A REVISION OF THE MEXICAN AND CENTRAL AMERICAN SPECIES OF *CERASTIUM* (CARYOPHYLLACEAE)

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ABSTRACT

Eighteen species of *Cerastium* are known to occur in Mexico and Central America, including 16 native and two alien species. The limits of these species are described and their taxonomy is revised. Three species are newly described.

Key Words: *Cerastium,* Caryophyllaceae, Mexico, Central America, systematics, taxonomy

INTRODUCTION

Cerastium, known commonly as "mouse-eared chickweed", is of virtually worldwide distribution with its center of diversity in Eurasia. The number of species included varies (Pax and Hoffmann, 1934; Lawrence, 1951; Willis, 1973). The genus is represented in Mexico and Central America by 18 species, all but two of which are native.

While the taxonomy and relationships within *Cerastium* are not well understood anywhere, this situation is particularly true in Latin America. It was in order to improve the understanding and facilitate the identification of species in Latin America that this study was conducted. In looking for diagnostic characters, only externally visible characters were used. Neither cytological nor biochemical characters were investigated; work in these areas may further improve the systematics of *Cerastium.*

Since only morphological features were available for analysis, the species concept employed is necessarily typological. I have tried to be conservative in assigning taxonomy. Hence, in such variable species as *Cerastium nutans* and *C. sinaloense,* I have not tried to give specific or varietal status to forms which may warrant it but for which insufficient material is available.

Cerastium is in many ways a difficult genus. Species are often poorly delimited, resulting in the publication of many names which have since been reduced to synonymy. Relationships among species

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have also been poorly understood. Pax and Hoffmann (1934) described a system of subgeneric classification based primarily on style number and capsule morphology, and included the Mexican and Central American species in their subgenus *Cerastium*. While they listed none of these species in their discussion of sections, it is clear from character descriptions that all of them, with the possible exceptions of *C. sinaloense, C. sordidum,* and *C. texanum,* belong to the section *Orthodon.* Robinson (1894) included *C. texanum* in the section *Strephodon* (*C. sinaloense* and *C. sordidum* were as yet undescribed), but the presence of revolute capsule teeth makes this inclusion unlikely since Pax and Hoffmann (1934) stated that its members never have this character.

The literature concerning Mexican and Central American species of *Cerastium* consists primarily of lists of species collected on a single expedition, by a particular collector on several expeditions, or by several collectors from a single region (Schlechtendal and Chamisso, 1830; Presl, 1831; Schlechtendal, 1838; Schultz, 1862; Hemsley, 1878; Britton, 1888; Watson, 1888; Sessé and Mociño, 1894; Robinson, 1900, 1904; Greenman, 1904; Briquet, 1911; Standley, 1937; Standley and Steyermark, 1940, 1944). More recently floras have appeared, some of which treat species of *Cerastium.* These include Sanchez S. (1968) and Beaman (1979) for the Valley of Mexico, Shreve and Wiggins (1964) for the deserts of Sonora and Baja California, Standley (1937) for Costa Rica, and Standley and Steyermark (1946) for Guatemala.

CHROMOSOME VARIATION IN *CERASTIUM*

Published chromosome counts for species of *Cerastium* range from $2n = 34$ to $2n = 180$. By far the majority of these are multiples of $n = 18$ ($2n = 36$, 54, 72, 90, 108, 126, 144, 162, and 180). Brett (1952) stated that $2n = 36$ is probably tetraploid, although $2n = 18$ is unknown, and she concluded that, for the section *Orthodon,* the basic chromosome number is probably $n = 9$. She also stated that the species in the section *Strephodon* are mostly $2n = 38$ or multiples thereof and that the basic number for these is probably $n = 19$. Many of the species from Mexico and Central America seem to be $2n = 34$ (Beaman et al., 1962), but she made no mention of any of these.

Known chromosome numbers for the Mexican and Central American species are listed following the individual species descriptions below. The native species can readily be separated into two groups, those with $2n = 34$ and those with $2n = 36$. Some question arises as to the position of *Cerastium nutans* in this scheme since Söllner (1952, 1954) listed the chromosome number as $2n = 35–36$, while Beaman et al. (1962) counted $2n = 34$ for a *Cerastium* sp. which, upon further examination of the voucher specimen, turned out to be *C. nutans*. Söllner, however, did not use Mexican material for his count and it is possible that the species is geographically variable in chromosome number.

Beaman et al. (1962) published the only chromosome counts for several of the Mexican and Central American species of *Cerastium*. After study of the voucher specimens for these counts, it has become apparent that some revisions of their determinations are in order. *Beaman 3745* and *Beaman 3896*, recorded as *C. brachypodum*, are specimens of what is here recognized as *C. cuchumatanense*. *Beaman 3436* and *Beaman 3508*, reported as *C. orithales*, are *C. ramigerum*. *Beaman 3711*, listed as *Cerastium* sp., is *C. nutans*.

KEY TO THE SPECIES

1. Capsules straight, teeth revolute; rosette leaves absent, lower leaves large, crowded and broadly spatulate, upper leaves few (2–25, usually fewer than 10), smaller and lanceolate .. (2)
   2. Petals large, 10.0–17.5 mm long, usually greater than 14.0 mm; Pacific side of the Sierra Madre Occidental ..... 13. *C. sinaloense*
2. Petals smaller, not more than 8.0 mm long; Chihuahuan-Sonoran Sierra Madre and Baja California ..... (3)
   3. Stems very slender; stems, leaves and sepals soon turning light orange-brown with age; cyme 8–25 flowered; flowers small, petals 4.0–5.5 mm long; capsules short, 4.0–7.0 mm long, barely exserted beyond the calyx; Baja California ..... 15. *C. texanum*
   3. Stems not particularly thin; stems, leaves and sepals remaining green; cyme 3–10 flowered; flowers larger, petals 5.5–8.0 mm long; capsules longer, 8.0–13.5 mm long, well exserted beyond the calyx; mainland ..... 14. *C. sordidum*

1. Capsules curved, teeth not revolute; spatulate lower leaves sometimes present, but usually as rosette leaves ..... (4)
4. Lanate pubescence present (at least some), usually best seen at the nodes and on the rosette leaves (when present) and lower cauline leaves (this character is sometimes hard to see in old specimens of *C. vulcanicum*) ..... (5)
5. Sepals, pedicels and usually the upper parts of the stem glandular-pubescent ..... (6)
6. Plants regularly branching above the base; basal rosette usually lacking; cymes usually more or less many flowered; petals usually less than, equal to, or only slightly exceeding the sepals in length; annual .. (7)
7. Plants usually fairly large (over 25 cm tall); internodes longest just below the inflorescence, becoming shorter toward the base; pedicels fairly long, 18.0–30.0 mm long; petals usually equal to or only slightly exceeding the calyx in length, white; seeds 0.7–1.0 mm in diameter ..... 9. *C. nutans*
7. Plants smaller (6–30 cm tall); internodes more or less equal throughout; pedicels short, 5.0–15.5 mm long; petals shorter than the sepals (except on Pico de Orizaba and Cofre de Perote and sometimes on Ixtaccihuatl and Popocatepetl), white or more often pale green; seeds 0.5–0.7 mm in diameter .... 18. *C. vulcanicum*
6. Plants branching usually only at the base; basal rosette almost always present; cyme relatively few (1–13) flowered; petals usually well exceeding the sepals in length; perennial ..... (8)
8. Plants usually fairly large (15–35 cm tall); cauline leaves few (usually 2–3 pairs); pedicels longer, the lower ones 18.0–32.0 mm long; sepals lanceolate; seeds 0.9–1.3 mm in diameter; Sierra Madre of Chihuahua and Durango ..... 8. *C. madrense*
8. Plants smaller, usually less than 20 cm tall; cauline leaves numerous, closer together (though still usually shorter than the internodes); pedicels shorter, though sometimes to 25.0 mm long; sepals elliptic; seeds 0.7–0.9 mm in diameter; volcanoes of central Mexico

(Distrito Federal, México, Michoacan and Puebla) ..... 16. *C. tolucense*

5. Plants nowhere glandular-pubescent ..... (9)
9. Plants low, caespitose; internodes usually shorter than the leaves; cymes dense, flowers crowded at the apex of each fertile branch; pedicels usually shorter, less than 10.0 mm long; capsules broader .... 11. *C. purpusii*
9. Plants not very caespitose; internodes usually longer than the leaves; cymes looser; pedicels usually longer, to 25.0 mm long; capsules less broad ..... 16. *C. tolucense*

4. Lanate pubescense lacking ..... (10)
10. Plants glabrous or only *very* sparsely pilose, hairs on the pedicels subreflexed ..... 2. *C. barberi*
10. Plants more or less densely pubescent..... (11)
11. Pedicels short, the lowermost (longest) usually less than 10.0 mm long ..... (12)
12. Glandular hairs few or lacking; flowers usually many, very densely crowded at the apex of each fertile branch; introduced species ..... (13)
13. Bracts scarious margined; flowers larger, sepals usually 4.5–6.5 mm long; capsules longer, 7.0–11.5 mm long; seeds larger, 0.5–0.7 mm in diameter; perennial..... 17. *C. triviale*
13. Bracts herbaceous; flowers smaller, sepals 3.0–4.5 mm long; capsules shorter, 5.0–9.0 mm long; seeds smaller, 0.3–0.4 mm in diameter; annual .....5. *C. glomeratum*
12. Glandular hairs predominant, at least on the sepals and pedicels; flowers not densely crowded, or if crowded, then flowers few; native species... (14)
14. Petals shorter than the sepals ..... (15)
15. Plants larger, usually over 10.0 cm tall; leaves more or less similar throughout; lowermost flower well above the ground .... 3. *C. brachypodum*
15. Plants smaller, usually less than 10.0 cm tall; lower leaves often more or less spatulate; lowermost flowers near ground level ....1. *C. axillare*

14. Petals longer than the sepals ..... (16)
16. Leaves often more or less erect, close to the stem; pedicels with short, dense, subreflexed hairs; flowers nodding; petals larger, 6.5–10.5 mm long, well exserted beyond the calyx; perennial; volcanoes of central Mexico (México, Puebla, Tlaxcala, and Veracruz) .... 12. *C. ramigerum*
16. Leaves more spreading; pedicel hairs not reflexed; flowers not nodding; petals shorter, capsules 4.0–7.0 mm long, often barely exserted beyond the calyx; annual; Sierra de los Cuchumatanes and various Guatemalan volcanoes ..... 4. *C. cuchumatanense*

11. Pedicels longer, usually more than 10.0 mm long ... . (17)
17. Cymes few (1–8) flowered; flowers large, sepals 6.0–7.5 mm long, petals 9.5–18.5 mm long; capsules longer, 12.0–17.0 mm long ..... (18)
18. Plants very slender, propped up by the surrounding vegetation; pedicels with short, dense, subreflexed hairs; volcanoes of central Mexico (México, Puebla, and Veracruz) .... 10. *C. orithales*
18. Plants more or less free-standing; pedicel hairs not reflexed; Sierra de los Cuchumatanes, Guatemala ..... 7. *C. juniperorum*

17. Cymes usually many (to 40 but usually somewhat fewer) flowered; flowers smaller, sepals 3.0–6.0 mm long; capsules shorter, 6.0–10.5 mm long ... (19)
19. Leaves acuminate; leaves more or less similar in size throughout; perennial; volcanoes of Guatemala .....6. *C. guatemalense*
19. Leaves not acuminate (except in a form found in central Mexico); leaves largest at the base, smaller upward; annual..... 9. *C. nutans*

TAXONOMIC TREATMENT

GENERIC DESCRIPTION

Cerastium Linnaeus, Sp. Pl., ed. 1, p. 437. 1753.

TYPE SPECIES: *Cerastium arvense* L., lectotype of Britton and Brown (1913).

Centunculus Adanson, Fam. 2: 256. 1763.
Prevotia Adanson, Fam. 2: 256. 1763.
Moenchia Ehrhart, Beitr. 2: 177. 1788.
Quaternella Ehrhart, Beitr. 4: 149. 1789.
Doerriena Borkhausen *in* Rhein, Magaz. 2: 528. 1793.
Myosotis Tournefort *ex* Moench, Meth., p. 224. 1794.
Esmarchia Reichenbach, Fl. Germ. Excurs., p. 793. 1832.
Dufourea Grenier, Act. Soc. Linn. Bord., p. 25. 1837.
Doerriera Steudel, Nom., ed. 2, 1: 522. 1840.
Prevotia Steudel, Nom., ed. 2, 2: 394. 1840.
Dichodon Bartling *ex* Reichenbach, Nom., p. 205. 1841.
Pentaple Reichenbach, Ic. Fl. Germ. 37: 227. 1841.
Leucodonium Opiz, Seznam, p. 59. 1852.
(Synonymy according to Jackson, 1895; and Pax and Hoffman, 1934).

Plants herbaceous, low and caespitose to fairly tall and erect, often decumbent; annual or perennial; stems almost always pubescent, either glandular or not; leaves variously linear to elliptical or spatulate, opposite, exstipulate, entire, acuminate, acute or obtuse, variously pubescent, usually without a petiole; basal rosette present or lacking; cauline leaves few to many, usually shorter then the rosette leaves when the latter are present; inflorescence a cyme, either compact or loose; flowers various in size, from very small (sepals 2.5 mm long) to larger (sepals over 8 mm long); petals shorter than to more than twice as long as the sepals; sepals 5, rarely 4, lanceolate to elliptic, acute, scarious margined, usually pubescent; petals 5, rarely 4 or absent, usually white, variously bifid; stamens 10, rarely 5 or 4, shorter than the petals; ovary superior, carpels 5, rarely 4 or 3; styles 5, rarely 4 or 3, opposite the sepals; capsules usually well exserted beyond the calyx at maturity, opening apically by twice as many teeth as there were styles; seeds many, small (0.3–1.2 mm in diameter), variously tuberculate.

In Mexico and Central America only the most frequent numbers of flower parts are found: 5 sepals, 5 petals, 10 stamens, and 5 styles.

The name *Cerastium* is derived from the Greek "cerastes" meaning "horned", in reference to the shape of the capsule.

TREATMENT OF INDIVIDUAL TAXA

1. **Cerastium axillare** Correll, Brittonia 18: 308. 1966. TYPE: UNITED STATES. Texas: Jeff Davis Co., Little Aguja Canyon, Buffalo Trail Scout Camp Area, Davis Mountains, *Correll & Ogden 25069* (HOLOTYPE: LL).

Plant annual; branches few, usually erect; stems short (usually less than 10 cm tall), often more or less caespitose, glandular-pilose; lower leaves somewhat spatulate, those above lanceolate to elliptic, 7.0–20.0 mm long, 1.0–6.0 mm wide, acute to obtuse, more or less glandular-pilose; basal rosette lacking; cymes 5–20 flowered, bracts not scarious margined, lowermost flowers often close to the ground; pedicels short, 2.0–5.0 mm long, glandular-pilose; sepals lanceolate, 3.0–5.0 mm long, 1.0–1.5 mm wide, acute, scarious-margined except at the apex, viscid-glandular; petals shorter than the sepals, 3.0–4.5 mm long, bifid about 1/4 of their length, white; filiments 2.5–3.0 mm long, anthers 0.3 mm long; styles 1.0–1.2 mm long; capsules 6.0–11.7 mm long, 2.0–2.6 mm wide; seeds 0.4–0.7 mm in diameter, light brown, tuberculate; chromosome number unknown.

DISCUSSION: *Cerastium axillare* is known in the United States only from the Trans-Pecos of Texas. In Mexico it has been collected in Chihuahua, Coahuila, and Durango (Figure 1A). No habitat information is given on any of the Mexican specimens but Correll and Johnson (1970) listed "open forested slopes, rocky hills and grasslands in the mountains."

SPECIMENS EXAMINED: **Mexico.** CHIHUAHUA: 10–15 mi southwest of Nueva Casas Grandes, *Correll & Johnston 21694* (LL); Puerta de San Diego, alt. ca. 6500 ft, *Hartman 637* (GH, NY, US). COAHUILA: 45 mi east of Saltillo, *Palmer s.n.* (GH). DURANGO: Otinapa, *Palmer 375* (F, GH, MO, NY, UC, US). **United States:** TEXAS: Jeff Davis Co., Little Aguja Canyon, Buffalo Trail Scout Camp Area, Davis Mountains, *Correll & Ogden 25069* (LL, holotype).

2. **Cerastium barberi** Robinson, Proc. Boston Soc. Nat. Hist. 31: 266. 1904. TYPE: MEXICO. Chihuahua: In the Sierra Madres near Colonia García, 27 June 1899, *Townsend & Barber 453* (HOLOTYPE: GH; ISOTYPES: MO, US).

Plant perennial; stems 10–35 cm tall, sometimes branched basally; branches erect, glabrous or only extremely sparsely pilose; inter-

nodes quite long just below the inflorescence, grading to very short at base; leaves linear to lanceolate, 8.0–20.0 mm long, 1.0–3.5 mm wide, acute, virtually glabrous; cymes 1–6 flowered, bracts not scarious-margined; pedicels 2.0–14.6 mm long, hooked in fruit, almost glabrous or with only very short reflexed hairs; sepals lanceolate to ovate, 4.5–5.0 mm long, 1.1–1.7 mm wide, acute, scarious-margined, glabrous or with a few ciliate hairs on the margin at the base; petals 5.5–6.5 mm long, bifid about 1/4 of their length, white; filaments 5.0–6.5 mm long, anthers 0.7 mm long; styles 2.0–2.2 mm long; capsules 8.0–10.0 mm long, 2.3–3.1 mm wide, curved; seeds 0.8–1.0 mm in diameter, tuberculate; chromosome number unknown.

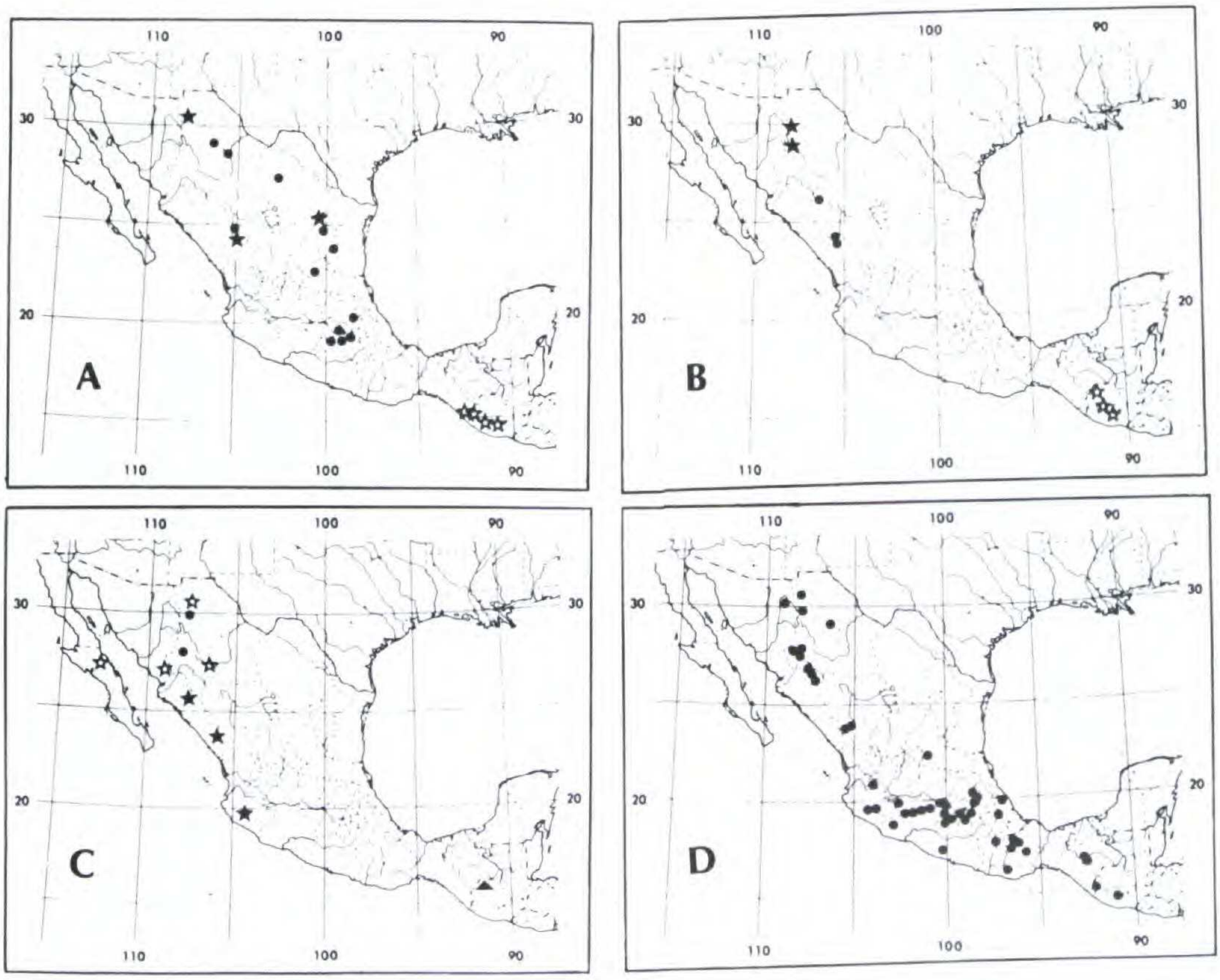

Figure 1. Distribution in Mexico and Central America of *Cerastium*. **A.** *C. axillare* (closed stars), *C. guatemalense* (open stars), and *C. brachypodum* (closed circles); **B.** *C. barberi* (closed stars), *C. cuchumatanense* (open stars), and *C. madrense* (closed circles); **C.** *C. juniperorum* (triangle), *C. sinaloense* (closed stars), *C. texanum* (open stars), and *C. sordidum* (closed circles); and **D.** *C. nutans*. There is also a single specimen of *C. guatemalense* from Costa Rica.

DISCUSSION: *Cerastium barberi* is known primarily from two collections both apparently made on the same expedition and in the same place; in the Sierra Madre Occidental near Colonia García, Chihuahua (Figure 1B). The elevation was about 2290 m, but no other habitat information is available. Another specimen, collected at Yepáchic, Chihuahua, also appears to be referable to *Cerastium barberi* although it is slightly more pubescent.

SPECIMENS EXAMINED: **Mexico.** CHIHUAHUA: Near Colonia García, *Nelson 6167* (GH, US); Yepáchic, *Pennington 49* (TEX); In the Sierra Madres near Colonia García, alt. ca. 7500 ft, *Townsend & Barber 453* (GH, holotype; MO, US, isotypes).

3. **Cerastium brachypodum** (Engelmann *ex* Gray) Robinson, Proc. Amer. Acad. Arts 29: 277. 1894. TYPE: "w. Illinois and southwestward" (not seen).

Cerastium nutans var. *brachypodum* Engelmann *ex* Gray, Man., ed. 5, p. 94. 1867. TYPE: same as above.

Cerastium nutans var. *genuinum* (lusus 2) Rohrbach, Linnaea 37: 289. 1873. TYPE: "Habitat in media parte totus fere Americae borealis usque ad finis Mexicanos" (not seen).

Plant annual; usually diffuse, branches few to many, usually more or less erect but sometimes decumbent; stems to 40 cm high but usually less than 20 cm, very small in alpine and other harsh environments, glandular-pilose, often very viscid; leaves usually similar throughout, lanceolate to elliptic, 7.0–21.0 mm long (usually shorter than the adjacent internode), 1.2–5.0 mm wide, acute, rarely obtuse, more or less glandular-pilose; basal rosette lacking; cymes 5–30 flowered, bracts not scarious-margined; pedicels short, 2.1–5.8 mm long, glandular-pilose; sepals lanceolate, 3.2–5.8 mm long, 1.0–1.8 mm wide, acute, scarious-margined except at the apex, viscid-glandular; petals shorter than the sepals, 3.0–4.5 mm long, bifid about 1/4 of their length, white; filaments 2.6–3.2 mm long, anthers 0.3 mm long; styles 1.0–1.2 mm long; capsules 6.3–12.8 mm long, 2.0–2.8 mm wide; seeds 0.4–0.7 mm in diameter, light brown, tuberculate; chromosome number unknown.

DISCUSSION: *Cerastium brachypodum* is a species of varied habitat. In Mexico it has been collected at elevations from 2000 to over 3800 m in such habitats as *Pinus* and *Populus* woodlands and

alpine and subalpine meadows. It is often a species of disturbed areas such as trails and roadsides. Found in the United States and Canada north to southeastern Virginia, Illinois, North Dakota, Alberta, and Washington (Fernald 1950), it ranges into Mexico as far south as the state of México. It has been collected in the states of Chihuahua, Coahuila, Durango, Hidalgo, México, Nuevo Leon, Queretaro, San Luis Potosí, Tamaulipas, and Zacatecas (Figure 1A).

Cerastium brachypodum is often considered to be a form of *C. nutans* and many recent floras and checklists have listed it as such. However, at least in the area covered by the present work, the two forms are sympatric and easily distinguishable. I therefore retain their specific status.

REPRESENTATIVE SPECIMENS: **Mexico.** CHIHUAHUA: Majalca, *LeSueur 624* (F, GH, MO, TEX, UC, US). COAHUILA: Municipio de Ocampo, Sierra Maderas del Carmen, at Ojo del Negro below and west of Campo 0, alt. ca. 2100 m, *Riskind & Patterson 1801* (LL). DURANGO: Tejamen, *Palmer 542* (GH, US). HIDALGO: Sierra de Pachuca, alt. ca. 10,000 ft, *Pringle 11321* (ENCB, F, GH, US). MEXICO: Cañada Alcalicán, La Joya side of Ixtaccihuatl, alt. ca. 3850 m, *Murry 47* (MSC); on road to Nevado de Toluca, alt. ca. 3540 m, *Murray 52* (MSC). NUEVO LEON: Peña Nevada, alt. ca. 3200 m, *Good 1006* (MSC); Cerro Potosí, just above timberline, *Mueller 2245* (F, GH, MICH, MO); QUERETARO: Cerro Zamorano, 1 km southwest of the cumbre, alt. ca. 3100 m, *McVaugh 466* (ENCB). SAN LUIS POTOSI: Sierra de Alvarez, cerca de Puerto Huerta, alt. ca. 2300 m, *Rzedowski 4118* (ENCB, MSC). TAMAULIPAS: between Marcella and Hermosa, *Stanford et al. 2650a* (NY, US). ZACATECAS: Alt. 7000–8000 ft, *Purpus 415* (MO, UC, US).

4. **Cerastium cuchumatanense** D. A. Good, *sp. nov.* TYPE: GUATEMALA. Huehuetenango: Sierra de los Cuchumatanes, immediately north of Tojiah at km. 322 on Ruta Nacional 9N, alt. ca. 3200 m, 1 August 1960, *Beaman 3891* (HOLOTYPE: MSC; ISOTYPES: GH, TEX, US) (Figure 2).

Planta annua. Caules usque ad 25 cm alti sed plerumque minus quam 10–15 cm, plerumque basi ramosi, rare superne. Rami erecti vel saepius ascendentes, glanduloso-pilosi. Folia omnia similaria, anguste ad late lanceolata, foliis in ramis sterilibus saepe ovatis vel leviter spathulatis, 6.0–11.2 mm longa (internodiis contiguis longiora vel breviora), 1.8–3.0 mm lata, acuta vel obtusa, interdum plus minusve ad apicem rotundata, plus minusve dense pilosa. Rosula

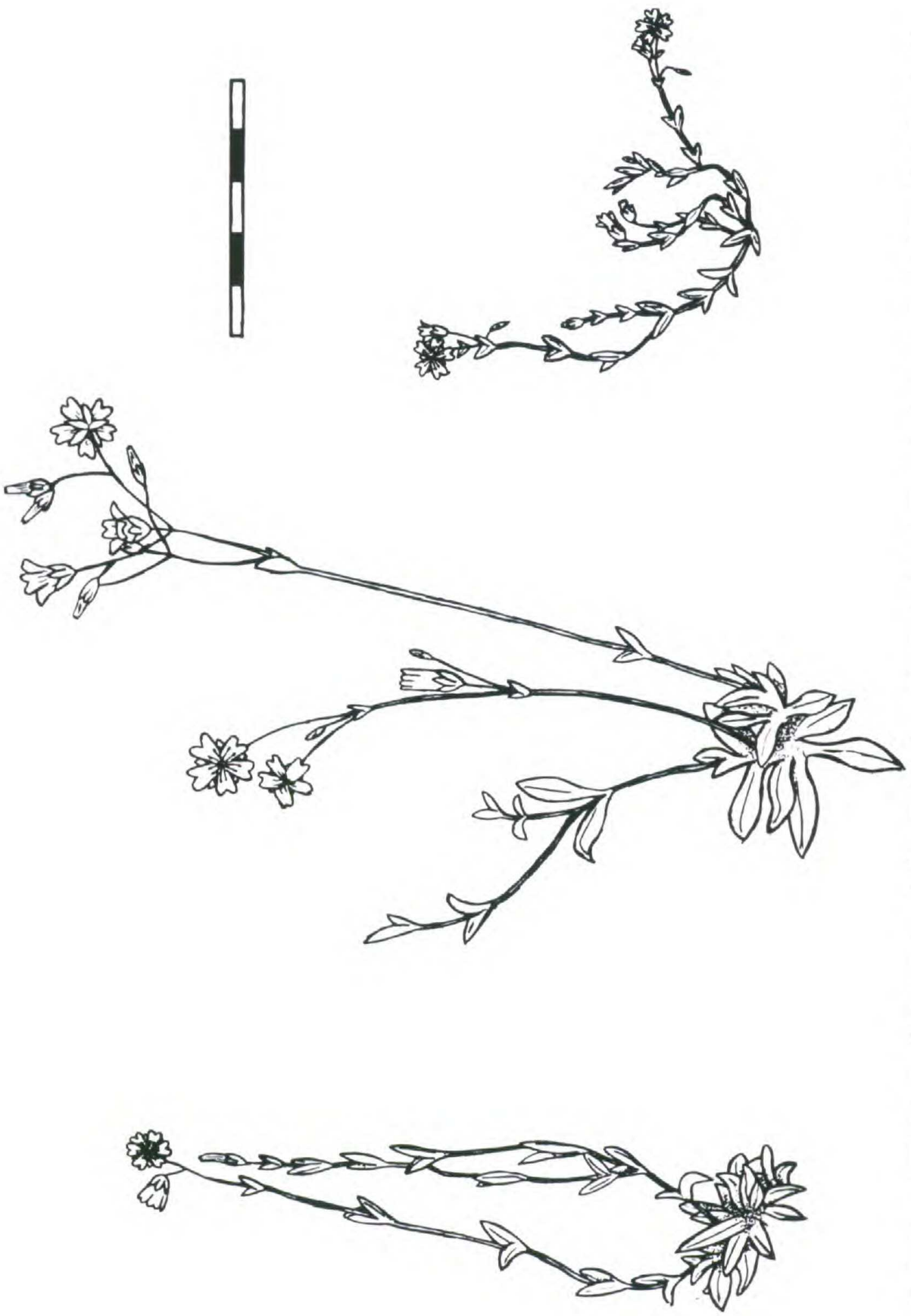

Figure 2. Illustrations of *Cerastium*. (Left to right) *C. tolucense*, *C. sinaloense*, and *C. cuchumatanense*. The scale in the upper right represents 5 cm.

basalis absens. Cymae plerumque 3–8 floribus, floribus ad apicem uniuscujusque rami fertilis aggregatis. Pedicelli brevissimi,1.2–5.0 mm longi, glanduloso-pilosi. Sepala lanceolata usque ovata, 3.0–5.0 mm longa, 1.1–1.6 mm lata, glandulifera, praeter apicem anguste scarioso-marginata. Petala 4.2–6.2 mm longa, quam sepala longiora, bifida per circa 1/4 longitudinem, alba. Filamenta 3.0 mm longa. Antherae 0.3 mm longae. Styli 1.3 mm longi. Capsulae plerumque tantum vix ultra calycem exsertae, 4.0–7.0 mm longae, 1.6–2.2 mm latae, curvae. Semina 0.6–0.9 mm diametro, aurantiaca usque rubro-brunnea, dense tuberculata. Chromosomatum numerus $2n = 34$ (Beaman et al., 1962).

Cerastium cuchumatanense is characterized by the following set of characters: basal rosette lacking; cauline leaves not ascending; pubescence present, glandular, not lanate; pedicels short, with hairs not reflexed; flowers not nodding; petals longer than the sepals; capsules curved, usually only barely exserted beyond the calyx.

DISCUSSION: *Cerastium cuchumatanense* is a species primarily of the high llanos of the Sierra de los Cuchumatanes, Guatemala, but is also found on the Tecum Umán Ridge and above timberline on Volcán de Agua and Volcán Acatenango, also in Guatemala (Figure 1B). It is restricted to the subalpine meadows above about 2700 m. There may be some preference for slightly moist sites.

The consensus to date (Standley and Steyermark, 1946; Beaman et al., 1962; Beaman, 1979) has been that the specimens here referred to as *Cerastium cuchumatanense* are *C. brachypodum*. This consensus seems to be based primarily on the fact that both *C. brachypodum* and *cuchumatanense* have small flowers and unusually short pedicels. Standley and Steyermark, however, stated that "more ample specimens may show the Guatemalan plant to be an undescribed species, since it does not appear to be referable to any other species known from Mexico."

There is a gap of approximately 980 km between the southern limit of *Cerastium brachypodum* near Nevado de Toluca, México, and the Sierra de los Cuchumatanes, Guatemala, the northermost locality for *C. cuchumatanense*. Ecologically, while the distributions of the two species overlap with both being found in high mountain meadows, *C. brachypodum* has a much broader range of habitats, often occurring in woodlands and other situations in which *C.*

cuchumatanense has never been collected. For these reasons and because of the morphological differences obvious when descriptions of the two species are compared, there is no doubt that the Guatemalan specimens are indeed distinct from *Cerastium brachypodum.*

SPECIMENS EXAMINED: **Guatemala.** CHIMALTENANGO: Volcán Acatenango, northwest side of peak, alt. ca. 3825 m, *Beaman 3271* (MSC). HUEHUETENANGO: Sierra de los Cuchumatanes, at Chémal at km. 316.8 on Ruta Nacional 9N, alt. ca. 3310 m, *Beaman 3089* (GH, MSC); Sierra de los Cuchumatanes, between Tojiah and Chémal at km. 319.5 on Ruta Nacional 9N, alt. ca. 3380 m, *Beaman 3745* (MSC); Sierra de los Cuchumatanes, immediately north of Tojiah at km. 322 on Ruta Nacional 9N, alt. ca. 3200 m, *Beaman 3891* (GH, MSC, TEX, US); Sierra de los Cuchumatanes, immediately north of Tojiah at km. 322 on Ruta Nacional 9N, alt. ca. 3200 m, *Beaman 3896* (MSC, holotype; GH, TEX, US, isotypes); Sierra de los Cuchumatanes, large meadow 7 mi north of Santa Eulalia along road to San Mateo Ixtatán, Municipio de Santa Eulalia, alt. ca. 9100 ft, *Breedlove 11521* (DS, LL, MICH, US); Sierra de los Cuchumatanes, on road from Huehuetenango to San Juan Ixcoy, south of road to Todos Santos Cuchumatanes, alt. ca. 3450 m, *Good 1022* (MSC); Sierra de los Cuchumatanes, open llano to the west of road to San Juan Ixcoy, alt. ca. 3600 m, *Good 1026* (MSC); Sierra de los Cuchumatanes, between Paquix and Llanos San Miguel, road to San Juan Ixcoy, alt. ca. 3300 m, *Molina R. 21242* (F, NY); Chémal, Sierra de los Cuchumatanes, alt. ca. 4000 m, *Molina R. & Molina 26415* (F); between Capzin and km. 143 on way to San Juan Ixcoy, Sierra de los Cuchumatanes, alt. ca. 3100 m, *Molina R. & Molina 26446* (F); Region of Chémal, Sierra de los Cuchumatanes, alt. ca. 3300 m, *Standley 81085* (F); between Tojquia and Chémal, Sierra de los Cuchumatanes, alt. 3700–3750 m, *Steyermark 50237* (F, US). SACATEPEQUEZ: Volcán de Agua, summit of the south rim of crater, alt. ca. 3750 m, *Beaman 2918* (MSC);Volcán de Agua, on floor of crater, alt. ca. 3670 m, *Beaman 2946* (GH, MSC); upper slopes of Volcano Agua, near crater, alt. ca. 3600 m, *Harmon 3669* (ENCB). TOTONICAPAN: on the Tecum Umán Ridge at km. 154 on Ruta Nacional 1, ca. 20 km east of Totonicapán, alt. ca. 3340 m, *Beaman 4183* (GH, MSC, UC, US); 4.5–5 mi southeast of Totonicapán, alt. 9600–9800 ft, *Webster et al. 11781a* (F).

5. **Cerastium glomeratum** Thuillier, Fl. Paris, ed. 2, p. 226. 1799. TYPE: FRANCE: "Se treuve dans le bois de Boulogne; à Vinncennes et ailleurs" (not seen).

Cerastium viscosum Linnaeus (*nom. ambig.*), Sp. Pl., ed. 1, p. 437. 1753. TYPE: "Habitat in Europae pratis macilentis" (photograph seen).

Plant annual; stems decumbent or erect, sometimes caespitose, 2.5–30 cm tall, very much branched at the base, little otherwise; branches pilose; internodes usually longer distally than basally, longer or shorter than the leaves; leave more or less similar

throughout, perhaps slightly smaller above, broadly elliptic to orbicular or spatulate, 5.0–20.0 mm long, 3.0–12.0 mm wide, obtuse, pilose; basal rosette lacking; cymes many flowered, flowers very crowded terminally; pedicels very short, 1.0–5.0 mm long, pilose, sometimes slightly glandular; sepals lanceolate, 2.8–5.1 mm long, 0.5–1.6 mm wide, acute, scarious margined, pilose, sometimes glandular; petals shorter than or equal to the sepals, bifid about 1/4 of their length, white; filaments 1.8–2.3 mm long, anthers 0.1 mm long; styles 0.8–1.1 mm long; capsules 5.0–8.8 mm long, 1.3–1.8 mm wide, curved; seeds 0.3–0.4 mm in diameter, finely tuberculate; chromosome number $2n = 72$ (Rohweder, 1937, 1939; Heiser and Whittaker, 1948; Brett, 1952, 1955; Söllner, 1952, 1954; Löve and Löve, 1956; Blackburn and Morton, 1957; Huynh, 1965; Gadella and Kliphius, 1966; Favarger, 1969; Löve and Kjellquist, 1974). No counts have been published for Mexican or Central American material.

DISCUSSION: *Cerastium glomeratum* and *C. triviale* are the only two introduced species of *Cerastium* in Mexico or Central America. While native to Europe, *C. glomeratum* has become established almost worldwide and is found in North America from Florida, Texas, and California north to southeastern Massachusetts, New York, Ohio, Illinois, South Dakota, and British Columbia (Fernald, 1950), as well as in central Mexico (Distrito Federal, Hidalgo, México, Michoacan, and Veracruz), southern Mexico (Chiapas), Guatemala (Alta Verapaz, Chimaltenango, Guatemala, Huehuetenango, Jalapa, Quetzaltenango, Quiche, Sacatépequez, San Marcos, and Sololá), Honduras (Itibucá), Nicaragua (Matagalpa), Costa Rica (Alajuela, Cartago, and San José), and Panama (Chiriquí) (Figure 3A). It is found in a variety of habitats at elevations from 1200 to 3700 m. Such habitats include roadsides, fields, woodlands, volcanic rocks, cornfields, gardens, etc.

Cerastium glomeratum was originally described in 1753 by Linnaeus as *C. viscosum*. However, examination of photographs of the type specimen and that of *C. vulgatum*, described by Linnaeus in 1762, indicate that these specimens were somehow reversed in the Linnaean herbarium (i.e. the type description of one matches the type specimen of the other). This mixup has resulted in enough confusion to warrant declaring both names ambiguous. Many recent workers (cf. Jalas et al. 1964) have taken this position.

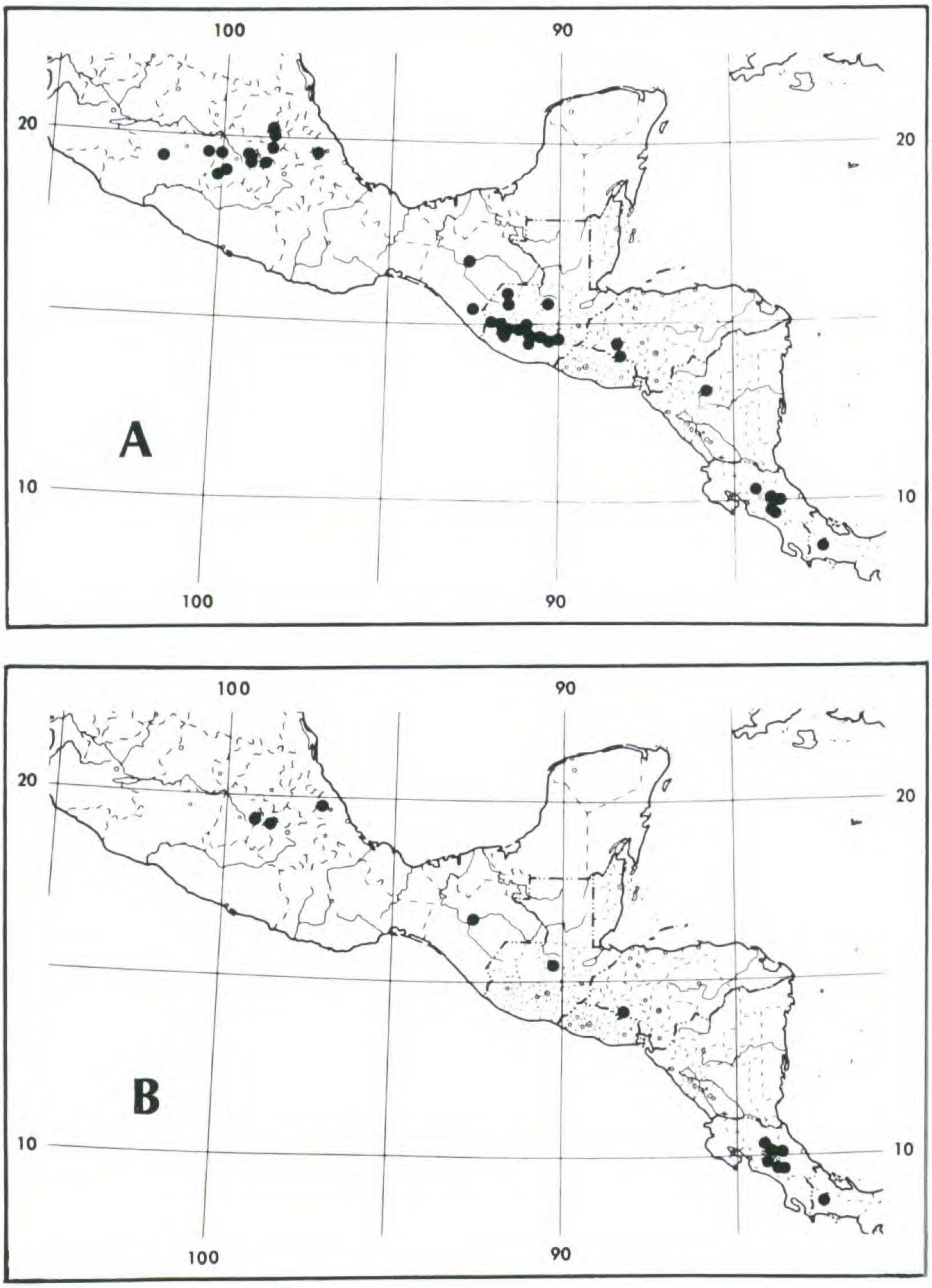

Figure 3. Distribution in Mexico and Central America of *Cerastium*. **A.** *C. glomeratum;* and **B.** *C. triviale*.

Cerastium viscosum then becomes *C. glomeratum* and *C. vulgatum* becomes *C. triviale* (or *C. fontanum* subsp. *triviale;* see below).

REPRESENTATIVE SPECIMENS: **Costa Rica.** ALAJUELA: Region of Zaracero, Guadeloupe de Zaracero, alt. ca. 4500 ft, *Smith A366* (F). CARTAGO: Volcán de Turrialba, alt. ca. 2600 m, *Pittier 7556* (NY, US); Birris, south slope of Volcán de Irazú, *Standley 35438* (US); SAN JOSE: La Palma, alt. ca. 1600 m, *Standley 38043* (US); near Laguna de Escuandra, northeast of El Copey, alt. 2000–2200 m, *Standley 41996* (US). **Guatemala.** ALTA VERAPAZ: Coban, *von Tuerckheim 1334* (GH, NY, US). CHIMALTENANGO: Cerro de Tecpam, region of Santa Elena, alt. ca. 2700 m, *Standley 58679* (F). GUATEMALA: Volcán de Pacaya, above las Calderas, alt. 1800–2400 m, *Standley 58364* (F). HUEHUETENANGO: Sierra de los Cuchumatanes, between Paquix and Llanos San Miguel, road to San Juan Ixcoy, alt. ca. 3300 m, *Molina R. 21235* (F, NY). JALAPA: on the summit of Montaña Miramundo, between Jalapa and Mataquescuintla, alt. 2000–2500 m, *Steyermark 32611* (F). QUETZALTENANGO: Cerro la Pedrera, south of Quetzaltenango, alt. ca. 2400 m, *Standley 65520* (F); Olintepeque, alt. ca. 2415 m, *Standley 66002* (F). QUICHE: south of Chichicastenango, alt. 1830–1880 m, *Standley 62390* (F). SACATEPEQUEZ: Volcán de Agua, above Santa María, alt. 7000–8000 ft, *Bell & Duke 16969* (MO). SAN MARCOS: Barrancas south and west of town of Tajumulco, northwest slopes of Volcán Tajumulco, alt. 2300–2500 m, *Steyermark 36535* (F); *Steyermark 35673* (F). SOLOLA: near María Tecum, Sierra Madre Mountains, ca. 10–12 km northwest of Los Encuentros, alt. ca. 3000 m, *Williams et al. 27319* (F). **Honduras.** INTUBUCA: vicinity of La Esperanza and Intubucá, alt. 1500–1600 m, *Standley 25434* (F). **Mexico.** BAJA CALIFORNIA NORTE: Guadeloupe Island, alt. ca. 700 m, *Moran 17304* (ENCB, LL). CHIAPAS: north and west slope of Cerro Mozotal below the microwave tower along the road from Huixtla to El Porvenir and Siltepec, Municipio de Motozintla de Mendoza, alt. ca. 3000 m, *Breedlove 40319* (DS,MP); north end of San Cristóbal las Casas, alt. ca. 7100 ft, *Breedlove & Raven 8264* (DS). DISTRITO FEDERAL: ladera oriental del Cerro Ajusco, alt. ca. 3250 m, *Arrendondo 69* (ENCB); along the road up the Cañada del Río Magdelina near the 4th dynamo, alt. ca. 3000 m, *Murry 11* (MSC); MEXICO: Ocotepec, Distrito Temascaltepec, alt. ca. 1500 m, *Hinton 2888* (GH, MO, NY, US). MICHOACAN: near the microwave tower on Cerro Burro, 7 km south of Opopeo, alt. ca. 3170 m, *Murry 58* (MSC). VERACRUZ: La Joya, alt. ca. 2100 m, *Ventura A. 11061* (ENCB). **Nicaragua.** MATAGALPA: road to La Fundadora, cloud forest area north of Santa María de Ostuma, Cordillera Central de Nicaragua, alt. 1300–1500 m, *Williams et al. 24948* (F, NY). **Panama.** CHIRIQUI: vicinity of Boquete, Finca Collins, "El Vilo", alt. ca. 6150 ft, *Stern et al. s. n.* (MICH, US).

6. **Cerastium guatemalense** Standley, Field Mus. Nat. Hist., Bot. Ser. 17: 244. 1937. TYPE: GUATEMALA. Chimaltenango: Volcán de Agua, 22 July 1937, *Johnson 816* (HOLOTYPE: F).

Plant perennial; stems to 45 cm tall, often more or less much branched basally and above; branches erect or decumbent, densely

glandular-pilose; internodes more or less equal except at the base, where shorter; leaves more or less similar throughout or the lower ones somewhat shorter, linear to lanceolate, long, widest at the base, narrowing to an attenuate tip, 15.0–48.0 mm long, 2.0–5.0 mm wide, glandular-pilose, particularly on the lower surface; basal rosette lacking; cymes 3–40 flowered, usually 3–15; bracts not scarious-margined; lowermost (longest) pedicels 14.0–35.0 mm long, upper ones shorter, all more or less hooked in fruit, glandular-pilose; sepals lanceolate, 4.4–6.0 mm long, 1.0–1.7 mm wide, acute, scarious-margined except at the apex, glandular; petals 6.0–7.1 mm long, bifid about 1/8 of their length, white; filaments 3.2–3.5 mm long, anthers 0.3 mm long; styles 1.9–2.1 mm long; capsules 7.8–11.8 mm long, 2.0–2.8 mm wide, curved; seeds tuberculate, 0.8–1.0 mm in diameter; chromosome number unknown.

DISCUSSION: *Cerastium guatemalense* is known from open pine forests and adjacent subalpine meadows between 2130 and 4600 m elevation on the following Guatemalan volcanoes: Acatenango, Agua, Fuego, Santa María, Santo Tomas, Tacaná, and Tajumulco. Outside of Guatemala three collections have been made: *Stevens et al. 2427* from the Chiapas side of Volcán Tacaná, *Breedlove 40315* from nearby Cerro Mozotal, Chiapas, and *Burger & Gomez P. 8216* from the Department of San José, Costa Rica. This last specimen is considerably disjunct from the known range of *Cerastium guatemalense* (Figure 1A).

REPRESENTATIVE SPECIMENS: **Costa Rica.** SAN JOSE: along the trail to the Valle de los Conejos along the upper Río Talari, alt. 3250–3450 m, *Burger & Gomez P. 8216* (F, MO). **Guatemala.** CHIMALTENANGO: Volcán de Fuego, north side of mountain on Meseta, alt. ca. 3500 m, *Beaman 4041* (GH, MSC); slopes of Volcán de Acatenango, above Las Calderas, alt. 2700–2900 m, *Standley 61893* (F). QUETZALTENANGO: summit of Volcán Santa María, alt. ca. 12,400 ft, *Skutch 834* (F, GH, US); Volcán Santo Tomas, alt. 3000–3300 m, *Steyermark 34882* (F). SACATEPEQUEZ: Volcán de Agua, *Johnson 816* (F, holotype). SAN MARCOS: Volcán Tajumulco, east side of peak, at timberline, alt. ca. 4050 m, *Beaman 3176* (GH, MSC); between Sibinal and summit of Volcán Tacaná, lower slopes above ridge of La Vega, alt. 2500–4400 m, *Steyermark 36088* (F). **Mexico.** CHIAPAS: on the north and west slope of Cerro Mozotal below the microwave tower along the road from Huixtla to El Porvenir and Siltepec, Municipio de Motozintla de Mendoza, alt. ca. 3000 m, *Breedlove 40315* (DS); on southeast slope of Volcán Tacaná, alt. ca. 3550 m, *Stephens et al. 2427* (MSC).

7. **Cerastium juniperorum** Standley & Steyermark, Field Mus. Nat. Hist., Bot. Ser. 23: 51. 1944. TYPE: GUATEMALA. Huehuetenango: alpine areas in the vicinity of Tuminá, Sierra de los Cuchumatanes, alt. 3400–3500 m, 7 July 1942, *Steyermark 48413* (HOLOTYPE: F).

Plant perennial; stems to 40 cm tall with little branching except sometimes at the base; branches densely glandular-pilose, almost villous in places; leaves more or less similar throughout, lanceolate to almost ovate, 10.0–33.0 mm long, 1.5–9.0 mm wide, acute, densely pilose tending toward villous when young; upper few internodes much longer than the leaves, gradually shortening to much shorter below, creating, in some cases, a basal cluster; basal rosette lacking; cymes 3–8 flowered, bracts not scarious-margined; pedicels 10.2–36.0 mm long, the lower ones being the longer, very densely glandular-pilose, somewhat hooked in fruit; sepals lanceolate to ovate, 5.8–7.6 mm long, 1.8–2.2 mm wide, acute, scarious margined except at the apex, sparsely glandular-pilose; petals large, 9.5–14.5 mm long, bifid about 1/4 of their length, white; filaments 5.5–6.0 mm long, anthers 0.9 mm long; styles 3.7–4.0 mm long; capsules 12.0–16.1 mm long, 2.0–2.4 mm wide, curved; seeds dark red-brown, tuberculate, 1.0–1.2 mm in diameter; chromosome number $2n = 34$ (Beaman et al., 1962).

DISCUSSION: *Cerastium juniperorum* has perhaps the most limited range of any species of *Cerastium* in Mexico or Central America. As far as is known, it is restricted to a few square kilometers in the Sierra de los Cuchumatanes, in west-central Guatemala, where it is not uncommon in pine and juniper woodlands at elevations of between 3050 and 3700 m (Figure 1C.)

Standley and Steyermark (1944), in their original description of the species, stated that it is perhaps only an extreme form of *Cerastium guatemalense* but that the latter has a much smaller calyx and that its cauline leaves are much narrower. Indeed, these are two outstanding differences between the species, but they are only two of many. Others can be seen when the respective descriptions are compared.

SPECIMENS EXAMINED: **Guatemala.** HUEHUETENANGO: Sierra de los Cuchumatanes at km. 311 on Ruta Nacional 9N (between Paquix and Chémal), alt. ca. 3360

m, *Beaman 2973* (GH, MSC, TEX, UC, US); Sierra de los Cuchumatanes, between Tojiah and Chémal at km. 320 on Ruta Nacional 9N, alt. ca. 3365 m, *Beaman 3748* (ENCB, GH, MSC, TEX, UC, US); Sierra de los Cuchumatanes, ca. 3 km south of road between Llano San Miguel and Todos Santos, from a point 2.5 km west of Llano San Miguel, near highest point in Cuchumatanes, alt. ca. 3680 m, *Beaman 3974* (MSC); Sierra de los Cuchumatanes, side of cliff 2 km north of km. 299 on road to San Juan Ixcoy, alt. ca. 3350 m, *Good 1024* (MSC); Sierra de los Cuchumatanes, along road to Todos Santos, alt. ca. 3050 m, *Good 1025* (MSC); along road in region of Chémal, Sierra de los Cuchumatanes at km. 36, alt. ca. 3300 m, *Standley 81687* (F); near Tunimá, Sierra de los Cuchumatanes, alt. 3300–3500 m, *Steyermark 48262* (F); alpine area in vicinity of Tunimá, Sierra de los Cuchumatanes, alt. 3400–3500 m, *Steyermark 48413* (F, holotype); between Tojquia and Caxin bluff, summit of Sierra de los Cuchumatanes, alt. ca. 3700 m, *Steyermark 50192* (F).

8. **Cerastium madrense** Watson, Proc. Amer. Acad. Arts 23: 269. 1888. TYPE: MEXICO. Chihuahua: On cool summits of the Sierra Madre, 7 October 1887, *Pringle 1504* (HOLOTYPE: GH).

Plant perennial; stems 15–35 cm tall, much branched from the base, not so above, erect, glandular-pilose, often more or less lanate near the base; basal rosette prominent. Basal and sterile leaves oblanceolate, obovate or spatulate, 10.0–60.0 mm long, 4.0–12.0 mm wide, acute, lanate, particularly basally and beneath; cauline leaves much smaller, 8.0–20.0 mm long, 2.0–5.0 mm wide, lanceolate, acute, pilose, tending toward lanate particularly toward the base of the plant, much shorter than the rather long internodes (upper internodes 29.0–85.0 mm long); cymes 4–13 flowered, large, open; bracts not scarious-margined; pedicels very long, the lowermost (longest) 18.0–32.0 mm long, the upper ones 5.0–10.0 mm long, glandular-pilose, apically hooked when in fruit; sepals lanceolate, 4.5–6.2 mm long, 1.2–1.8 mm wide, acute, scarious-margined except at the apex, glandular-pilose; petals large, 7.8–11.1 mm long, bifid about 1/5 of their length, white; filaments 6.0–6.2 mm long, anthers 0.8 mm long; styles 4.0–4.2 mm long; capsules 7.6–11.9 mm long, 2.1–3.0 mm wide, curved; seeds dark brown, 0.9–1.3 mm in diameter, densely tuberculate; chromosome number unknown.

DISCUSSION: As far as can be discerned from the specimens examined, *Cerastium madrense* is found in moist *Pinus* and *Quercus* forests at elevations of between 2900 and 3200 m in the states of Chihuahua and Durango (Figure 1B).

SPECIMENS EXAMINED: **Mexico.** CHIHUAHUA: cool summits of the Sierra Madres, *Pringle 1504* (GH, holotype). DURANGO: north slopes of Cerro Huehueto (Huehuento), south of Huachicheles, ca. 75 mi west of C. Durango, alt. 2900–3150 m, *Maysilles 7241* (MICH); north slopes of Cerro Huehueto (Huehuento), ca. 75 mi west of C. Durango, alt. 2900–3150 m, *Maysilles 7250* (MICH); north slopes of Cerro Huehueto (Huehuento), south of Huachicheles, ca. 75 mi west of C. Durango, alt. 2900–3150 m, *Maysilles 7276* (DS, MICH, TEX); San Luis del Río, 51 road miles northwest of Coyotes, *Maysilles s.n.* (F, GH, NY, US).

9. **Cerastium nutans** Rafinesque, Prec. Decouv., p. 36. 1814. TYPE: UNITED STATES. "en Pensylvanie" (not seen).

Cerastium nutans var. *genuinum* Rohrbach (lusus 1), Linnaea 37: 289. 1873. TYPE: same as above.

Cerastium longepedunculatum Muhlenberg (nom. nud.), Cat., p. 47. 1813. TYPE: UNITED STATES. "Pens." (not seen).

Cerastium apricum Schlechtendal (with varieties *angustifolium* and *brachycarpum*), Linnaea 12: 208. 1838. *Cerastium nutans* var. *apricum* Rohrbach, Linnaea 37: 1873. *Cerastium longepedunculatum* var. *apricum* Briquet, Ann. Conserv. Jard. Bot. Genève 13 & 14: 381. 1911. TYPE: MEXICO. state unknown: "Jalapam", May, June (year not known), *Schiede s.n.* (HOLOTYPE: HAL?), (not seen).

Cerastium ripartianum Schultz, Flora 45: 458. 1862. TYPE: MEXICO. state unknown: "Hab. in Mexico, unde cl. *Schaffner,* absque nomine, misit", (not seen).

Cerastium cuspidatum Hemsley, Diag. Pl. Nov., p. 21. 1878. TYPE: MEXICO: state unknown: "in Convalli Mexici", *Schaffner 60* (HOLOTYPE: K) (not seen).

Cerastium sericeum Watson, Proc. Amer. Acad. Arts 20: 354. 1885. TYPE: UNITED STATES. Arizona: "Huachuca Mountains, 8000 ft", *Lemmon & Lemmon s.n.,* 1882, and "Santa Rita Mountains", *Pringle s.n.,* 1884 (not seen).

Plant annual; stems 15–50 cm tall, often much branched; branches erect or decumbent, pilose, usually more or less glandular-pilose, sometimes more or less lanate below; internodes longest just below the inflorescence, gradually shorter toward the base, usually longer than, though sometimes shorter than, the leaves; leaves largest near the base of the plant, gradually smaller upward, lanceolate to ovate or spatulate, 7.0–60.0 mm long, 2.0–25.0 mm wide, acute or obtuse, often somewhat thin, pilose or glandular-pilose; basal rosette lacking; cymes 2–25 flowered, bracts not scarious-margined; the lowermost pedicels the longest, 11.0–37.0 mm long, upper ones shorter, distally hooked when in fruit, glandular-pilose; petals shorter than to much longer than the sepals

(the petal/sepal ratio being 0.95–1.95), 3.6–10.3 mm long, bifid about 1/4 of their length, white; filaments 2.5–4.0 mm long, anthers 0.3 mm long; styles 2.0–3.0 mm long; capsules 6.0–13.2 mm long, 1.5–3.5 mm wide, curved; seeds 0.7–1.0 mm in diameter, tuberculate; chromosome number $2n = 34$ (Beaman et al., 1962) or $2n = 35–36$ (Söllner, 1952, 1954).

DISCUSSION: *Cerastium nutans* is the most widely distributed species of *Cerastium* in Mexico. It has been collected throughout the upland areas (1700–3660 m) except in the northeastern part of the country. Collections have been made in the states of Chiapas, Chihuahua, Distrito Federal, Durango, Guerrero, Hidalgo, Jalisco, México, Michoacan, Morelos, Oaxaca, Puebla, San Luis Potosí, Sonora, and Veracruz. To the south of Mexico, the species is known only from Guatemala (Chimaltenango and San Marcos), and to the north it is found as far as southwestern Quebec and British Columbia (Fernald, 1950) (Figure 1D). The habitat includes such areas as roadsides, woodlands, and rocky hillsides, almost always below timberline.

Not only is *Cerastium nutans* the most widely distributed *Cerastium* in Mexico, it is also the most variable. Some attempt might be made at using this variation to define varietal or even specific boundaries, but in most cases the material available for this study showed too much intergradation between extremes. There was also too little material on which to base sound taxonomic judgement. I will therefore content myself here with describing the variation without assigning any taxonomy to it.

The typical *Cerastium nutans* is a rather large, robust, much branched plant with fairly thin, lanceolate to ovate leaves. It has fairly long pedicels (usually well over 17 mm long) and moderately sized sepals (4.0–5.0 mm long). The petals are usually equal to or slightly longer than the sepals. This form is found from western Guatemala north through the central highland of Mexico and into the United States and Canada. From this typical form, specimens vary in several ways, as described below:

a. In the Sierra Madre Occidental of western Mexico and in the trans-Mexican volcanic belt (Clausen, 1959) there is a tendency for the petals to increase considerably in size, reaching almost twice the length of the sepals. This tendency is also seen in some parts of the United States (Correll and Johnston, 1970).

b. In central and southern Mexico, particularly Michoacan, specimens have been collected which have generally shorter pedicels (13.0–19.0 mm long) and slightly smaller flowers than the typical. These characteristics combine to give the plants to some extent the aspect of *Cerastium brachypodum* with which these specimens have often been confused. However, they are clearly not of that species since, even in these characters, they much more closely approach *C. nutans*.

c. Apparently restricted to the high mountains of Jalisco and Guerrero is a variant which is usually fairly small and has rather small, pale, rhomboidal leaves covered with a distinctively long, glandular-pilose pubescence. Its pedicels are short (12.0–23.0 mm long) and it has fairly large petals (5.2–7.1 mm long).

d. In northern Oaxaca a similar set of specimens has been collected but these have elliptical leaves and lack the distinctive pubescence described above.

e. Also in central Mexico can be found plants with very narrow, attenuate leaves and small flowers.

f. A form found in western Chihuahua and eastern Sonora, is characterized by very few, small flowers (sepals 2.9–4.0 mm long, petals 3.9–4.0 mm long), short, broad capsules (6.0–8.6 mm long, 1.8–2.8 mm wide) and long, linear to lanceolate leaves (the length to width ratio averaging 11.5, as opposed to 4.4 for all other specimens of *C. nutans*).

g. The last variant bears varying amounts of lanate pubescence on the lower parts of the stem and lower leaves. This group is probably referable to the binomial *C. sericeum,* described from the Huachuca and Santa Rita Mountains of Arizona (Watson, 1885). Aside from the lanate pubescence, Watson, and later Robinson (1897), separated it from *C. nutans* because its "seeds are twice larger and more coarsely tuberculate." Kearney and Peebles (1939), however, stated that "intergradation in pubescence [between *C. sericeum* and *C. nutans*] is complete in Arizona specimens" and therefore desribed the specimens as a variety of *C. nutans, C. nutans* var. *obtectum.* This situation is also seen in the Mexican specimens which vary from extremely lanate basally (*Knobloch 5915*) through less lanate (*Ibana G. 416* and *Knobloch 5750*) to only slightly lanate (*Townsend & Barber 160, Phillips 672,* and *Nelson 6122*). Kearney and Peebles also stated that "the two forms are not constantly distinguishable by the seed characters mentioned by Robinson

(1897)." In Mexico, specimens showing lanate pubescence are found in Chihuahua, eastern Sonora, and Durango.

REPRESENTATIVE SPECIMENS: **Guatemala.** CHIMALTENANGO: Sierra Santa Elena, bei Tecpam Guatemala, *Seler 2362* (GH). SAN MARCOS: Volcán Tacaná, east side of mountain at La Haciendita, alt. ca. 3375 m, *Beaman 3188* (GH, MSC). **Mexico.** CHIAPAS: slopes on southeastern side of Zontehuitz near summit, Municipio de Chamula, alt. ca. 9400 ft, *Breedlove 6703* (DS, F); near summit of Chuchil Ton, northeast of Bochil, Municipio de San Andres Larranizar, alt. ca. 2700 m, *Breedlove 26786* (DS, LL, MO). CHIHUAHUA: Mojarachic, *Knobloch 5720* (MSC); Mojarachic, *Knobloch 5915* (MSC); Majalca Cañon, *LeSueur 466* (F, GH, TEX); foothills of the Sierra Madres near Colonia Juárez, *Nelson 6122* (GH, US); Cerro Mohinora, 10 mi south of Guadeloupe y Calvo, alt. 2300–2400 m, *Straw & Forman 1960* (MICH); near Colonia García in the Sierra Madres, alt. ca. 7300 ft, *Townsend & Barber 160* (F, GH, MICH, MO, MSC, NY, TEX, UC, US). DISTRITO FEDERAL: Cañada de Contreras, alrededores del 4° dinamo, alt. ca. 3000 m, *Rzedowski 20411* (ENCB, MSC). DURANGO: ca. 5 mi north of railroad at Coyotes (45 airline mi west of C. Durango), west facing slopes of broad arroyo, tributary to Río del Presidio, alt. ca. 2400–2500 m, *Maysilles 7118* (NY). GUERRERO: near Toro Muerto, Distrito Mina (Galeana), *Hinton 11231* (GH, MICH, NY, US). HIDALGO: Distrito Pachuca, Municipio Mineral del Chico, below Parque Nacional El Chico, *Moore 1554* (GH, UC). JALISCO: Nevado de Colima (Nevado de Zapotlán), a few mi. south of Ciudad Guzman (Zapotlán), alt. ca. 3080 m, *Gregory & Eiten 287* (GH, MICH, MO, MSC, NY). MEXICO: Salto de Agua, *Purpus 1668* (F, GH, NY, UC, US); northwest slopes of Nevado de Toluca, 10 km (by road) southwest of junction of roads to Sultepec and Temascaltepec on Hwy. 130 to Temascaltepec or 27 km (by road) southwest of Toluca, alt. ca. 3000 m, *Roe, Roe & Mori 273* (ENCB, MICH, US, WIS). MICHOACAN: at the southwest side of Cerro San Andres, ca. 12 km (straight line distance) north of Ciudad Hidalgo, alt. ca. 3100 m, *Beaman 4318* (GH, MSC, NY, TEX, UC, US). MORELOS: along Rte. 95, 12 mi north of Cuernavaca toward Mexico City, *Powell & Edmondson 732* (F, MICH, TEX); Lagunas de Zempoala, alt. ca. 2775 m, *Villamar s. n.* (ENCB, MSC). OAXACA: Llano de las Flores, on the Oaxaca-Valle Nacional highway 20 km east of Ixtlán, alt. ca. 2870 m, *Beaman 3711* (GH, MSC, US). PUEBLA: vicinity of San Luis Tutitlanapa, *Purpus 2720a* (F, GH, MO, NY, UC, US). SAN LUIS POTOSI: region of San Luis Potosí, alt. 6000–8000 ft, *Parry & Palmer 47* (GH, NY, US). SONORA: between Las Lierritas and El Tigre, region of the Río de Bavispe, *Phillips 672* (GH, MICH). VERACRUZ: Mt. Orizaba, Sierra Negra, alt. ca. 11,800 ft, *Balls & Gourlay B4436* (MICH, UC).

10. **Cerastium orithales** Schlechtendal, Linnaea 12: 209. 1838. TYPE: MEXICO. state unknown: "in regione subnivale montis Orizaba", September (year not known), *Schiede s. n.* (HOLOTYPE: HAL?) (not seen).

Cerastium arvense var. *orithales* (Schlechtendal) Rohrbach, Linnaea 37: 305. 1873. TYPE: same as above.

Cerastium mutabile var. *arvense* f. *angustatum* Grenier, in part, Monogr. Cerast., p. 68. 1841. TYPE: "Hab. in America boreali; in Siberia (DC. herb); in Pyrenaeis (Grenier); in alpibus; (ex nonullis bot. hortis etiam habui)" (not seen).

Plant perennial; stems 15–50 cm tall, branched at the base or not, never branching above; branches very slender, usually held up by surrounding grasses, more or less short glandular-pilose; internodes much longer than the adjacent leaves near the inflorescence, gradually becoming shorter basally until the leaves become densely clustered; basal rosette lacking. Leaves more or less similar throughout, sometimes smaller just below the inflorescence, linear to lanceolate, 15.0–25.0 mm long, 2.0–4.0 mm wide, acute, densely short glandular-pilose; cymes 1–6 flowered, bracts not scarious-margined; pedicels various, 7.2–30.0 mm long, densely pubescent with short glandular sub-reflexed hairs; sepals lanceolate to broadly lanceolate or ovate, 6.0–7.5 mm long, 2.0–3.0 mm wide, acute, scarious-margined except at the apex, glandular-pilose; petals large, 12.0–18.5 mm long, bifid about 1/4 of their length, white; filaments 6.1–7.3 mm long, anthers 0.8 mm long; styles 4.0–4.9 mm long; capsules 13.5–17.0 mm long, 2.6–3.2 mm wide, curved; seed 0.9–1.2 mm in diameter, apparently only sparingly tuberculate, dark red-brown; chromosome number $2n = 36$ (Beaman et al., 1962).

DISCUSSION; *Cerastium orithales* is found at elevations between 3600 and 4100 m on Ixtaccihuatl, Pico de Orizaba, Sierra Negra, and Cofre de Perote (all in central Mexico) (Figure 4A). The species is restricted in habitat to grassy floors of open forest (almost invariably *Pinus hartwegii* forests) just below timberline. Specimens were collected by the author on Cofre de Perote in open meadows (*Good 1019*), but these meadows were the result of the recent clear-cutting of the native pine forest.

SPECIMENS EXAMINED: **Mexico.** MEXICO: Joya de Alcalicán, extremo sur del Ixtaccihuatl, alt. ca. 3900 m, *Aldanda A. 47* (ENCB); Ixtaccihuatl, northwest side of mountain above San Rafael, alt. ca. 3810 m, *Beaman 2844* (GH, MSC, TEX, UC, US). PUEBLA: Sierra Negra (adjacent to Pico de Orizaba), west side of mountain, alt. ca. 3880 m, *Beaman 2523* (F, GH, MSC, UC); Pico de Orizaba, north of Alberque Piedra Grande, alt. ca. 3950 m, *Beaman 3643* (GH, MSC, UC, US); Pico de Orizaba, north side of mountain, ca. 3 km southeast of Villa Hidalgo, alt. ca. 3780 m, *Beaman 3649* (ENCB, GH, TEX, UC, US); along the road down the east side of the Paso de Cortés, alt. ca. 3660 m, *Good 1018* (MSC); north side of Pico de Orizaba,

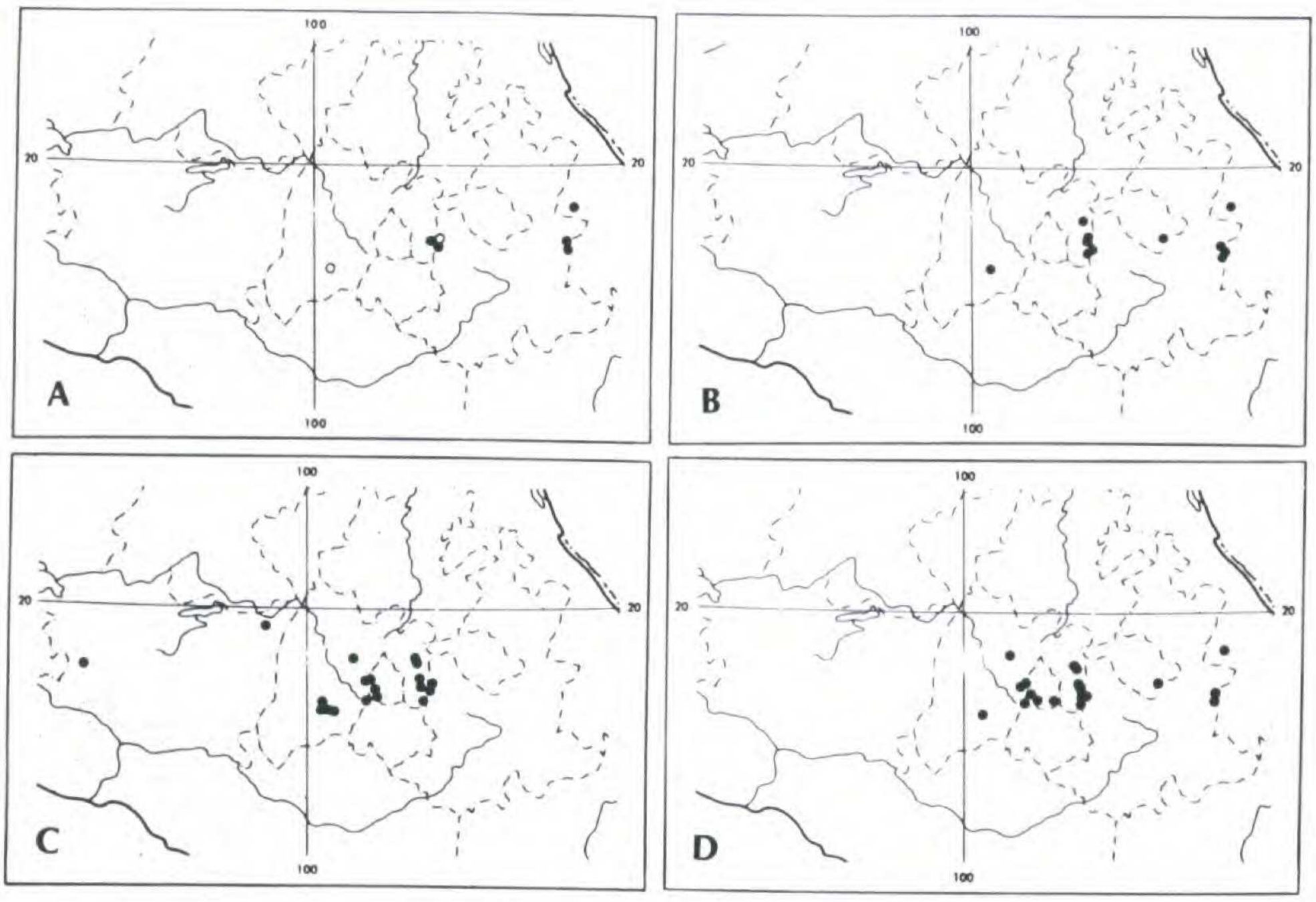

Figure 4. Distribution in central Mexico of *Cerastium*. **A.** *C. orithales* (closed circles) and *C. purpusii* (open circles); **B.** *C. ramigerum;* **C.** *C. tolucense;* and **D.** *C. vulcanicum*. There is also a single specimen of *C. vulcanicum* from Guatemala.

Murry 64 (MSC); Mt. Orizaba, alt. ca. 12,000 ft, *Pringle 8551* (ENCB, F, GH, MICH, MO, MSC, NY, UC, US). VERACRUZ: Cofre de Perote, east side of mountain, alt. ca. 3930 m, *Beaman 2159* (F, MSC, UC); ladera este del Cofre de Perote, alt. ca. 4000 m, *Dorantes L. 331* (CAS, GH); Cofre de Perote, *Nelson 28* (US). STATE UNKNOWN: Mt. Orizaba, alt. 13,000–13,400 ft, *Nelson 283* (US); Ixtaccihuatl, alt. 11,000–12,000 ft, *Purpus 268* (GH, MO, UC, US); Citlaltepetl, *Purpus 2803* (F, GH, MO, NY, UC, US). Mt. Orizaba, *Rose & Hay 5756* (US); Mt. Orizaba, alt. ca. 13,000 ft, *Seaton 236* (F, GH, NY, US).

11. **Cerastium purpusii** Greenman, Zoe 5: 183. 1904. TYPE: MEXICO. state unknown: Mt. Ixtaccihuatl, 1903, *Purpus 472* (HOLOTYPE: GH; ISOTYPES: MO, UC, US).

Cerastium molle Bartling *in* Presl, Rel. Haenk. 2: 17. 1831. (non *C. molle* Villars, Hist. Pl. Dauphine 3: 644. 1789). TYPE: MEXICO. state unknown: *Haenke s. n.* (HOLOTYPE: PR; photograph of holotype in MICH).

Cerastium lanuginosum Sessé & Mociño, Fl. Mex., ed. 2, p. 118. 1894. (non *C. lanuginosum* Willdenow *ex* Reichenbach, Fl. Germ. Excurs., p. 797. 1832.) TYPE: MEXICO. Mexico: "habitat in Vulcano Tolucae" (not seen).

Plant a short-lived perennial, low, dense, caespitose; stems to 20 cm tall, usually less than 10 cm, much branched at the base, not

otherwise; branches pilose to lanate; internodes usually, though not always, shorter than the leaves; cauline leaves broadly lanceolate to ovate, 5.0–15.0 mm long, 2.0–6.0 mm wide, often largest just below the inflorescence, usually acute, pilose or lanate; basal rosette often present; basal leaves larger, to 35.0 mm long and 10.0 mm wide, lanate, acute, lanceolate to spatulate; cymes 1–10 flowered, flowers more or less densely crowded at the apex of each branch; bracts not scarious-margined; pedicels less than 10 mm long, pilose; sepals 4.2–7.8 mm long, 1.3–1.8 mm wide, lanceolate, acute, pilose, never glandular, margins narrowly scarious except at the apex; petals 6.0–10.6 mm long, bifid about 1/8 of their length, white; filaments 4.5–6.7 mm long, anthers 0.7 mm long; styles 3.0–3.3 mm long; capsules 7.2–10.3 mm long, 2.5–3.0 mm wide, curved; seeds 0.7–0.9 mm in diameter, densely tuberculate; chromosome number $2n = 34$ (Beaman et al., 1962).

DISCUSSION: *Cerastium purpusii* is one of the species of *Cerastium* living at the highest elevations of any in Mexico, being found only in the high, wet alpine meadows between 3650 and 4610 m on Nevado de Toluca and Ixtaccihuatl, central Mexico (Figure 4A).

The binomial *Cerastium molle* Bartling *in* Presl, commonly used for the species here described as *C. tolucense,* was originally used for this species. However, since Villars used the name *C. molle* in 1789 (42 years before Bartling used it), Bartling's name is not valid.

The name *Cerastium lanuginosum* was published in 1894 by Sessé and Mociño for a plant bearing the description of *C. purpusii*; this binomial antedates *C. purpusii* by ten years. However, the fact that *C. lanuginosum* Willdenow *ex* Reichenbach (probably synonomous with *C. alpinum* Linnaeus) was published in 1832, 62 years before the Sessé and Mociño publication, prohibits its use for the Mexican species.

REPRESENTATIVE SPECIMENS: **Mexico.** MEXICO: Nevado de Toluca, near large lake in the crater, alt. ca. 4140 m, *Beaman 1882* (F, GH, MICH, MSC, NY, TEX, UC, US). PUEBLA: Ixtaccihuatl, alpine region, *Purpus 472* (GH, holotype; MO, UC, US, isotypes).

12. **Cerastium ramigerum** Bartling *in* Presl, Rel. Haenk. 2: 16. 1831. TYPE: MEXICO, state unknown: *Haenke s. n.* (HOLOTYPE: PR; photograph of holotype in MICH).

Cerastium lithophilum Greenman, Zoe 5: 183. 1904. TYPE: MEXICO. state unknown: Mt. Ixtaccihuatl, July 1903, *Purpus 231* (HOLOTYPE: GH; ISOTYPES: MO, UC, US).

Plant perennial; stems 5–25 cm tall, often much branched at the base, sometimes above; sometimes more or less caespitose; branches glandular-pilose; internodes very long just below the inflorescence, very short basally, grading in between; leaves more or less similar throughout, lanceolate to broadly lanceolate, often erect and close to the stem, 10.0–30.0 mm long, 3.0–6.0 mm wide, acute, glandular-pilose; basal rosette lacking; cymes 1–8 flowered, bracts not scarious-margined; pedicels short, 2.2–10.6 mm long, densely pubescent with short glandular subreflexed hairs; flowers nodding; sepals lanceolate, 4.1–5.8 mm long, 1.6–2.2 mm wide, acute, scarious-margined except at the apex; petals 6.4–10.3 mm long, bifid about 1/3 of their length, white; filaments 3.6–4.0 mm long, anthers 0.3 mm long; styles 1.2–1.6 mm long; capsules 7.0–10.8 mm long, 2.0–2.4 mm wide, curved; seeds 0.5–0.7 mm in diameter, light brown, tuberculate; chromosome number $2n = 36$ (Beaman et al., 1962).

DISCUSSION: This is a species of very high elevations (3660 to 4720 m) on Nevado de Toluca, Ixtaccihuatl, Popocatepetl, Tlaloc, Malinche, Pico de Orizaba, and Cofre de Perote in the states of México, Puebla, Tlaxcala, and Veracruz (Figure 4B). It is restricted to the high alpine meadows and barrens on those mountains and is sometimes found approaching the upper limit of vascular plants. One collection from Orizaba (*Swan s. n.*) bears the phrase "in forests only" but this is atypical.

At present this species is referred to (in floras, etc.) as *Cerastium lithophilum*. However, the binomial *C. ramigerum* has precedence.

REPRESENTATIVE SPECIMENS: **Mexico.** MEXICO: Nevado de Toluca, shore of large lake in the crater, alt. ca. 4140 m, *Beaman 1878* (F, GH, MICH, NY, TEX, UC, US); Tlaloc, near summit of mountain, alt. 4100–4140 m, *Beaman 2333* (GH, MSC, NY, TEX, US); Ixtaccihuatl, south side of mountain, alt. ca. 4410 m, *Beaman 2550* (MICH, MSC, NY); Municipio Amecameca, slopes of Popocatepetl between 10,000 and 12,000 ft, *Gilly & Dodds 20* (MICH, MSC). PUEBLA: north side of Popocatepetl, above timberline, *Beaman 1727* (GH, MSC); Ixtaccihuatl, south side of mountain, ca. 7 km north of Paso de Cortes, alt. ca. 4300 m, *Beaman 2875* (MSC). Pico de Orizaba, north side of mountain at Alberque Piedra Grande, alt. ca. 4275 m, *Beaman 3631* (GH, MSC); Ixtaccihuatl, south side of mountain on the south side of Cerro Amacuilecatl, alt. ca. 4300 m, *Beaman 4233* (MSC). TLAXCALA: Malinche, crest of north rim of crater, alt. 4400–4450 m, *Beaman 2241* (MICH, MSC, TEX, UC, US). VERACRUZ: Pico de Orizaba, south side of mountain, north of Cueva del Muerto, *Beaman 1765* (GH, MSC, US); Cofre de Perote, east side of mountain, alt. ca. 3930 m, *Beaman 2158* (GH, MSC, NY, TEX, US).

13. **Cerastium sinaloense** D. A. Good, *sp. nov.* TYPE: MEXICO. Sinaloa: Los Pucheros, Sierra Surotato, alt. 5500–6500 ft, 17–24 March 1945, *Gentry 7224* (HOLOTYPE: GH; ISOTYPES: F, US). (Figure 2).

Planta perennis. Caules usque ad 40 cm alti, basi ramosi. Rami erecti, glanduloso-pilosi. Internodia basi brevissima, inflorescentiam versus longissimascentia. Rosula basalis absens sed folia infima aggregatissima, magna, 30.0–65.0 mm longa, 7.2–18.2 mm lata, spathulata, acuta. Folia superiora pauca (1–3 paria per ramum), parviora, 4.0–28.7 mm longa, 1.2–7.6 mm lata, lanceolata usque ovata, acuta. Omnia folia plus minusve pilosa. Cymae 2–8 floribus, apertae. Pedicelli longi, glanduloso-pilosi, non uncati ubi fructificantes. Sepala lanceolata ad late lanceolate, 4.0–7.2 mm longa, 1.1–2.0 mm lata, praeter apicem scarioso-marginata, glanduloso-pilosa. Petala maxima, 10.0–17.5 mm longa, bifida per circa 1/8 longitudinem, alba. Filamenta 6.4–7.0 mm longa. Antherae 1.1 mm longae. Styli 4.7–5.5 mm longi. Capsulae 11.2–14.2 mm longae, 2.8–3.3 mm latae, rectae, dentibus recurvatis. Semina 0.5–0.6 mm diametro, tuberculata. Chromosomatum numerus non cognitus.

Cerastium sinaloense is characterized by having broad, spatulate leaves crowded at the base of the plant (not in a rosette), very large flowers, and straight, revolute-toothed capsules.

DISCUSSION: *Cerastium sinaloense* has been collected only in the pine-oak forests of the Sierra Surotato in northern Sinaloa, near Rosario in southern Sinaloa, and in the Sierra de Manantlán in Jalisco (Figure 1C). It has been collected only at relatively low elevations, between 1680 and 2250 m.

Three specimens, one from northern Sinaloa (*Gentry 7234*), one from southern Sinaloa (*Norris et al. 20466*), and one from Jalisco (*McVaugh 23172*), while obviously allied with *Cerastium sinaloense, C. sordidum* and *C. texanum* by the presence of straight capsules with revolute teeth, are atypical of *C. sinaloense* in that they have far smaller flowers. They do, however, match *C. sinaloense* more closely in general habit and in distribution than they do either *C. sordidum* or *C. texanum.* Whether they merely represent variation within *C. sinaloense* or are in fact specimens of a fourth and as yet undescribed species is not discernible from the limited material at hand.

SPECIMENS EXAMINED: **Mexico**. JALISCO: Sierra de Manantlán (25–30 km southeast of Autlán), along lumber roads 5 km east of the road crossing called "La Cumbre" between El Chante and Cuzalapa, alt. 2000–2250 m, *McVaugh 23172* (ENCB, MICH). SINALOA: east slope of Sierra Madre Occidental, 2.2 mi east of La Palmita, ca. 47 mi east of Concordia on Mexico 40, Municipio de Rosario, alt. ca. 6450 ft, *Breedlove 1710* (DS, MICH); Sierra Surotato, near settlement of Los Ornos along the road to Surotato, 53 mi east of Mocorito, alt. ca. 5800 ft, *Breedlove 15559* (MO, MSC); near settlement of El Triguito along the road from Los Ornos to Surotato, alt. ca. 6200 ft, *Breedlove 16474* (MSC); Sierra Surotato, below Buenas Juntas, 5 mi northwest of Los Ornos along the road to Mocorito, Municipio de Sinaloa y Vela, alt. ca. 5800 ft, *Breedlove 19194* (MSC); Sierra Surotato, 5 mi northeast of La Cienenga along the road to Santa Rita, Municipio de Badiraguato, alt. ca. 7000 ft, *Breedlove 19261* (MO, MSC); Los Pucheros, Sierra Surotato, alt. 5500–6500 ft, *Gentry 7224* (GH, holotype; F, US, isotypes); Los Pucheros, Sierra Surotato, alt. 5500–6500 ft, *Gentry 7234* (GH); along Hwy. 40, ca. 6 mi west of Las Palmitas, alt. ca. 7500 ft, *Norris et al. 20466* (CAS, MO); 4–8 mi west of Palmito on the Durango-Mazatlan Highway, *Oatman & Rowlett s. n.* (TEX).

14. **Cerastium sordidum** Robinson, Bot. Gaz. 30: 58. 1900. TYPE: MEXICO. Chihuahua: Sierra Madre 8 km southeast of Colonia García, alt. ca. 2310 m, 30 May 1899, *Townsend & Barber 40* (HOLOTYPE: GH; ISOTYPES: F, MO, MSC, TEX, UC, US).

Cerastium longepedunculatum var. *sordidum* Briquet, Ann. Conserv. Jard. Bot. Genève 13 & 14: 381. 1911. TYPE: same as above.

Plant perennial; stems to 40 cm tall, usually much less, erect or decumbent, branches primarily at the base but sometimes above; branches erect or decumbent, sparsely glandular-pilose; leaves mostly crowded basally with very short internodes, these becoming longer toward the inflorescence; lower leaves 18.0–35.0 mm long, 6.0–14.0 mm wide, ovate to spatulate, acute, glandular-pilose; upper leaves few, much shorter than the adjacent internodes, 9.0–19.0 mm long, 1.0–2.5 mm wide, linear to lanceolate, acute, glandular-pilose; basal rosette lacking; cymes more or less open, but relatively small, 3–10 flowered; lower pedicels 10.0–20.0 mm long, upper ones 4.0–10.0 mm long, glandular-pilose, not hooked when in fruit; sepals ovate, 3.0–5.7 mm long, 1.2–1.8 mm wide, acute, narrowly scarious-margined; petals 5.5–7.8 mm long, bifid about 1/8 of their length, white; filaments 4.6–6.3 mm long, anthers 1.0 mm long; styles 3.0–3.3 mm long; capsules 8.0–13.4 mm long, 2.2–3.0 mm wide, straight, teeth revolute; seeds red-brown, densely tuberculate, 0.6–0.8 mm in diameter; chromosome number unknown.

DISCUSSION: The only specimen of *Cerastium sordidum* seen during this study bearing any mention of habitat was *Spaulding et al. s. n.* which listed "spruce stand". The species has been collected from Mexico only in Chihuahua (Figure 1C). It is also known from the pine forests of the Chiricahua and Santa Rita Mountains of Arizona (Kearney and Peebles, 1969).

Briquet (1911) stated that *Cerastium sordidum* is not separable from *C. longepedunculatum* (a synonym for *C. nutans*) and therefore coined the name *C. longepedunculatum* var. *sordidum*. He stated that "il existe en effet tous les intermediares a corolle reduite, parfois meme nulle" ("in fact there exist all intermediate forms in regard to reduced corolla, occasionally even none at all"). While I have never seen a specimen with no corolla, the rest of this statement is quite true, as far as it goes. *Cerastium nutans*, in fact, varies considerably in corolla length (see above). If this were the primary distinguishing character between the two species, I would agree with Briquet's diagnosis. However, since other characters such as the straight, revolute-toothed capsule and the shape and distribution of leaves are of greater importance, there is no reason to consider *C. sordidum* and *C. nutans* conspecific.

Briquet (1911) mentioned three specimens from Oaxaca (*Galeotti 4410, Galeotti 4428* and *Jurgensen 15*) as being ascribable to *Cerastium longepedunculatum* var. *sordidum*. Although I have not seen these specimens, no other indication of any plant resembling *C. sordidum* has been found south of Chihuahua. It is therefore likely that Briquet was mistaken about the identity of these three specimens and that they were actually *C. nutans*.

SPECIMENS EXAMINED: **Mexico.** CHIHUAHUA: Mojarachic, *Knobloch 5037* (F, MSC); El Rialito spruce stand, 5 km south-southwest of San Juanito, alt. ca. 2400 m, *Spaulding, Martin & Wiseman s. n.* (ENCB); in the Sierra Madre 8 km southeast of Colonia García, alt. ca. 2310 m, *Townsend & Barber 40* (GH, holotype; F, MO, MSC, TEX, UC, US, isotypes).

15. **Cerastium texanum** Britton, Bull. Torrey Bot. Club 15: 97. 1888. TYPE: "Hills, Blanco", March, April (year not known), *Wright 69* (HOLOTYPE: NY?) (not seen).

Stellaria montana Rose, Contr. U. S. Natl. Herb. 1: 93. 1891. TYPE: MEXICO. Sonora: Alamos Mountains, *Palmer s. n.* (HOLOTYPE: US) (not seen).

Plant perennial; stems very slender, erect or decumbent, much branched basally, not so above, 15–35 cm tall, sparsely glandular-pilose; internodes nowhere long (to 60 mm) but longest toward the inflorescence, almost nonexistent at the base; basal rosette lacking but lower leaves very crowded, large, 8.0–55.0 mm long, 3.0–16.0 mm wide, broadly spatulate, acute or obtuse, sometimes acuminate, very sparsely pilose, often turning pale orange-brown with age; upper leaves few or lacking, small, 4.0–8.0 mm long, 1.0–2.0 mm wide, linear to lanceolate, pilose; cymes very open and loose, 8–25 flowered; pedicels 5.1–18.0 mm long, the lowest ones the longest, very slender, glandular-pilose; sepals lanceolate to ovate, 3.0–5.1 mm long, 1.0–2.0 mm wide, glandular, scarious-margined except at the apex, turning light orange-brown when in fruit; petals 4.1–5.4 mm long, narrow, bifid about 1/8 of their length, white; filaments 4.5 mm long, anthers 0.4 mm long; styles 1.2 mm long; capsules small, only slightly exserted beyond the calyx, 4.2–6.8 mm long, 1.8–2.1 mm wide, straight, teeth revolute; seeds red-brown, 0.4–0.6 mm in diameter, densely tuberculate; chromosome number unknown.

DISCUSSION. *Cerastium texanum* is found near watercourses in canyons (Tidestrom and Kittel, 1941) or in open oak woods (Correll and Johnston, 1970). The only specimens from Mexico seen in this study with habitat data say "igneous rocky canyon slope in pine forest" (*Gentry 7991*) and "talus slope" (*Moran 20425*). *Cerastium texanum* is found at lower elevations than any other native *Cerastium* species in Mexico or Central America, having been collected at between 1275 and 1980 m in Baja California, Chihuahua, and Sonora (Figure 1C). North of Mexico this species is found north to Coconino and Apache counties, Arizona (Kearney and Peebles, 1969) and the Edwards Plateau of Texas (Correll and Johnston, 1970).

SPECIMENS EXAMINED: **Mexico.** BAJA CALIFORNIA SUR: San Julio Cañon, *Brandegee s. n.* (UC); lower north slope of Volcán las Tres Virgenes, alt. ca. 1275 m, *Moran 20425* (ENCB, LL, MO). CHIHUAHUA: Arroyo Hondo, Sierra Charuco, alt. 4500–5500 ft, *Gentry 7991* (US); Puerta de San Diego, alt. ca. 6500 ft, *Hartman 593* (CAS, F, GH, NY, UC). SONORA: San Bernardo, Río Mayo, *Gentry 1253* (GH); Sierra de los Alamos, *Palmer 293* (MICH, UC, US). arroyo in Sierra de Alamos, in vicinity of Alamos, *Rose et al. 12975* (NY, US).

16. **Cerastium tolucense** D. A. Good, *sp. nov.* TYPE: MEXICO. Mexico: Nevado de Toluca, north side of mountain, 0.7 mi east of point where road goes above timberline, alt. ca. 3985 m, 28 July 1958, *Beaman 1921* (HOLOTYPE: MSC; ISOTYPES: GH, MICH, TEX, US). (Figure 2).

Planta perennis. Caules usque ad 35 cm alti sed plerumque minus quam 20 cm, erecti vel ascendentes, basi profuse ramosi, non superne. Rami pilosi usque lanati, praesertim basi et ad nodos lanati. Internodia proxima infra inflorescentiam longissima, plerumque (praeter aliquot specimina juvenia) multo longiora quam folia. Folia caulina plerumque parva, 5.0–30.0 mm longa, 1.0–5.5 mm lata, linearia usque lanceolata, acuta, plus minusve lanata. Rosula basalis praesens. Folia basalia majora, usque ad 60.0 mm longa et 10.0 mm lata, lanceolata usque late elliptica, acuta vel obtusa, plerumque praesertim basi dense lanata. Cymae 1–12 floribus. Bracteae non scarioso-marginatae. Pedicelli usque ad 25.0 mm longi, plerumque breviores, pilosi, interdum glanduloso-pilosi. Sepala 3.4–6.5 mm longa, 1.0–2.0 mm lata, elliptica, acuta, praeter apicem scarioso-marginata. Petala 4.5–11.6 mm longa, bifida per circa 1/8 longitudinem, alba. Filamenta 4.0–7.0 mm longa. Antherae 0.7 mm longae. Styli 3.0–4.0 mm longi. Capsulae 6.0–9.0 mm longae, 2.1–2.8 mm latae, curvae. Semina 0.7–0.9 mm diametro, tuberculata. Chromosomatum numerus $2n = 34$ (Beaman et al., 1962).

Cerastium tolucense is characterized by its non-caespitose habit, the presence of a basal rosette, usually extensive lanate pubescence, many cauline leaves, relatively large flowers, and curved capsules.

DISCUSSION: *Cerastium tolucense* is a species of fairly high mountains (3000 to 4000 m) in central Mexico, having been collected in the mountains of Distrito Federal, México, Michoacan, and Puebla (Figure 4C). Its habitat includes both alpine and subalpine meadows and, at slightly lower elevations, open *Pinus* forests.

Although the name *Cerastium molle* Bartling *in* Presl (1831) has, since its publication, been used exclusively for this species, examination of a photograph of the type indicates that the name is instead referable to what is here recognized as *C. purpusii.* Because

of this confusion, no description has been published for this species; I therefore describe it here as *C. tolucense.*

REPRESENTATIVE SPECIMENS: **Mexico.** DISTRITO FEDERAL: top of Cerro Ajusco, alt. ca. 3937 m, *Beaman 2773* (GH, MSC, US); Cerro Coyotes, cerca de Contreras, *Paray 300* (ENCB). Llano Grande, cerca del Desierto de los Leones, alt. ca. 3250 m, *Rzedowski 20496* (ENCB). MEXICO: Nevado de Toluca, north side of mountain, 0.7 mi east of point where road goes above timberline, alt. ca. 3985 m, *Beaman 1921* (MSC, holotype; GH, MICH, TEX, US, isotypes); Telapon (north of Ixtaccihuatl), south side of mountain, alt. 3450–3650 m, *Beaman 2431* (GH, MSC, TEX, UC, US); Ixtaccihuatl, south side of mountain between Altzomoni and La Joya, 0.7 km south of La Joya, alt. ca. 3980 m, *Beaman 3495* (GH, MSC); park area at junction of road to Temascaltepec and road to Nevado de Toluca, alt. ca. 10,500 ft, *Dunn et al. 22518* (MO); vertiente oeste del Ixtaccihuatl, alt. ca. 3800 m, *Espinosa 6* (CAS, ENCB, MSC); Cerro Tlaloc, Municipio de Tecaltitlán, alt. ca. 3000 m, *García S. s. n.* (MSC); Lerma, alt. ca. 3000 m, *Pina C.* 79 (ENCB); Nevado de Toluca, alt. 13,000 ft., —Palomas, Municipio de Iturbide (Santiago Tlazala), alt. ca. 3400 m, *Rzedowski 25912* (MSC). *Rzedowski 28562* (ENCB). MICHOACAN: summit of Cerro San Andres, ca. 12 km (straight line distance) north of Ciudad Hidalgo, alt. ca. 3589 m, *Beaman 4278* (GH, MSC, UC, US); Municipio Tancitaro, alt. ca. 12,600 ft, *Leavenworth 278* (F, GH, MO, NY). PUEBLA: Ixtaccihuatl, south side of mountain, ca. 6 km north of Paso de Cortés, alt. ca. 3900 m, *Beaman 2871* (MSC).

17. **Cerastium triviale** Link, Enum. Hort. Berol. 1: 433. 1821.

TYPE: not seen.

Cerastium vulgatum Linnaeus (nom. ambig.), Sp. Pl., ed. 2, p. 627. 1762. TYPE: "Habitat in Scandiae et Europae australioris pratis, areis" (photograph seen).

Cerastium caespitosum Gilibert (nom. ambig.), Fl. Lithuan. 2: 159. 1781. TYPE: LITHUANIA: not seen.

Cerastium holosteoides Fries (nom. ambig.), Novit., ed. 2, p. 126. 1823. TYPE: not seen.

Cerastium fontanum subsp. *triviale* (Link) Jalas, Arch. Soc. Zool.-Bot. Fenn. 'Vanamo' 18: 63. 1963. TYPE: not seen.

Plant weakly perennial; much branched, mostly basally; often caespitose; braches 10–25 cm long, decumbent, more or less long-pilose; internodes longest just below the inflorescence; leaves more or less similar throughout, ovate to spatulate, 7.0–30.0 mm long, 3.0–10.0 mm wide, acute, sometimes obtuse, pilose; basal rosette lacking; cymes usually quite dense, few to many flowered; bracts with scarious margins; pedicels short, 2.2–8.4 mm long, long-pilose; sepals lanceolate, 4.3–6.2 mm long, 1.0–1.6 mm wide, scarious-margined, acute, pilose; petals slightly shorter to slightly longer than the sepals, bifid about 1/3 of their length, white; filaments 3.7–4.0

mm long, anthers 0.3 mm long; styles 1.8–2.2 mm long; capsules 7.0–11.6 mm long, 2.1–3.0 mm wide, curved; seeds 0.5–0.7 mm in diameter, red-brown, tuberculate; chromosome number $2n = 72$ (Blackburn and Morton, 1957), 110 (Heitz, 1926), 126 (Hagerup, 1944, Blackburn and Morton, 1957), 136 (Brett, 1950), 137–147 (Brett, 1955), 140 (Taylor and Mulligan, 1968), 144 (Tischler, 1937; Heiser and Whittaker, 1948; Blackburn and Morton, 1957; Favarger, 1969; Löve, 1972), 160 (Favarger and Küpfer, 1968) or 180 (Blackburn and Morton, 1957). No counts have been published for the Mexican or Central American populations.

DISCUSSION: Although native to Europe, *Cerastium triviale* has become established in North America throughout temperate and subarctic Canada and the United States (Hitchcock et al., 1964) and in central Mexico (Distrito Federal, México, and Veracruz), southern Mexico (Chiapas), Guatemala (Alta Verapaz, and Baja Verapaz), Honduras (Morazan), Costa Rica (Alajuela, Cartago, Heredia, and San José), and Panama (Chiriquí). In habitat, it ranges from roadsides and open meadows through brushy and wooded areas to cloud forests at elevations of about 1400 to 3700 m (Figure 3B).

As has already been discussed (see *Cerastium glomeratum*), the oldest name for this species, *C. vulgatum,* is ambiguous and therefore invalid. Two of the other four names listed above have been used interchangeably for *C. triviale* and *C. glomeratum* and have therefore also been considered ambiguous (*C. caespitosum* and *C. holosteoides*). This series of eliminations leaves the names of *C. triviale* and *C. fontanum* subsp. *triviale.* I here use the older and shorter name, *C. triviale,* since in the absence of extensive hybridization studies such a question of taxonomic rank is largely a matter of personal preference.

REPRESENTATIVE SPECIMENS: **Costa Rica.** ALAJUELA: in and around Zaracero, Canton Alfaro Ruiz, Hwy. 15, *Weston et al. 2110* (UC). CARTAGO: cerca de la cima del Volcán Irazú, *Jimenez 140* (F); south slope of Volcán de Turrialba, near Finca del Volcán de Turrialba, alt. 2000–2400 m, *Standley 35276* (US). HEREDIA: Cerro de Zurquí, northeast of San Isidro, alt. 2000–2400 m, *Standley & Valerio 50601* (US). SAN JOSE: Cerro de Piedra Blanca, above Escasú, *Standley 32481* (US). **Guatemala.** ALTA VERAPAZ: mountains east of Tactic, on road to Tamahú, alt. 1500–1650 m, *Standley 71180* (F). BAJA VERAPAZ: region of Patal, alt. ca. 1600 m, *Standley 69597* (F, NY). **Honduras.** MORAZAN: Montaña de la Tigra, al sudoeste de San Juancito, alt. ca. 2000 m, *Molina R. 14490* (F). **Mexico.** CHIAPAS:

northeast slope of Zontehuitz near summit, Municipio de San Cristóbal las Casas, alt. ca. 9300 ft, *Breedlove 14031* (DS, F, LL, MICH, US). DISTRITO FEDERAL: Puerto de las Cruces, alt. ca. 3100 m, *Rzedowski 34297* (ENCB). MEXICO: between kms. 76 and 77 on the Amecameca-Popocatepetl road, alt. ca. 3250 m, *Beaman 2062* (MSC). VERACRUZ: Las Vigas, *Nelson 14* (US). Balsequillo, Municipio de Perote, alt. ca. 2350 m, *Ventura R. 7386* (ENCB). **Panama.** CHIRIQUI: Volcán de Chiriquí, alt. 3500–4000 m, *Woodson & Schery 472* (GH, MO, US).

18. **Cerastium vulcanicum** Schlechtendal, Linnaea 12: 208. 1838. TYPE: MEXICO. state not known: "in regione subnivale montis Orizaba", September (year not known), *Schiede 508* (HOLOTYPE: HAL; MSC photograph no. 3868).

Cerastium micropetalum Greenman, Zoe 5: 183. 1904. TYPE: MEXICO. state not known: Mt. Ixtaccihuatl, 1903, *Purpus 473* (HOLOTYPE: GH; ISOTYPES: MO, UC, US).

Plant annual or short-lived perennial; stems 6–30 cm tall, very much branched, often tangled, sometimes more or less caespitose; branches erect or decumbent, usually leafy, glandular-pilose above, sparsely to densely lanate or villous toward the base; internodes longer than to shorter than the leaves, mostly more or less similar throughout except at the extreme base, where shorter; leaves more or less similar throughout, linear to broadly lanceolate, 10.0–40.0 mm long, 2.0–7.0 mm wide, acute, pilose to lanate, the latter particularly at the leaf bases and on the margins, leaves generally more lanate toward the base of the plant, often lost in very old plants; basal rosette usually lacking; cymes many flowered, plants often mostly inflorescence; bracts not scarious-margined; pedicels 5.2–15.4 mm long, slender, densely glandular-pilose; sepals lanceolate to ovate, 3.5–4.8 mm long, 0.8–1.2 mm wide, acute, scarious-margined, glandular-pilose; petals usually shorter than the sepals, 3.0–4.8 mm long, sometimes longer than the sepals (particularly on Pico de Orizaba), to 5.2 mm long, bifid about 1/4 of their length, white or pale green; filaments 2.6–3.4 mm long, anthers 0.2 mm long; styles 1.3–1.6 mm long; capsules 5.0–9.0 mm long, 1.8 mm wide, curved; seeds brown, 0.5–0.7 mm in diameter, lightly tuberculate; chromosome number $2n = 34$ (Beaman et al., 1962).

DISCUSSION: *Cerastium vulcanicum* is primarily a species of alpine and subalpine meadows and disturbed sites in pine and fir forests at elevations from 2900 to 4210 m in the Distrito Federal and

the states of México, Puebla, Tlaxcala, and Veracruz, Mexico (Figure 4D). There is one collection of what appears to be *C. vulcanicum* from northwestern Guatemala (*Skutch 1219*).

REPRESENTATIVE SPECIMENS: **Guatemala.** HUEHUETENANGO: Sierra Cuchumatanes, alt. ca. 10,800 ft, *Skutch 1219* (F, GH). **Mexico.** DISTRITO FEDERAL: Volcán Xitle, *Matuda s. n.* (CAS); Ajusco, *Orcutt 3702* (F, GH, MO, US). MEXICO: Nevado de Toluca, north side of mountain 2.0 mi east of point where road goes above timberline, alt. ca. 4020 m, *Beaman 1937* (F, GH, MICH, MSC, TEX, UC, US); 3 km north of Paso de Cortés on road to Ixtaccihuatl, alt. ca. 3800 m, *Beaman 3610* (GH, MSC, TEX, UC, US); Llano Grande, Municipio de Zequiapán, cerca de Río Frío, alt. ca. 3200 m, *Cruz C. 1261* (ENCB, MICH, MSC). PUEBLA: Pico de Orizaba, west side of Cerro Colorado, alt. ca. 3860 m, *Beaman 2486* (GH, MSC, TEX, UC, US); ca. 1.5 km east of the Paso de Cortés, alt. ca. 3580 m, *Beaman 2897* (MSC). TLAXCALA: Ladera noreste de la Malinche, entre Apizaco y Huamantla, alt. ca. 3750 m, *Ern 95* (ENCB). VERACRUZ: west slope of Barranca de Mala Cara, south-southeast of peak of Orizaba, alt. ca. 4210 m, *Clausen s. n.* (NY); ladera este del Cofre de Perote, alt. ca. 3750 m, *Dorantes L. 346* (CAS, GH).

EXCLUDED SPECIES

Two type specimens seen during this study, those of *Cerastium fasciculatum* Bartling *in* Presl and *C. stellarioides* Mociño *ex* Seringe *in* de Candolle, were labelled as having been collected in Mexico (the type of *C. stellarioides* is a drawing). However, in its type description (de Candolle 1824), *C. stellarioides* is listed as being found "in American bor. circa Nutka" so that either the label on the specimen is in error or it is not the type of this species and is actually an illustration of some Mexican species, probably a large flowered *C. nutans.*

No other specimen even remotely resembling the type of *Cerastium fasciculatum* was seen in this study; it is therefore unlikely that the species occurs in Mexico. Although both the type specimen and the original description (Presl 1831) list "Mexico" as the collection locality, Fenzl, on the type specimen, noted "verosimiliter pl. chilensis non Mexicana!" (probably a Chilean plant, not Mexican).

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Finally, I would like to dedicate this paper to the memory of Dr. William T. Gillis of the Natural History and Botany Departments of Michigan State University. He will be very much missed by all those who knew and, in knowing, loved him.

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