km S of San Juan Las Joyas, on road to Chilapa, 17°40'11"N, 99°3'54"W, 1440 m, 28 Jul 1978, *Martínez* 308 (FCME, MEXU); **Mun. Atlixac**, Petatlán, 17°36'0"N, 99°0'0"W, 1,579 m, 18 Aug 2004, *Carreto* 678 (FCME); 3.8 NW of Petatlán, 17°36'15"N, 99°1'4.6"W, 1300 m, 9 Nov. 2000, *Cruz* 5558 (FCME); **Mun. Chilpancingo**, Chilpancingo de los Bravo, 5 mi W, on road to Omiltemi, 17°33'54.44"N, 99°33'12.45"W, 1,900 m, 21 Oct. 1962, *McVaugh* 21916 (ENCB, TEX); Salto de Valadez, 122 km S of Chilpancingo, 17°26'0"N, 99°27'40"W, 1360 m, 7 Aug 1976, *Patiño s.n.* (IEB, MEXU, ENCB); **Mun. Eduardo Neri**, Zopilote canyon, Oct. 1932, *Bravo-Hollis* 3223 (MEXU); Xochipala, 5.5 km NW, on road to Filo de Caballo, 17°54'N, 99°39'W, *Cruz & Ponce* 5899 (FCME); Mezcala, 11.6 km al SO, 17°51'35"N, 99°40'20"W, 1495 m, 6 Sep 2000, *Cruz & Castrejón* 4983 (FCME); 8 km NE of highway Mexico-Acapulco, on road to Huiziltepec, 10 Nov. 1993, *García* 88 (FCME); 10 km of Mezcala, towards Carrizalillo, 17°50'34"N, 99°36'3"W, 1540 m, 24 Nov. 1994, *Martínez* 1012 (FCME).

### 3.3.2. *Pterostemon mexicanus* Schauer, *Linnaea*

20:726. 1847. TYPE: MEXICO. Hidalgo:

*Crescit in Montosis Mexici, ad Zimapan, Aschb.*  
259 (Holotype: Herbarium Unknown)

**Shrubs**, 1 - 3 m tall; cortex ribbed, young branches pubescent. **Leaves** petiolate; petiole 4 - 6 mm long, pubescent; stipules 0.5 - 1 mm long, linear-subulate pubescent, deciduous; blade (0.7-)2 - 4 cm long, 1.2 - 3 cm wide, subcoriaceous, obovate to widely obovate; apex obtuse, margin dentate or double dentate in the upper 2/3, revolute, base cuneiform, adaxial surface pilose, adaxial surface densely pubescent, secondary veins 3 - 4 pairs, proximal pair suprabasal. **Inflorescences** 1.5 - 2 cm long,



**Figure 12.** Pollen of *Pterostemon bravoanus*, equatorial view (from *Cruz & Ponce* 5899 at FCME).

in subterminal cymes, with 5 - 12 (-20) flowers, peduncles pubescent; bracteoles 1.5 - 2 mm long, linear-lanceolate, pubescent. **Flowers** pedicelled, pedicels 4 - 5 mm, pilose; sepals 5, (3-)4 - 5 mm long, 1.5 mm wide, linear-lanceolate, apex acuminate; adaxial surface glabrous, abaxial surface pubescent; petals 5, 8 - 10 mm long, 4 - 5 mm wide, oblong, apex emarginated, base unguiculate, white, slightly reflexed, adaxial surface glabrous, abaxial surface pilose; stamens 5, staminodia 5; filaments flattened, wide and winged, pubescent on the abaxial surface; anthers cordiform, apiculated; pollen tricolporoidate, prolate, with the transversal colpi circular, exine tectate perforated, and suprarrugulated (**Figures 13, 14**), tricellular when freed; ovary 5 locular, pubescent, 4 - 8 ovules per carpel; styles 5, pubescent, free at the distal end; stigmas 5, lobulated, sometimes free. **Fruit** an indehiscent capsule. Seeds generally one per fruit, ovoid, maroon.

**Phenology.** Flowering throughout the year.

**Distribution and habitat.** In dry scrublands and Pinus forest, in altitudes between 500 and 2350 m.

**Additional Specimens Examined. MEXICO. GUANAJUATO:** **Mun. Atarjea**, Manga Cuata, 8 km N of Atarjea, 21°15'30"N, 99°45'42"W, 1,300 m, 16 Nov. 1989, *Ventura & López* 7666(ENCB, IEB, MEXU, XAL); **Mun. Xichú**, La Aurora mine, 6 km E of Xichú, 21°17'99"N, 100°3'99"W, 1,200 m, 30 Oct. 1986, *Rzedowski* 41511 (ENCB, MEXU, IEB, XAL); La Cuchilla hill, 15 km N of Xichú, 21°17'99"N, 10°3'99"W, 7 Dic 1988, 1,800 m, *Ventura & López* 6432 (ENCB, IEB, MO, XAL). **HIDALGO:** **Mun. Cardonal**, Tolan-tongo, La Piedra Cerrada canyon, 20°18'N, 99°00' W, 2,100 m, 28 Aug 1976, *González, Ortiz, Hiriart & Solís* 9468, 9509 (ENCB, MEXU, MO); Tolan-tongo canyon, at bottom, 20°45'24"N, 99°1'42"W, 1300 m, 16 Oct. 1983, *Rzedowski* 38345 (ENCB, IEB, MEXU); **Mun. Ixmiquilpan**, 3 km SE of El Cubo, road to Arroyo Hondo, 20°37'55.2"N, 99°01'36.8"W, 1,945 m, 20 Mar 1999, *Castrejón* 509 (FCME), 28 Oct. 2000, 1334

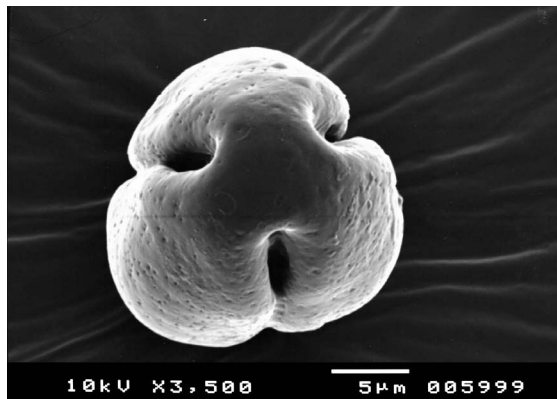


Figure 13. Pollen of *Pterostemon mexicanus*, polar view (from Cruz 5999 at FCME).

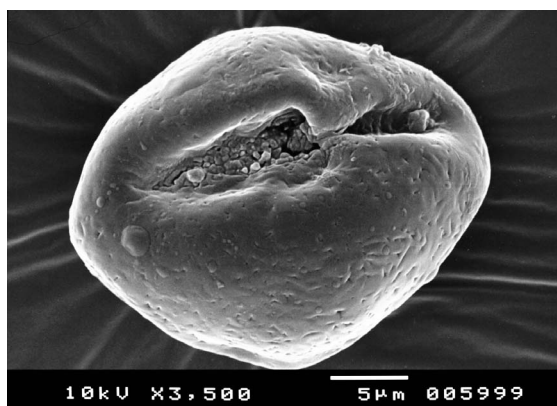


Figure 14. Pollen of *Pterostemon mexicanus*, equatorial view (from Cruz 5999 at FCME).

(FCME); El Cubo, 3 km SE, Tolantongo canyon, 1,900 m, Cruz 5998, 5999 (FCME); **Mun. Jacala de Ledezma**, Jacala de Ledezma, 20°59'48"N, 99°11'33"W, Apr 1953, Paray 355 (ENCB); **Mun. Metztlán**, 3 km W of Meztlán, road to San Pablo, 20°37'22"N, 98°52'53"W, 22 Oct. 2000, Miranda 1039 (MEXU); **Mun. Zimapan**, Río Tolimán canyon, 20°48'30"N, 99°26'49"W, 1,000 m, 11 Jun 1993, Zamudio & Pérez-Cálix 9121 (MEXU). **QUERETARO:** **Mun.** Cadereyta de Montes, La Tinaja, road to San Joaquín, Balderas & Serrano 23 (MEXU); 8 km N of Vizarrón, El Mirador, 20°52'48"N, 99°42'40"W, 1,900 m, 10 Nov. 1984, Fernández 2623 (ENCB, IEB MEXU); **Mun. Peñamiller**, 5 km NW of Peñamiller, on road to Aldama, 21°5'9"N, 99°49'13.67"W, 1,580 m, 9 Nov. 1977, Zamudio 2544 (MEXU, IEB, ENCB, TEX, XAL); **Mun. Pinal de Amoles**, SSO of Cuatro Palos, 21°8'N, 99°33'W, 2,000 m, 12 Jan 1990, Carranza 2304 (ENCB, IEB, MEXU, XAL); **Mun. San Joaquín**, La Culebra canyon, aprox. 5 km NE of La Tinaja, 20 Oct. 1994, Zamudio 9407 (MEXU, IEB). **SAN LUIS POTOSÍ:** **Mun.** Lagunillas: 3 km SE of Lagunillas, 21°34'3"N, 99°32'47.92"W, 850 m, 29 Apr 1956, Rzedowski 7622 (MEXU, TEX).

**3.3.3. *Pterostemon rotundifolius* Ramírez, Estudio 4: 453. pl. 18. 1893. Type: MEXICO. Oaxaca: between Jaltepetongo and Guandulain, 1891/1, Altamirano H. s.n. (Holotype: US)**

**Shrubs**, 1.5 - 3 m tall; cortex ribbed, young branches pubescent. **Leaves** petiolate, petioles 7 - 9.5 mm long, pubescent; stipules 1.1 - 2 mm long, linear, pubescent, deciduous; blade 2 - 3.2 cm long, 2.2 - 3.3 cm wide, coriaceous, suborbicular, oblong-orbicular, sometimes slightly oblong, apex obtuse, margin dentate-crenate, generally revolute, base rounded or slightly subcordate; adaxial surface glabrous, abaxial surface pilose or glabrous, secondary veins 4 - 5 pairs, the proximal pair basal. **Inflorescences** 2 - 2.6 cm long, in terminal cymes, with 9 - 22 or less than 50; peduncles puberulent; bracteoles 2 - 2.5 mm long, linear, pubescent. **Flowers** pedicellate, pedicels 3.5 - 5 mm long; sepals 5, 2.5 mm long, deltate-lanceolate, apex acute, adaxial and abaxial surfaces pilose; petals 5, 7 - 8 mm long, 3 - 4 mm wide, oblong, apex rounded, base slightly cuneiform, pink, white when old, reflexed, adaxial and abaxial surfaces pilose; stamens 5, staminodia 5; filaments flattened, wide and winged, pubescent adaxially; anthers cordiform, apiculated; pollen tricolporate, spheroidal, with the transversal colpi circular; exine tectate, perforated (Figures 15, 16), tricellular when freed; ovary 5-locular, pubescent; 4 - 8 ovules per carpel; styles 5, hispid in the proximal half, connate throughout; stigmas 5-lobed, connate to slightly free. **Fruit** an indehiscent capsule. **Seeds** generally one per fruit, ovoid, maroon.

*Phenology.*— Flowering from January to September.

*Distribution and habitat.*— In dry scrublands or *Quercus/Brahea* forest, from 500 to 1900 meters above sea level.

*Additional Specimens Examined.*—**MEXICO. OAXACA:** **Mun.** Asunción Nochixtlán, 89 km by road S of Teotitlán del Camino on road to Oaxaca, 17°34'0"N, 96°57'0"W, 1500 m, 10 Oct. 1983, Anderson 12986 (MEXU); 50 km N of San Francisco Telihtlahuaca, road to Tehuacán, 17°33'0"N, 96°58'0"W, 1,524 m, 6 Nov. 1983, Breedlove 59835 (MEXU); Concepción Buenavista, 0.5 km on road km 109 highway Tehuacán-Oaxaca, 18°01'11.3"N, 97°21'21.2"W, 1,590 m, Téllez 17066 (FCME); **Mun. Heroica Ciudad de Huajuapán de León**, Santiago Miltepec, 17 km al NE de Miltepec, 48 km NE of Huajuapán de León, road to Tehuacán, 17°59'0"N, 97°41'0"W, 4 Sep 1979, Chiang 406 (XAL); Huajuapán de León, 17°48'9"N, 97°46'34"W, 1,475 m, 10 Jul 1994, Panero 4153 (IEB, TEX); La Loma Pachona, 6 km NW of Guadalupe Cuautepéc, 1 km E of cross-section road Huajuapán de León-Tehuacán, 18°1'0"N, 97°39'0"W, 2,060 m, 27 Nov. 1986, Salinas F-3688 (MEXU); **Mun. Miahuatlán de Porfirio Díaz**, road to Quixtla, 16°15'48"N, 96°35'36"W, 1,900 m, 13 Jun

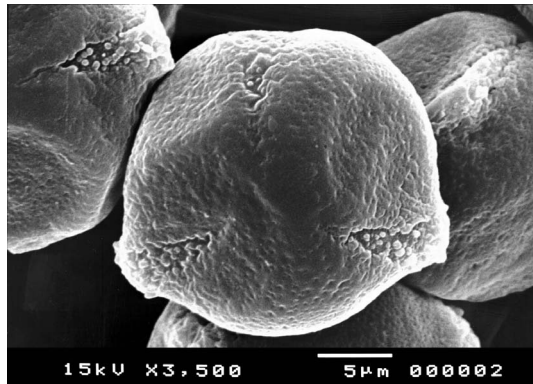


Figure 15. Pollen of *Pterostemon rotundifolius*, polar view (from Vega 2 at FCME).

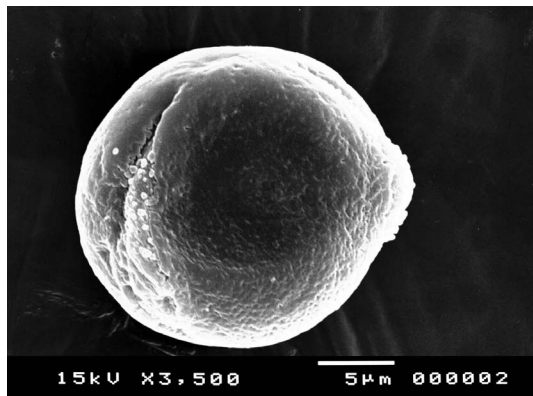


Figure 16. Pollen of *Pterostemon rotundifolius*, equatorial view (from Vega 2 at FCME).

1985, *García-Mendoza* 1600 (MEXU); Miahuatlán de Porfirio Díaz, 16°15'48"N, 96°35'36"W, 25 Oct. 1982, Flores, Pochotepec, 17°58'36"N, 96°57'12"W, 25 Sep 1990, *Tenorio* 17208 (IEB); **Mun. San Antonio Nahuatipam**, 10 km S of Ignacio Mejía, Río Xiquila, 18°2'0"N, 97°11'0"W, 990 m, 16 Nov. 1987, *Salinas* 4535 (MEXU, XAL); Mun. Oaxaca de Juárez, Las Hoyas canyon, 17°19'0"N, 96°56'0"W, 1,500 m, 2 Nov. 1994, *Pringlei* 6027 (ENCB); **Mun. San Andrés Sinaxtla**, cañada NW of Santa María Ixcatlán, 17°51'0"N, 97°11'0"W, 2,200 m, 10 May 1992, *Tenorio* 18340 (TEX); Mun. San Francisco Telixtlahuaca, San Francisco Telixtla-huaca; 50 km N, along highway 131, 17°35'3"N, 96°56'53"W, 1,524 m, 6 Nov. 1983, *Breedlove* 59835 (TEX); **Mun. San Juan Bautista Cuicatlán**, 11 km NE of Cuicatlán, 17°32'0"N, 96°57'0"W, 1,400 m, 29 Aug 1980, *González F-1741* (MEXU); San Jerónimo Sosota, El Parian-Las Sedas [San Sebastián Sedas], km 313 - 314 of rail road, 17°23'0"N, 97°0'0"W, 1,500 m, 29 May 1992, *Salinas* 6864 (MEXU); **Mun. San Marcos Arteaga**: 30.5 km SO of Huajuapán de León, 8 km SO of San Marcos Arteaga, road to Tonalá, 17°44'N, 97°56' W, 1,750 m, 10 Feb 1993, *Campos* 5017 (MEXU); **Mun. San Mateo Tlapiltepec**, 4 km NE of La Unión, 17°56'0"

N, 97°21'0"W, 2300 m, 9 Oct. 1970, *Cruz* 2641 (ENCB); **Mun. San Pedro Jaltepetongo**, road from San Pedro Jaltepetongo towards Tomellín, km 6 SE, 17°44'25"N, 96°59'10"W, 1,475 m, 11 Jun 2002, *Medina* 1096 (MEXU); 14.3 km of Tomellín, towards Santa María Texcatitlán, 17°43'06"N, 97°01'27.1"W, 29 Jun 2004, *Téllez* 16063 (FCME); 23 km of Tomellín, towards Santa María Texcatitlán, 17°42'58.4"N, 97°01'28.3"W, *Téllez* 16079 (FCME); **Mun. San Pedro Jocotipac**, Cuicatlán, aprox. 20 mi S, 17°35'0"N, 96°55'0"W, 1,200 m, 23 Aug 1975, *Webster* 20152 (IEB, MEXU); **Mun. Santa María Apazco**, 18°12'57.5"N, 97°38'46.8"W, *Téllez* 16389 (MEXU); **Mun. Santa María Ixcatlán**, towards Santa María Ixcatlán, 5 km S, 20 km O, 17°52'0"N, 97°6'0"W, 15 Sep 1991, *Salinas* 6109 (MEXU); *Tenorio* 17841 (MEXU); **Mun. Santa María Tecomavaca**: Barranca seca, road to Santa María Ixcatlán, 12 km W, 17°56'0"N, 97°3'0"W, 19 Nov. 1991, *Tenorio* 18118 (MEXU); towards Santa María Ixcatlán, 5 km S, 20 km O, 17°52'N, 97°6' W, 15 Sep 1991, *Salinas* 6109 (MEXU); **Mun. Santiago Chazumba**, 4 km NE of Santiago Chazumba, highway Huajuapán de León-Tehuacán, 18°13'0"N, 97°41'0"W, 2,000 m, 22, Mar 1980, *González F-954* (MEXU, TEX); 2 km S limits of Oaxaca and Puebla, highway Huajuapán de León-Tehuacán, 18°13'0"N, 97°41'0"W, 27 Jul 1979, *Chiang F-188* (MEXU); **Mun. Santiago Nacaltepec**, Jayacatlán, north along road towards Nacaltepec, 17°30'9"N, 96°55'11"W, 1,600 m, 4 Nov. 1973, *Breedlove* 35942 (ENCB); **Mun. Santiago Tenango**, Las Hoyas canyon, 17°19'0"N, 96°56'0"W, 1,500 m, 2 Nov. 1894, *Pringlei* 6027 (MEXU); **Mun. San Juan Bautista Suchitepec**, La Loma Pachona, 6 km NE of Guadalupe Cuauhtepic or 1 km E of junction highway to Huajuapán de León-Tehuacán and road to Guadalupe Cuauhtepic; 18°27'0"N, 97°36'0"W, 27 Nov. 1986, *Salinas* 3688 (IEB, XAL); **Mun. Teotitlán del Valle**, 89 km by road S of Teotitlán del Camino, on road to Oaxaca, 17°34'0"N, 96°57'0"W, 1,500 m, 10 Oct. 1983, *Anderson* 12986 (IEB); Flores Magón, 10 km S of Ignacio Mejía, Río Xiquila, Tierra Grande 2 - 3 km E, 18°2'0"N, 97°11'0"W, 850 m, 16 Nov. 1987, *Salinas* 4535 (IEB); Santa María Tecomavaca, 17°51'0"N, 97°8'0"W, *Salinas* 5853 (MEXU); **Mun. Tepelmeme Villa de Morelos**, Tepelmeme Villa de Morelos, 17°55'5"N, 97°19'2.8"W, 2,350 m, 24 Aug 1968, *Cruz* 2131 (ENCB, TEX); 4 km NE of La Unión, 17°56'0"N, 97°21'0"W, 2,300 m, 9 Oct. 1970, *Cruz-Cisneros* 2641 (ENCB, MEXU); **Mun. San Pedro and San Pablo Tequixtepec**, 17 km N of Santiago Miltepec, 48 km NE of Huajuapán de León-Tehuacán, 18°6'0"N, 97°41'0"W, 4 Nov. 1979, *Chiang F-406* (MEXU); **Mun. Valerio Trujano**, 1.8 km S of Tomellín, towards Nochistlán, 17°44'40.2"N, 96°58'10.7"W, 29 Jun 2004, *Téllez* 15974 (FCME). **PUEBLA**: **Mun. Atexcal**, Guadalupe hill, NW of San Martín Atexcal,

18°26'58"N, 97°40'56"W, 1,870 m, 15 Oct. 1984, *Tenorio* 7693 (ENCB, MEXU); **Mun. Atoyatempan**, Tepeyahualco, 9 km SE, Cascadas of Acatzitzimitla, Atoyatempan, 18°45'7"N, 97°53'18"W, 1,890 m, 17 Nov. 1984, *Fernández* 2640 (ENCB, MEXU); **Mun. Caltepec**, La Huerta barranca, NE of Caltepec, 18°10'53"N, 97°28'45"W, 1,890 m, 28 May 1984, *Tenorio* 5938 (MEXU, TEX); El Coatepec hill, SE of Caltepec (Puebla-Caltepec) 18°9'7"N, 97°26'43"W, 2100 m, 11 Aug 1984, *Tenorio* 6815 (TEX); **Mun. San Francisco Chapulapa**, 1.6 km of road on km 25.8, highway Coacnolapan-Oaxaca, 18°37'0.35"N, 97°28'10.9"W, 27 Oct. 2005, *Rosas* 364 (FCME); **Mun. San Antonio Cañada**, 6 km E of San Antonio Cañada, 18°30'0"N, 97°16'0"W, 2,000 m, 20 Jul 1990, *Salinas* 5507 (MEXU); behind cerro Colorado, between San Esteban Nacoxcalco and San Antonio Cañada, along the barranca Los Mangos, 18°30'0"N, 97°18'0"W, 1,000 m, 16 Jul 1961, *Smith* 4079 (MEXU); 8 km N of San Antonio Cañada, 18°31'0"N, 97°16'0"W, 19 May 1986, *Tenorio* 11302 (MEXU); **Mun. Santiago Miahuatlán**, Santiago Miahuatlán, 18°32'54"N, 97°26'18"W, 1400 m, 28 Jul 1987, *Martínez* 21736 (IEB, MEXU); 6 - 7 km SO of San José Axusco, 18°13'0"N, 97°15'0"W, 1,200 m, 18 Aug 1988, *Salinas* 4794 (MEXU); Tlacuilosto barranca, S of San Juan Atzingo, 18°17'0"N, 97°24'0"W, 1,900 m, 22 Jul 1985, *Tenorio* 9440 (MEXU); **Mun. Tehuacán**, Tehuacán, 18°28'0"N, 97°24'0"W, Sep 1911, *Purpus* 1382 (MEXU); 7.9 km from highway Fco. I. Madero-Tehuacán, entrance at Meseta San Lorenzo, 18°26'14.9"N, 97°28'03.1"W, *Téllez* 19563 (MEXU); Santiago Acatepec, 18°13'36"N, 97°34'42"W, 2,120 m, 3 Jul 1984, *Tenorio* 6649 (IEB, MEXU); Santiago Acatepec, 18°13'36"N, 97°34'42"W, 2,000 m, 25 Jul 1978, *Ventura* 15399 (ENCB, IEB, MEXU); **Mun. Tepeji de Rodríguez**, 2 km SO of Tepeji de Rodríguez, 6 Jan 1981, *González-Medrano BC-68* (FCME); 12 km W of Molcaxac, 5 Apr 1882, *González-Medrano* 12367 (MEXU); **Mun. Tepeyahualco**, 9 km SE, Cascadas de Acatzitzimitla, Atoyatempan, 18°45'7"N, 97°56'18"W, 17 Nov. 1984, *Fernández* 2640 (IEB); **Mun. Vicente Guerrero**, 8 km N of San Antonio Cañada, 18°33'0"N, 97°16'12"W, 2,030 m, 19 May 1986, *Tenorio* 11302 (MEXU); **Mun. Zapotitlán**, 4 km NE of Santiago Acatepec, highway Huajuapán de León-Tehuacán, 18°15' 0"N, 97°33'0"W, 5 Sep 1979, *Chiang F-432* (MEXU); 8 km NE of Santiago Acatepec, 18°16'0"N, 97°33'0"W, 16 May 1981, *Chiang F-1973* (MEXU); 4 km E of San Francisco Xochiltepec, 18°15'0"N, 97°25'0"W, 2,120 m, 30 Jul 1983, *Chiang F-2402* (MEXU, TEX); Zapotitlán de Las Salinas, 18°20'0"N, 97°27'0"W, 27 Oct. 1960, *Gómez-Pompa* 361 (MEXU); km 79, on road from Coyotepec to Acatlán, 18°19'39.6"N, 97°49'27.8"W, 1,697 m, 3 Jul 2003, *Vega & Jiménez s.n.*, 2, 3 (FCME).

#### 4. Conclusion

The genus *Pterostemon* Schauer is included into the Iteaceae, a paleo-endemic family restricted to Mexico. It comprises three species of woody shrubs or small trees in arid and semi-arid regions. *Pterostemon bravoanus* is distinguished by presenting leaves with elliptic to orbicular lamina, inflorescences with more than 50 flowers, petals erect at anthesis, pollen spheroidal, and their distribution is restricted to the state of Guerrero; *P. mexicanus* has leaves with obovate to widely-obovate lamina, inflorescences with fewer than 20 flowers, petals extended at anthesis, pollen prolate, and distribution in the states of Guanajuato, Queretaro, Hidalgo, San Luis Potosí, and Puebla; *P. rotundifolius* has leaves with sub-orbicular to oblong-orbicular lamina, inflorescences with 2 - 50 flowers, petals reflexed at anthesis, pollen spheroidal, and is restricted in distribution to the states of Oaxaca and Puebla. In all three species the fruit is an indehiscent capsule with a solitary seed.

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