

## CAREX SECTION POROCYSTIS (CYPERACEAE) IN MEXICO AND CENTRAL AMERICA

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**ABSTRACT.** *Carex* section *Porocystis* is a small, mostly New World section. Two species have long been known from Mexico and Guatemala; one, *C. complanata*, disjunct from the southeastern United States, and another, *C. boliviensis*, disjunct from Andean South America. Study of numerous recent collections disclosed that *C. complanata* in Mexico and Guatemala is represented by an endemic subspecies, subsp. *tropicalis*, differing from temperate North American subsp. *complanata* in its broader pistillate and staminate scales, and generally shorter awned pistillate scales. *Carex boliviensis* is represented in Mexico by two geographically separated subspecies: subsp. *boliviensis* of the Transvolcanic Belt and the Eastern Cordillera in central Mexico, and the more northern and western subsp. *occidentalis*. The latter is larger than subsp. *boliviensis*, has longer inflorescences, and especially longer terminal spikes with longer staminate portions. *Carex angustispica*, a localized endemic with blunt, broad, pistillate scales, short achenes, and narrow spikes is newly described. It occurs in subalpine habitats in the state of Oaxaca and is related to *C. complanata*.

### INTRODUCTION

*Carex* sect. *Porocystis* Dumort. (subg. *Carex*) is a small, primarily North American section of loosely to densely cespitose, small species, with the sheaths and sometimes also the leaves, culms, and perigynia pubescent. The inflorescences have essentially sheathless bracts, leaf-like or not, and densely flowered spikes with the terminal spike usually gynaeandrous or uncommonly staminate. The perigynia are beakless or very short-beaked with an essentially entire orifice. Eight species, *C. bushii*, *C. caroliniana*, *C. complanata*, *C. hirsutella*, *C. pallescens*, *C. swanii*, *C. torreyi*, and *C. virescens*, occur in North America, north of Mexico. One of these, *C. pallescens*, also occurs in Eurasia. Two species, *C. boliviensis* and *C. tovarensis*, occur in South America (Reznicek & Wheeler 1993).

Since Hermann's (1974) study of *Carex* in Mexico and Central America, a great deal of new material has accumulated, enough to allow a thorough systematic analysis of sect. *Porocystis* as it occurs in Mexico. Hermann recognized two Mexican species in sect. *Porocystis* (under sect. *Virescentes*). The primarily South American *C. boliviensis* was recorded from Durango, Guerrero, Puebla, and the Valley of Mexico. The southeastern North American *C. complanata* was recorded from Chiapas, the first record of this species from the tropics. We describe here a third, *C. angustispicata*, from Oaxaca. The following key separates all Mexican members of sect. *Porocystis* and *C. complanata* subsp. *complanata* from the southeastern United States.



1. Larger perigynia 2.5–4.1 (–4.6) mm long, widest at 1.4–2.3 mm below apex; pistillate scales obtuse to acute, rarely with a minute mucro to 0.1 mm long; culms more or less flexuous, 0.2–0.65 (–0.85) mm wide ca. 1 cm below the inflorescence; plants loosely cespitose, rhizomes ca. (0.3–) 0.5–2 (–4) cm long between shoots; lateral spikes pistillate or gynaeandrous.
2. Longest terminal spikes 8–17 mm long, the staminate portion usually less than half the length of the spike; the lowest bract often shorter than or about equaling the inflorescence, rarely longer; inflorescences 1.1–2.6 (–3.2) cm long.
 

*C. boliviensis* subsp. *boliviensis*.
2. Longest terminal spikes 15–30 mm long, the staminate portion often half the length of the spike or longer; the lowest bract often longer than the inflorescence; longest inflorescences 2.5–6.1 cm long.
 

*C. boliviensis* subsp. *occidentalis*.
1. Larger perigynia 2.1–2.8 mm long, widest at 1.1–1.5 mm below apex; pistillate scales obtuse to acuminate, often minutely cuspidate or short-awned; culms stiff, straight or arched, (0.4–) 0.5–1.2 mm wide ca. 1 cm below the inflorescence; plants densely cespitose, rhizomes rarely more than 0.5 cm long between shoots; lateral spikes pistillate.
3. Pistillate scales 1.2–1.6 times as long as wide, obtuse to acute, sometimes minutely cuspidate; achenes 1.4–1.8 mm long; pistillate portion of terminal spikes 2.8–5.1 mm wide.
 

*C. angustispica*.
3. Pistillate scales 1.6–3.3 times as long as wide, obtuse to acuminate-awned, at least some scales with an awn 0.1–0.9 mm long; achenes 1.7–2.2 mm long; pistillate portions of terminal spikes (4.4–) 4.8–7.3 mm wide.
4. Scales from the middle of the staminate portion of the terminal spikes 1.8–2.9 (–3.1) times as long as wide, (1–) 1.2–1.6 (–1.8) mm wide; scales from the middle of the pistillate portions of the spikes 1.3–2.5 times as long as wide, the longest awns 0.1–0.5 (–0.8) mm long.
 

*C. complanata* subsp. *tropicalis*.
4. Scales from the middle of the staminate portion of the terminal spikes (2.2–) 2.7–5 times as long as wide, 0.9–1.5 mm wide; scales from the middle of the pistillate portions of the spikes (1.9–) 2.3–3.3 times as long as wide, the longest awns 0.3–0.9 mm long.
 

*C. complanata* subsp. *complanata*.

### CAREX BOLIVIENSIS

*Carex boliviensis* consists of two geographically separated entities differing consistently by several overlapping characters. Plants from the Transvolcanic Belt, and the Eastern Cordillera in central Mexico, have the inflorescences 1.1–2.6 (–3.2) cm long with terminal spikes (6–) 8–17 mm long, the staminate portion usually less than half the length of the spike, and the lowest inflorescence bracts shorter than or about equaling the inflorescence (rarely longer). These plants appear to be essentially identical with those from the South American range of the species. Plants of the Western Cordillera from Chihuahua south to Guerrero have the inflorescences (1–) 2.5–6.1 cm long with terminal spikes (9–) 15–30 mm long, the staminate portion often half the length of the spike or longer, and the lowest bracts often longer than the inflorescence (Fig. 1).

In addition, *C. boliviensis* in the Western Cordillera also differs from those elsewhere in being a generally larger and more robust plant that can have longer culms (up to 87 cm), which are more scabrous- or ciliate-angled. The culms are also sometimes more erect and less flexuous. The perigynia, scales, achenes, and anthers also tend to be longer, and the basal sheaths are often purple or purple-tinged to a greater extent than is typical for *C. boliviensis*. All the characters separating these two entities, however, overlap to a greater or lesser degree, and recognition of these two entities as geographical subspecies seems most appropriate, although robust plants from the Western Cordillera are quite strikingly different.



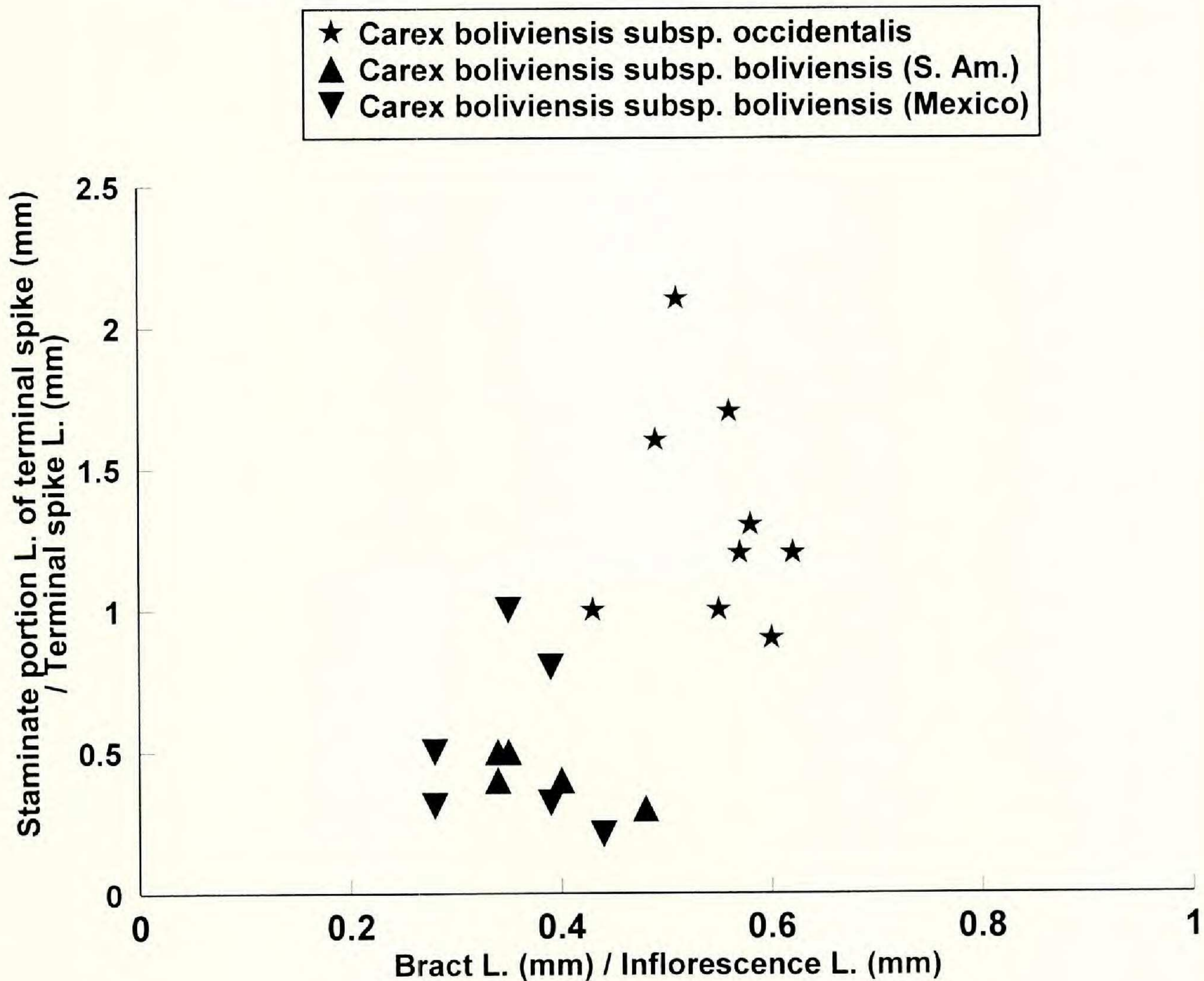


FIG. 1. *Carex boliviensis*. Bract length (mm)/inflorescence length (mm) versus length of the staminate portion of the terminal spike (mm)/terminal spike length (mm).

***Carex boliviensis*** Van Heurck & Muell.-Arg., *Observ. Bot.* 1: 32. 1870.—TYPE: BOLIVIA. [La Paz:] Prov. Larecaja prope Sorata, *Mandon 1428* (holotype: AWH?; isotypes: GH! MICH! NY! P! US!).

Loosely cespitose from hard, ascendent, branched rhizomes, the rhizomes ca. (0.3–) 0.5–2 (–4) cm long between shoots; fertile culms (3–) 8–87 cm long, at maturity erect, decumbent, or prostrate, usually much longer than the leaves, wiry and flexuous or not so, trigonous, 0.2–0.65 (–0.85) mm wide ca. 1 cm below the inflorescence, the angles acute, prominent, scabrous to ciliate; bladeless basal sheaths yellowish brown to red or dark purple, soon ruptured and fibrillous. Leaves 5–10, mostly on the lower 1/3 to 1/8 of the culms, occasionally one present a few centimeters below the inflorescence; blades 3.5–25 cm long, 0.8–3.8 mm wide, flat to conduplicate, pubescent basally or almost glabrous, scabrous to ciliate on margins and occasionally on the main veins; leaf sheaths 1–15 cm long, tight, dorsally pubescent or glabrous, green, the inner band membranaceous, pubescent to nearly glabrous, stramineous to pale brown, sometimes red- or brown-dotted, hyaline and easily ruptured, concave to truncate, ciliate at apex; ligules rounded to acute, 0.6–3.7 (–4.6) mm long, the free portion ciliate, 0.1–0.3 (–0.4) mm wide, whitish to brownish. Inflorescences (1–) 2.5–6.1 cm long, spikes (1–) 2–4, overlapping or the



lowermost separated up to 3 cm, single at nodes, sessile or the lowermost sometimes on a filiform peduncle up to 12 mm long; a single pistillate spike is occasionally present on a filiform (0.2 mm wide) ciliate basal culm; the lowest bracts  $\pm$  scalelike to filiform-triangular to foliaceous, scabrous distally, 0.25–8.5 cm long, 0.1–1.6 mm wide, shorter or longer than the inflorescence, sheathless or with a sheath 1–5 mm long, the upper bracts reduced, scalelike and sometimes awned; terminal spike gynaeandrous, (6–) 8–30 mm long, with an ovoid to cylindrical distal pistillate portion 4.5–16 mm long and 3.5–6 mm wide, 6–45-flowered, the staminate portion 2–22 mm long, 1.5–2.5 mm wide, 3–45-flowered, cylindric-obconic to turbinate; lateral spikes pistillate or gynaeandrous, 5–15 mm long, 3.5–6 mm wide, ovoid to cylindrical, with 6 to 35 (–50) perigynia. Pistillate scales 1.7–3.4 mm long, 1.1–2 (–2.2) mm wide, 1.2–2.2 times as long as wide, ovate to ovate-lanceolate, obtuse to acute, rarely with a minute mucro to 0.1 mm long, glabrous (rarely minutely scabrous), stramineous to brown or purple with a green or stramineous 3-nerved center and usually with narrow hyaline margins and apex; staminate scales 2.7–4.8 mm long, 1.2–2.3 mm wide, 1.7–3.2 times as long as wide, lanceolate to obovate, acute, stramineous to brown or purple with a green or stramineous 3-nerved center and narrow hyaline margins, glabrous or sparsely pubescent. Perigynia 2.2–4.1 (–4.6) mm long, 1.4–1.75 mm wide, widest at 1.4–2.3 mm below apex, ascending, trigonous to flattened-triangular with elliptic to rhombic-ovate sides, glabrous, firm-membranous, scarcely inflated, green to pale brown, sometimes red-dotted, faintly 6–16-nerved or with some nerves prominent, conically tapered to a truncate, entire, minutely erose, or emarginate apex; beak absent. Achenes 1.6–2.6 mm long, 1.1–1.5 mm wide, trigonous, ovoid, ellipsoid, or obovoid, brown with paler, yellowish angles, minutely punctulate, pedicellate and apiculate. Style straight, withering; stigmas 3. Anthers 3, 1.4–2.3 mm long.

***Carex boliviensis* var. *boliviensis*.**

*Carex galbana* L. H. Bailey, Bot. Gaz. (Crawfordsville) 25: 271. 1898.—TYPE: MEXICO. México: Sierra de las Cruces, 13 Aug 1896, *Pringle 7083* (holotype: BH!; isotypes: ENCB! MEXU-2! US! VT!).

Culms 3–64 cm tall, wiry, flexuous, decumbent or prostrate, 0.2–0.5 (–0.75) mm wide at ca. 1 cm below the inflorescence, finely scabrous-angled; bladeless basal sheaths yellowish brown or only little red-tinged. Inflorescences 1.1–2.6 (–3.2) mm long, the lowest bracts little more than an awned scale to filiform-triangular, 0.25–3 cm long, usually shorter than to equaling the inflorescence; terminal spikes (6–) 8–17 mm long, the staminate portion 1–4.5 mm long, usually less than half the length of the spike. Pistillate scales 1.8–2.3 mm long; staminate scales 2.7–3.1 (–3.7) mm long. Perigynia 2.2–3.2 (–3.4) mm long. Achenes 1.6–2.2 mm long. Anthers 1.4–2.1 mm long.

*Carex boliviensis* var. *boliviensis* is known from central and southern Mexico, and in South America from Peru south to northern Argentina. In Mexico it occurs in alpine to subalpine sites, usually in swampy areas and along streambanks, but sometimes in drier meadows between 2700 and 3940 m (Fig. 3). In South America it grows at elevations up to 4100 m. Fruiting occurs from June to October.

REPRESENTATIVE SPECIMENS. **Mexico.** DISTRITO FEDERAL: Puerto de Las Cruces, Deleg. Cuajimalpa, 24 Jun 1973, *S. González 999* (ENCB); Sierra de Las Cruces, 13 Aug 1896, *C. G. Pringle 7088* (MEXU); Llano de La Cieneguilla, cerca del Cerro de La Palma, Sierra de Las Cruces, 9 Jul 1967, *J. Rzedowski 23873* (ENCB); Puerto de Las Cruces, Deleg. Cuajimalpa, 24 Jun 1973, *J. Rzedowski*



30808-a (ENCB), 20 Jul 1980, *J. Rzedowski 36725* (ENCB).—HIDALGO: Cerro de Las Ventanas, al N de Pachuca, 14 Aug 1963, *J. Rzedowski 17032-a* (ENCB).—MÉXICO: Mpio. Ixtapaluca, 8 km S of Río Frío along main road from hwy to Estación Experimental Zoquiapan, 3100–3200 m, 8 Oct 1983, *W. R. Anderson et al. 12949* (ENCB, MEXU, MICH); Mpio. de Chalco, Llano de Aculco, 10 km al SW de Río Frío, 15 Aug 1972, *J. Rzedowski 29130* (ENCB); Villa Alpina, Naucalpan, 2 Jul 1978, *J. Rzedowski 35695* (ENCB), 1 Jul 1979, *J. Rzedowski 36154* (ENCB); Mpio. de Iturbide, cerca de la Presa Iturbide, 8 Jun 1980, *J. Rzedowski 36675* (ENCB); Mpio. de Tlalmanalco, La Ciénega, región de la cabeza del Ixtaccíhuatl, 18 Jul 1982, *J. Rzedowski 37861* (ENCB); 3.2 road km N of Paso de Cortés, S slope of Volcán Ixtaccíhuatl, 12,500 ft, 21 Aug 2000, *P. F. Zika 15389* (MICH).—MICHOACÁN: Mpio. de Zinapécuaro, base del Cerro del Gallo, cerca del yacimiento de caolín, 13 Jul 1989, *M. J. Jasso 1116* (IEB); Mpio. Santa Clara del Cobre, La Laguna, cerca de San Gregorio, 2700 m, 7 Jul 1985, *J. Rzedowski 38747* (IEB); Mpio. de Santa Clara del Cobre, La Lagunita, cerca de San Gregorio, 2700 m, 21 Jul 1987, *J. Rzedowski 43817* (CIIDIR, ENCB, IEB).—OAXACA: Mpio. Comaltepec, near Cerro Pelón, along Hwy 175 (Tuxtepec-Oaxaca Hwy), 17°34'23"N, 96°30'20"W, 2930 m, 16 Jul 1997, *S. González & A. A. Reznicek 10532* (CIIDIR, IEB, MICH).—PUEBLA: Iztaccíhuatl, south side of mtn, 3940 m, 31 Jul 1958, *J. H. Beaman 1979* (GH).

**Carex boliviensis** subsp. **occidentalis** Reznicek & S. González, subsp. nov.—TYPE: MEXICO. Durango: Mpio. Durango, aprox. 61 km al S de Durango, por el camino a La Flor, 2670 m, 13 Jul 1990, *S. González 4461* con *A. García y S. Acevedo* (holotype: CIIDIR!; isotypes: IEB! MEXU! MICH!).

Habitu *Carex boliviensis* subsp. *boliviensis* similis, inflorescentiis, spicis terminalibus, basibus staminatis spicarum terminalium longioribus differt.

Culms 35–87 cm tall, somewhat wiry and flexuous or not, erect, arching or ± decumbent, 0.2–0.65 (–0.85) mm wide at ca. 1 cm below the inflorescence, prominently scabrous- or ciliate-angled; bladeless basal sheaths brown to red or dark purple. Inflorescences (1–) 2.5–6.1 mm long, the lowest bracts often foliaceous, 1–8.5 cm long, shorter or often longer than the inflorescence; terminal spikes (9–) 15–30 mm long, the staminate portion 3–22 mm long, often more than half the length of the spike. Pistillate scales 1.8–3.4 mm long; staminate scales 3–4.8 mm long. Perigynia 3–4.1 (–4.6) mm long. Achenes 2–2.6 mm long. Anthers 1.7–2.3 mm long.

*Carex boliviensis* var. *occidentalis* is common, sometimes abundant, in marshy areas in openings in pine or pine-oak forest of the Sierra Madre Occidental in Chihuahua, Durango, Jalisco, and Guerrero from (2000–) 2500–3200 m (Fig. 3).

This subspecies seems to be most frequent in Durango, where it is a very prevalent component of marshy montane meadows, often forming extensive colonies. A collection from southern Durango (*S. González 2368*) is especially robust, with erect culms 0.6–0.85 mm wide.

REPRESENTATIVE SPECIMENS. **Mexico.** CHIHUAHUA: Mpio. Bocoyna, ca. 2–3 mi N of San Juanito road to El Alamito-San Pedro, 2300 m, 2 Aug 1977, *R. Bye & W.A. Weber 7844* (SD).—DURANGO: Mpio. Pueblo Nuevo, 7 km W de El Salto, 21 Aug 1981, *S. González 1911* (CIIDIR; duplicates to be distributed); Mpio. El Mezquital, 22 km al NE de Los Charcos, 1 Nov 1982, *S. González 2368* (CIIDIR; duplicates to be distributed); Mpio. Durango, entrada al predio Las Bayas (UJED), 93 km al S de Durango, 2700 m, 13 Jul 1990, *S. González 4491* (CIIDIR, MICH); Mpio. Durango, Cerro La Gruya, predio Las Bayas, al S de Durango, 15 Jul 1990, *S. González 4543* (CIIDIR); aprox. 10 km de Los Charcos, por el camino a Santa María Ocotán, 2630 m, 18 Jun 1992, *S. González 5155* (CIIDIR, IEB, MEXU, MICH); Mpio. El Mezquital, aprox. 16 km de La Ventana, camino Los Charcos–Santa María Ocotán, 18 Jun 1992, *S. González 5163* (CIIDIR, MICH); 1 km al S de Buenos Aires, cerca de la carretera Durango–Mazatlán, en sitio inundable, 23°42'15"N, 105°43'26"W, 19 Aug 1999, *S. González 6179* (CIIDIR, ENCB, IEB, MEXU, MICH); Mpio. Pueblo Nuevo, Km 134 carretera Durango–Mazatlán, 3 Nov 1990, *S. González & M. González 4880* (CIIDIR); El Salto, Aserraderos, Sierra Madre Occidental, 2530–2540 m, 28 Aug 1934, *F. W. Pennell 18368* (MEXU, PH, US); Mpio. El Salto, Sierra Madre Occidental, 3.2 mi E of La Cuidad along Hwy 40 (near 23°44'N, 105°40'W), 2600 m, 19 Aug



1988, A. C. Sanders 8135 (VDB).—GUERRERO: Distr. Mina, Teotepec, 3200 m 17 Jul 1939, G. B. Hinton 14460 (ENCB, LL, MICH, NY).—JALISCO: Mpio. Autlán, camino en el file de la vaca, por el límite W de la propiedad, Las Joyas, Autlán, 19°35'37"N, 104°16'38"W, 2040 m, 28 Jul 1985, A. Vásquez 3452 (ZEA).

### CAREX COMPLANATA

*Carex complanata*, as it occurs in Chiapas and Guatemala, differs from material from the southeastern United States in a few subtle features. Though the ranges are fairly similar, there is a strong tendency for the awns of the pistillate scales, especially of those in the middle portions of the spikes, to be shorter, giving the spikes a somewhat less "bristly" appearance as compared with plants from the southeastern United States. Tropical plants have awns 0.1–0.5 (–0.8) mm long, and plants from the southeastern United States have awns mostly 0.3–0.9 mm long. Also, both the pistillate and staminate scales have a strong tendency to be broader in the tropical plants. Scales from the middle of the pistillate portion of the spikes are 1.6–2.5 times as long as wide in the tropical plants and (1.9–) 2.3–3.3 times as long as wide in temperate plants. Scales from the middle of the staminate portion of the terminal spikes are (1–) 1.2–1.6 (–1.8) mm wide and 1.8–2.9 (–3.1) times as long as wide in the tropical plants versus 0.9–1.5 mm wide and (2.2–) 2.7–5 times as long as wide in temperate plants. These features are both subtle and show some degree of overlap (Fig. 2), but taken in combination allow almost all plants to be recognized without recourse to geography. Although only subtly different, the distinctions nevertheless suggest that the occurrence of *C. complanata* in southern Mexico and Guatemala is not the result of a very recent introduction. We describe the tropical entity as a geographically isolated subspecies, *C. complanata* subsp. *tropicalis*.

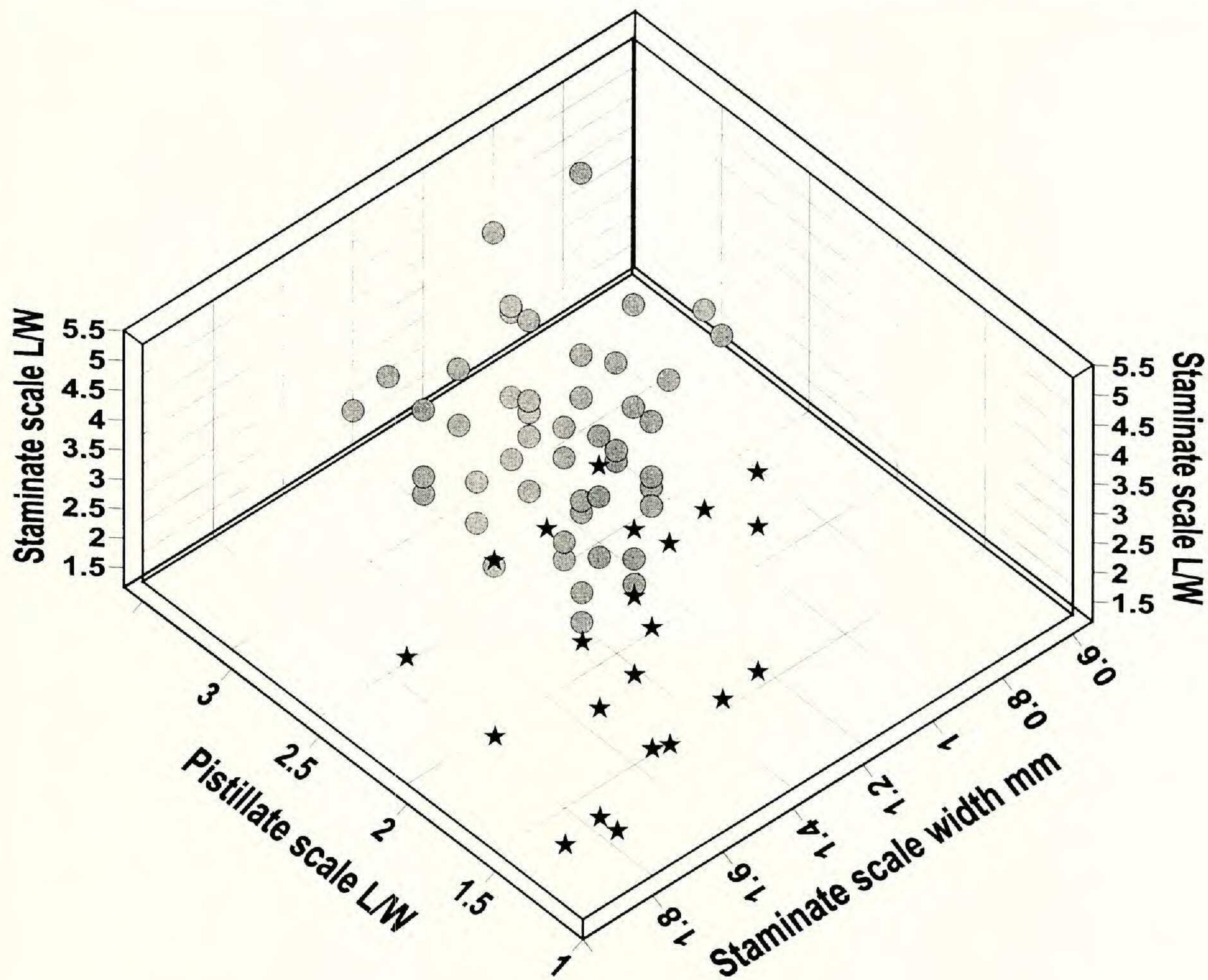
A relative of *C. complanata* in North America, *C. hirsutella*, is also sometimes recognized at infraspecific rank as *C. complanata* var. *hirsuta* (Gleason & Cronquist 1991). It differs consistently in its much more pubescent foliage and is here viewed as a separate species. Some authors, e.g., Correll and Johnston (1970), have suggested that *C. complanata* should also include *C. bushii* and *C. caroliniana*, but this view has not gained acceptance, and we recognize *C. complanata* in the restricted sense of Mackenzie (1935).

**Carex complanata** subsp. **tropicalis** Reznicek & S. González, subsp. nov.—  
TYPE: MEXICO. Chiapas: Mpio. Larrainzar, along road between San Andrés Larrainzar and Puerto Cato, 16°55'04"N, 92°45'34"W, 12 Jul 1997, S. González & Reznicek 10515, M. González, M. Pinedo (holotype MICH!; isotypes: CIIDIR!, others to be distributed).

Habitu Carici complanatae subsp. complanatae similis, squamis pistillatis staminatis latioribus, aristis brevioribus differt.

Densely cespitose from hard rhizomes rarely more than 0.5 cm long between shoots, forming small to large clumps; fertile culms (20–) 35–86 cm long, stiff, erect to spreading, trigonous, 0.45–1.1 mm wide ca. 1 cm below the inflorescence, the angles acute, prominent, smooth or minutely scabrous; bladeless basal sheaths dark purple or purple-tinged, becoming ruptured and somewhat fibrillous. Leaves 5–10, on the lower 1/4 of the culms; blades 15–38 cm long, 1.5–3.5 (–4) mm wide, flat, rarely conduplicate, nearly glabrous or scabrous to short-pilose distally and at





● *Carex complanata* subsp. *complanata*    ★ *Carex complanata* subsp. *tropicalis*

FIG. 2. *Carex complanata*. Staminate scale width (mm) versus pistillate scale l/w versus staminate scale l/w

the lower parts; leaf sheaths 2.5–16 cm long, tight, pale-green, dorsally glabrous or very sparsely short-pilose, the inner band whitish or pale-brown, short-pilose to hirsute, paler, sometimes red-dotted, membranous, hyaline and easily ruptured, the apex truncate to concave, ciliate; ligules shorter than wide, 0.5–1.4 mm long, the free portion 0.3–0.5 mm wide, ciliate, whitish to brownish or reddish. Inflorescences 1–2.9 cm long, spikes 2–5, overlapping, single at nodes, sessile or nearly so; bracts the lowest bracts 0.8–8.8 cm long, 0.4–2.2 mm wide, usually exceeding the terminal spike, sheathless or with a sheath up to 2.5 mm long, the upper bracts much reduced, setiform; terminal spike gynaeandrous with an ovoid to ovoid-cylindrical pistillate portion 5–13 mm long and (4.4–) 4.8–7.3 mm broad, the staminate portion 3–7 mm long, short-obconic; lateral spikes pistillate, ovoid to cylindrical, 4–14 mm long, 4.3–6 mm wide, sessile or very short-peduncled, with 7 to 70 perigynia. Pistillate scales (1.4–) 1.6–2.8 (–3.3) mm long, 1–1.5 mm wide, 1.3–2.5 times as long as wide, ovate, narrower and shorter than or more or less equaling the perigynia, obtuse to acuminate, often short-awned or minutely cuspidate, the longest awns 0.1–0.5 (–0.8) mm long, the lower more strongly acuminate than the upper, glabrous, stramineous hyaline to brownish hyaline with a green, stramineous or pale brown 3-nerved center, the center smooth or sparsely and minutely scabrous; staminate scales 2.3–4 (–4.6) mm long, 1–1.8 (–2) mm wide, 1.8–3.1 times as long as wide, ovate, acute to acuminate, stramineous to brownish hyaline



with a green, stramineous, or pale brown 3–5-nerved center. Perigynia 2–2.8 mm long, 1.2–1.9 mm wide, widest at 1–1.5 mm below apex, ascending, triangular to flattened-triangular or unequally biconvex, obovoid, glabrous (rarely minutely scabrous on the angles), firm-membranous, not inflated, olive-brown to brown, 2-ribbed, with several weak nerves that are inconspicuous at full maturity, the perigynia tapering to the base and to the apex, beakless, with a nearly entire, inconspicuous orifice. Achenes 1.7–2.2 mm long, 1.2–1.5 mm wide, trigonous, obovoid to ovoid, yellowish to brown, punctulate, sessile to short-pedicellate, bent-apiculate. Style withering; stigmas 3. Anthers 3, 1.5–1.9 mm long.

*Carex complanata* subsp. *tropicalis* is found in Chiapas and Guatemala (Fig. 3) in moist, shrubby openings and on steep slopes of mesophytic pine-oak forests from 1600 to 2800 m. Flowering and fruiting occur all year long. Subspecies *tropicalis* appears to be a plant of successional openings. It forms robust, spreading clumps with many culms in recent clearings and other disturbed open areas. In denser or shadier sites, it occurs as smaller clumps with few, lax culms, sometimes erect or leaning on other vegetation.

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** CHIAPAS: 2 km N of Jitotol on road to Pichucalco, 1620 m, 20 Oct 1983 *W. R. Anderson et al. 13243* (MICH); Mpio. Tenajapa, near crest of ridge in the paraje of Banabil, 9100 ft, 10 Oct 1965, *D. E. Breedlove 12943* (MICH); Mpio. La Independencia, 6–10 km NNE of La Soledad along logging road from Las Margaritas to Campo Alegre, 1600 m, 30 Sept 1981, *D. E. Breedlove 53191* (ENCB); Mpio. Jitotol, 10 km N of Jitotol near Río Hondo, 8 Nov 1981, *D. E. Breedlove 55135* (ENCB, NY); Mpio. Jitotol, near Colonia El Laurel, ca. 5 km N of Jitotol, 1600 m, 13 Nov 1984, *G. Davidse et al. 29623* (MICH, MO); Mpio. Tenejapa, ca. 1 km S of Tenejapa (Km 26.7) along road to San Cristóbal de Las Casas, 16°49'03"N, 92°30'08"W, 10 Jul 1997, *S. González & Reznicek 10469* (CAS, CIIDIR, IEB, MICH, MO); Mpio. Tenejapa, near Colonia Ach'lum, 16°46'50"N, 92°26'55"W, 11 Jul 1997, *S. González & Reznicek 10493* (CIIDIR, MICH); 10 km SE of Jitotol on road to Bochil, 5600 ft, 25 Jan 1965, *P. H. Raven 20059* (MICH); Mpio. Pueblo Nuevo Solistahuacán, Clínica Yerba Buena, 2 km NW of Pueblo Nuevo Solistahuacán, 5400 ft, 23–24 Jan 1965, *P. H. Raven 19879 & D. E. Breedlove* (MICH); Mpio. Tenajapa, at the Paraje Matsab, 9000 ft, 12 May 1966, *A. S. Ton 943* (F, MICH, MO). **Guatemala.** ALTA VERAPAZ: Sierra de las Minas, 3 km SE of Purulh, 2000 m, 6 Jan 1974, *L. O. Williams et al. 43413* (BM, F, MICH).

### CAREX ANGUSTISPICA

Several recent collections from subalpine habitats in Oaxaca of plants somewhat similar to *C. complanata* consistently differ in a number of features from both *C. complanata* in Chiapas and Guatemala, and representatives from the United States. These Oaxacan collections have very broad pistillate scales, only 1.2–1.6 times as long as wide, which are merely obtuse to acute and lack an awn, having at most a tiny cusp, contrasted with scales 1.6–3.3 times as long as wide with awns 0.1–0.9 mm long in *C. complanata*. Also, achenes are shorter, only 1.4–1.8 mm long, contrasted with achenes 1.7–2.2 mm long in *C. complanata*. The spikes in the subalpine plant are also narrower, with the terminal spikes 2.8–5.1 mm wide versus terminal spikes (4.4–) 4.8–7.3 mm wide in *C. complanata*. The several differences involving inflorescences, scales, and achenes, as well as the distinctive subalpine habitat of this taxon, argue for its recognition at specific rank.

**Carex angustispica** Reznicek & S. González, sp. nov.—TYPE: MEXICO. Oaxaca: Sierra de Juárez, along Hwy 175, 1.5 km by road SW of mirador at Cerro Pelón, 21 Feb 1988, *A. A. Reznicek & S. A. Reznicek 8093* (holotype: MICH!; isotypes: ENCB! GENT! MEXU!).



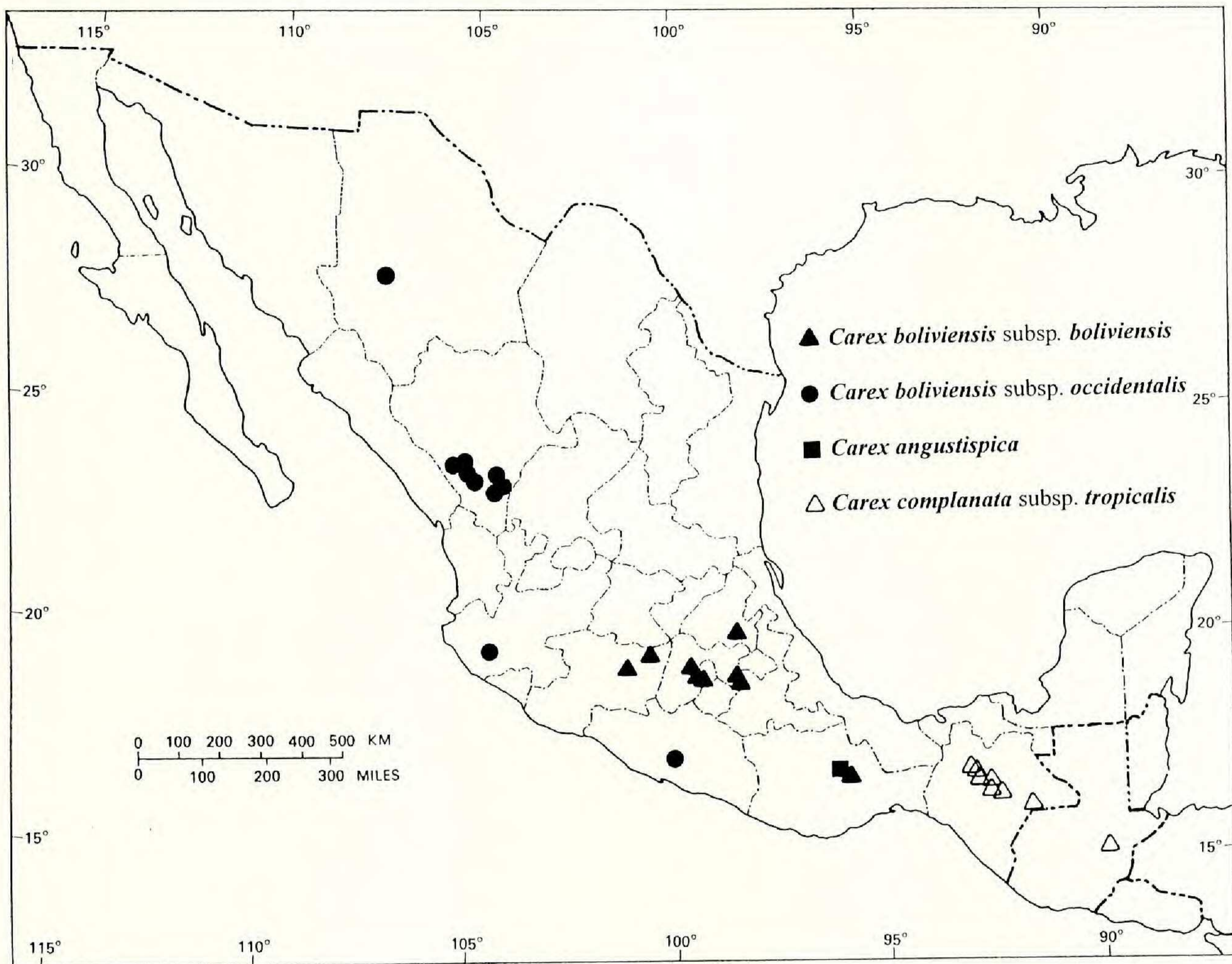


FIG. 3. Distribution of *Carex* sect. *Porocystis* in Mexico and Central America.

Dense cespitosae; culmi (3-) 10-65 cm alti; vaginae basales purpurascentes. Folia 5-10, plerumque basalia; laminae (2.5-) 5-28 cm longae, 1.2-3.6 mm latae; vaginae 0.8-4.5 cm longae, glabrae, ventraliter brevipilosae; ligulae 0.2-1.6 mm longae. Inflorescentiae 0.8-4.5 cm longae; spicae 2-4 (-5), plus minusve erectae; spica terminalis gynaeandra, spicae laterales pistillatae; bracteae infimae laminis 0.5-6 cm longis, 0.4-2.6 mm latis, plerumque evaginatis. Perigynia 2.1-2.8 mm longa, 1.2-1.5 mm lata, ovoidea vel obovoidea, complanato-trigona, ascendencia, viridia vel brunnea, erostrata. Achenium 1.4-1.8 mm longum, 1.1-1.3 mm latum. Styli marcescentes; stigmata 3. Antherae 3, ca. 1.3-1.7 mm longae.

Densely cespitose from hard rhizomes rarely more than 0.5 cm long between shoots, usually scattered in small clumps; fertile culms (3-) 10-65 cm long, erect, stiff, trigonous, 0.4-1.2 mm wide ca. 1 cm below the inflorescence, the angles acute, smooth to minutely scabrous; bladeless basal sheaths reddish purple-tinged, spikes pistillate, ovoid to cylindrical, 4-14.5 mm long, 3-4.8 mm wide, with ca. 5-40 perigynia. Pistillate scales 1.6-2.4 (-2.6) mm long, 1.3-1.7 mm wide, ca. 1.2-1.6 times as long as wide, ovate to broadly ovate, wider and shorter than the perigynia, obtuse to acute, sometimes minutely cuspidate, glabrous, stramineous hyaline to brownish with a green or pale brown 3-nerved center and narrow hyaline margins, the center smooth or sparsely and minutely scabrous; staminate scales 2.8-3.3 mm long, 1.3-1.9 mm wide, ca. 1.7-2.2 times as long as wide, ovate, acute to acuminate, stramineous to brownish with a green or pale brown 3-5-nerved center and narrow hyaline margins. Perigynia 2.1-2.8 mm long, 1.2-1.5 mm wide, widest at 1.1-1.4 mm below apex, ascending, flattened-trigonous, ovoid to obovoid,



glabrous, firm-membranous, not inflated, green to brown, 2-ribbed with ca. 9–14 weak nerves that are inconspicuous at full maturity, the perigynia tapering to the base and to the apex, beakless, with a nearly entire, inconspicuous orifice. Achenes 1.4–1.8 mm long, 1.1–1.3 mm wide, flattened-trigonous, obovoid, yellowish to brown, punctulate, sessile to short-pedicellate, bent-apiculate. Style withering; stigmas 3. Anthers 3, ca. 1.3–1.7 mm long.

*Carex angustispica* occurs in Oaxaca in grassy and sedgy areas among ericaceous shrubs in subalpine habitats or open pine forest on mountain summits and upper slopes at ca. 2800–3000 m. It fruits from late August to February.

This species is smaller in stature than *C. complanata* and sometimes forms a dwarf “turf” in gravelly, sterile openings. The culms tend to be stiffly erect, not spreading to ascending, like those of *C. complanata* subsp. *tropicalis*. *Carex angustispica* presumably grows on acidic soils; it is found on volcanic rock in association with various members of the Ericaceae. *Carex complanata* subsp. *tropicalis* occurs often in areas of limestone soils. Also, it flowers and fruits throughout the year, but *C. angustispica* has been collected in fruit only from August through February.

The vicinity of Cerro Pelón, Oaxaca, is the only area of Mexico where more than one species of sect. *Porocystis* occurs. In addition to *C. angustispica*, *C. boliviensis* subsp. *boliviensis* has been collected there (Fig. 3).

ADDITIONAL SPECIMENS EXAMINED. **Mexico.** OAXACA: 47 km al N de Ixtlán de Juárez, sobre la carretera a Tuxtepec (cerca de Cerro Pelón) [en lugares perturbados, cerca de matorral de Ericáceas], S. González 1014 (ENCB, IEB, MEXU); Cerro del Humo, 9300 ft, 10 Aug 1975, R. O. Lawton 803 (F, MO); along Mex Hwy 175, 30.5 mi NE of Guelatao, 24 Dec 1975, A. A. Reznicek & D. R. Gregory M-319 (MICH); Sierra de Juárez, along Hwy 175, 0.6 km by road SW of mirador at Cerro Pelón, 21 Feb 1988, A. A. Reznicek & S. A. Reznicek 8077 (IEB, MICH), 8080 (CAS, MICH).

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