

CACTACEAE CACTUS FAMILY

Part Five.

Pediocactus Britt. & J. N. Rose and *Sclerocactus* Britt. & J. N. Rose

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Pediocactus Britt. & J. N. Rose *Pediocactus*, Plains Cactus, Footcactus

Stem succulents from freely branching primary and secondary roots. STEMS solitary or clustered, 3-25 cm long, 2-11.5 cm diameter, subglobose to ovoid, sometimes depressed apically, to elongate-cylindrical; tubercles 2-12 mm long, 2-11 mm in diameter, not forming distinct ribs. SPINES more or less obscuring the stem; central spines 0-9, 0.5-5.3 cm long, up to 3 mm wide at the base, white, pale gray, or reddish-brown to brownish-black, spreading, straight, or curved upward, needle-like or corky; radial spines 3-25, 0.2-2.1 cm long, to 1 mm in diameter, white to pale gray or yellowish-tan. FLOWERS at stem apex, 1.2-3 cm long, 1-2.5 cm wide; inner tepals yellow, pink, magenta, cream or white, mostly with paler midstripes than on the outer tepals, oblanceolate, obovate-oblanceolate or oblong-cuneate, 0.4-1.5 cm long, 3-7 mm broad, the margins entire or minutely denticulate; stamens yellow or cream; stigma lobes 5-10, yellow or green. FRUITS green or greenish-yellow, often turning reddish-brown, dry, naked or with a few scales, smooth, cylindrical to globular or mostly top-shaped with a constricted base and a slightly convex apex, 0.6-1.5 cm long, 0.5-1.1 cm wide, dehiscing by a vertical slit along one side. SEEDS dark brown or gray to black, papillate, often rugose, 2-5 mm long, 1.5-3.5 mm wide, the hilum obovate or elliptic. —Species 8 in the sw U.S. Delimitation of genus is debated: here to include *Utahia* Britt. & J. N. Rose, *Navajoa* Croizat, *Pilocanthus* B. W. Benson & Backeb. and *Pediocactella* A. B. Doweld, but is distinct from *Sclerocactus* Britt. & J. N. Rose. (Greek: *pedio* = plain referring to habitat and *kaktos* = a spiny plant). Heil, K. D., B. Armstrong, and D. Schleser. 1981. *Cact. Succ. J.* (Los Angeles) 53:17-39. Hochstätter, F. 1995. *The Genera Pediocactus, Navajoa, Toumeyia*, Revised. Titisee-Neustat, Netherlands. The status of *Pediocactus peeblesianus* var. *mianus* L. D. Benson, is uncertain. It is known only from the type locality near Prescott. Benson (1982) suggests that the holotype is an immature *Echinocereus fendleri* specimen.

- 1. Stems 5-25 cm long; central spines 3-7, stout, 1.5-3 cm long, mostly 1 mm wide at the base; outer tepals and the scales of the floral tube long-fimbriate *P. sileri*
- 1' Stems less than 5 cm long; central spines fine, 0-9, less than 1.5 cm long, less than 1 mm in width at the base; outer tepals and the scales of the floral tube when present either minutely toothed, short fimbriate, or entire and often undulate.
- 2. Surface of the spines corky or spongy; central or peripheral spines 1-1.5 mm at the base *P. peeblesianus*
- 2' Surface of the spine smooth, never corky or spongy; central spines 0 or when present less than 1 mm wide at the base.
- 3. Central spines 0 (-1) *P. bradyi*
- 3' Central spines 3-9 (0-3 in some juvenile plants).

4. Central spines flexible, hair-like, bending or curving irregularly or straight *P. paradinei*
 4' Central spines needle-like, never flexible and hair-like *P. simpsonii*

Pediocactus bradyi L. D. Benson (for L. Brady). Marble Canyon Cactus. —STEMS solitary or rarely 2-4(12), subglobose to obovoid, 3.2-6.2 cm long, 2.6-4 cm in diameter, the stem apex at or to 3 cm above soil level; tubercles 3-4 mm long, 5-7 mm in diameter; areoles elliptic, white or yellow-villous. SPINES dense, obscuring the stem; central spines mostly 0; radial spines mostly (7-)13-16(-18), 3-5 mm long, about 0.8 mm in width, white or yellowish-tan, tips spread downward and taper from bulbous bases. FLOWERS mostly 2 cm long, 1.5 cm in diameter; outer tepals straw-yellow, inner tepals paler, 1-1.5 cm long, about 3 mm broad, oblanceolate. FRUIT green, turning reddish-brown, 7-10 mm long, 10 mm in diameter, smooth, top-shaped and basally constricted, the apex slightly convex, dehiscing by a vertical slit. SEEDS brownish-black, papillae and rugose, up to 2.8 mm long, 1.7-2 mm wide. [*Pediocactella bradyi* (L. D. Benson) A. Doweld, *Toumeyia bradyi* (L. D. Benson) W. H. Earle, *Pediocactus simpsonii* subsp. *bradyi* (L. D. Benson) J. J. Halda]. —Desertscrub: endemic to Coconino co.; 1050-1200m (3400-4000 ft); Mar-Apr.

Pediocactus paradinei B. W. Benson (for N. A. Paradine). Houserock Cactus. —STEMS solitary, subglobose to globose, 3-7.5 cm tall, 2.5-3.8 cm in diameter, the stem apex at to 5 cm above soil surface; tubercles truncate-conical, up to 5 mm long, 3-5 mm in diameter; areoles circular in diameter. SPINES dense in mature plants and sparse in young plants; central spines 3-6 but not clearly distinguishable from the radials, 0.8-2.8 cm long, white to pale gray, hair-like; radial spines 13-22, 2-5 mm long, white, straight or curving irregularly. FLOWERS up to 2.2 cm long, 1.9-2.5 cm wide; outer tepals straw-yellow to pink with brown midribs; inner tepals light yellow to pink, oblanceolate; stigma lobes yellow. FRUITS greenish-yellow maturing to reddish-brown, 7-10 mm long, 4.5-8 mm wide, smooth except for subapical scales, cylindrical, dehiscing by a vertical slit. SEEDS black, papillate but not rugose, obliquely pyriform, 2.5 mm long, 2 mm wide. $2n = 22$. [*Pilocanthus paradinei* (B. W. Benson) B. W. Benson & Backeb., *Pediocactus simpsonii* var. *paradinei* (B. W. Benson) J. J. Halda]. —Pinyon-juniper woodland, often with scattered ponderosa pine, and desert grasslands: endemic to Coconino co.; 1500-2150 m (5000-7000 ft); May.

Pediocactus peeblesianus (Croizat) L. D. Benson (for R. H. Peebles). Navajo Cactus. —STEMS solitary or clustered, somewhat glaucous, mostly obovoid, globose or depressed-globose, 2.2-6 cm long, 2-5.5 cm in diameter, the stem apex at or to 3 cm above soil surface; tubercles 3-7 mm long, 4-6 mm broad; areoles circular. SPINES white to pale gray, corky, not obscuring the stem; central spines 0-1, 0.8-2.1 cm long, 0.7-1.5 mm wide at the base, ascending, curved upward; radial spines 3-7, 2-9 mm long, 0.5-1 mm in width, recurved. FLOWERS 1.5-2.5 cm in diameter; outer tepals with pink or green midstripes; inner tepals cream, yellow or yellowish-green, 0.5-1.3 cm long, about 3 mm broad, lanceolate; stigma yellow. FRUITS green turning reddish-brown, 7-11 mm long, 6-11 mm in diameter, with a few scales on upper portion, top-shaped and basally constricted, dehiscing by a vertical slit. SEEDS dark brown to black, obliquely pyriform, papillate and rugose, ca. 3 mm long and 2 mm wide.

1. Central spines 0; peripheral (intermediate) spines 1; radial spines 3-6, mostly 3 subsp. *peeblesianus*
 1' Central spines 1; peripheral (intermediate) spines absent; radial spines 4-7, mostly 6 subsp. *fickeiseniae*

Subsp. **peeblesianus** Peebles Navajo Cactus. —STEMS 2.2-6 cm long, 2.7-4.5 cm in diameter. SPINES: central spines 0; peripheral (intermediate) spines 1, 0.8-2.1 cm long, 0.7-1.5 mm wide at the base; radial spines 3-6, 2-9 mm long, 0.5-1 mm wide. [*Navajoa peeblesiana* Croizat, *Toumeyia peeblesiana* (Croizat) W. T. Marshall, *Echinocactus peeblesianus* L. D. Benson, *Utahia peeblesianus* (L. Croizat) L. Kladiwa]. —Desertscrub: endemic to Navajo co.; 1500 m (5100 ft); Apr-May.

Subsp. **fickeiseniae** (Backeb. ex F. Hochstätter) J. M. Lüthy (for F. R. Fickeisen). Fickeisen Navajo Cactus. —STEMS 2.5-6 cm long, 2-5 cm in diameter. SPINES: central spines 1, 0.5-1.8 cm long, mostly 1 mm wide at the base; peripheral (intermediate) spines 0; radial spines 4-7, 3-7 mm long, less than 0.5 mm in width. [*Navajoa peeblesiana* var. *fickeisenii* Backeb. ex F. Hochstätter, *Navajoa peeblesianus* subsp. *fickeisenii* (Backeb. ex F. Hochstätter) F. Hochstätter, *Pediocactus peeblesianus* var. *fickeiseniae* L. D. Benson *nom. nud.*]. —Desertscrub and desert grasslands: endemic to Coconino, Mohave cos.; 1200 to 1500 m (4000-5000 ft); Apr-May.

Pediocactus sileri (Engelm.) L. D. Benson (for A. L. Siler). Gypsum Cactus, Siler Pincushion Cactus. —STEMS usually solitary or a few in clusters, depressed-ovoid, ovoid, or occasionally elongate-cylindrical, 5-15(-25) cm long, 6-11.5 cm in diameter, apex of the stem 3-11(-20) cm above soil surface; tubercles truncate-conical, 9-12 mm long, 6-11 mm in diameter, older tubercles dry, corky, compressed and persistent; areoles circular, woolly. SPINES densely covering the stem, the older spine clusters frayed, weathered, persistent and forming a thatch at the base of the stem; central spines 3-5(-7), 1.3-3 cm long, mostly 1 mm wide at the base, brownish-black aging to pale gray or white, nearly perfect, straight or slightly curving at the tips, acicular, nearly circular in cross section; radial spines 11-15, 1.1-2.1 cm long, white. FLOWERS up to 2.2 cm long, about 2.5 cm wide; outer tepals brown with white fringes; inner tepals yellow, obovate-oblongate, 1.5-1.9 cm long; 4.5-6 mm broad, minutely denticulate; stigma lobes yellow; FRUITS greenish-yellow, 1.2-1.5 cm long, 6-9 mm in diameter, scales present, cylindrical, dehiscing by a vertical slit. SEEDS gray to black, finely papillate and rugose, obliquely pyriform, 3.5-5 mm long, 3-3.5 mm wide. $2n = 22$. [*Echinocactus sileri* Engelm., *Utahia sileri* Britt. & J. N. Rose]. —Desertscrub: Coconino, Mohave cos.; 1500 m (5000 ft) May; UT.

Pediocactus simpsonii (Engelm.) Britt. & J. N. Rose (for J. H. Simpson). Mountain Cactus, Simpson's Footcactus. —STEMS solitary or branching, occasionally forming large depressed globose to globose clusters, 2.5-15 cm tall, 3-15 cm diameter, in AZ mostly 3-7 cm tall, 5-10 cm in diameter. SPINES dense and obscuring the stem; central spines 4-10, 0.5-2.8 cm long, mostly reddish-brown with a yellow or cream base, rarely black, spreading widely or erect; radial spines mostly 15-28, 0.3-1.9 cm long, white, spreading at right angles to the tubercle, nearly straight. FLOWERS 1.2-3 cm long, 1.5-2.5 cm wide, white, pink, magenta, yellow, or yellow-green; stamens yellow; stigma lobes green. FRUITS green tinged with red or turning reddish-brown, 0.6-1.1 cm long, 0.5-1 cm wide, bearing few scales, short cylindrical. SEEDS gray to black, papillate but not rugose, 2-3 mm long, 1.5-2 mm wide. [*Echinocactus simpsonii* Engelm., *Echinocactus simpsonii* var. *minor* Engelm., *Pediocactus simpsonii* var. *minor* (Engelm.) Cockerell]. —Pinyon-juniper woodlands, sagebrush communities, and Rocky Mountain forests: Apache co.; 2050-3050 m (6700-10000 ft); Apr-May; CO, ID, NM, NV, OR, UT, WY. With as many as 13 named subspecies, varieties and forms, this is the most morphologically variable and taxonomically complex member of *Pediocactus*. Plants of AZ have been referred to var. *minor*; however, this variety is neither geographically cohesive, nor morphologically distinctive.

Sclerocactus Britt. & J. N. Rose Devil's Claw Cactus

Small barrel-shaped stem-succulents from freely branching primary and secondary roots. STEMS mostly solitary, occasionally clumped, ovoid, globose, hemispheric to elongate-cylindrical, 3.5-13 cm in diameter, 3-27 cm tall, pale green to dark green or bluish green. AREOLES elliptic. SPINES 7-23, usually of two or three distinct types and usually one or more hooked, the longer ones 1.2-7.2 cm long, 0.7-3 mm wide, acicular or subulate or commonly some of each type, gray, white, yellow, straw-yellow, red, reddish-brown, brown, pink to purplish-pink or black. FLOWERS near apex of stem, opening 1.5-5.5 cm wide, 2.2-5.7 cm long; floral tube funnellform; bracteoles soft and scale-like, succulent, the margins hyaline, entire or fimbriate, the axils naked or sparsely hairy; outer tepals, oblanceolate, 2-4 cm long, 4-8 mm wide, with greenish-lavender, yellowish-brown, or purple midstripes, the margins white, cream, gold, rose, pink, or purple; inner tepals lanceolate to oblanceolate, 2-4 cm long, 5-10 mm wide, white, yellow, or pink to purple, magenta or lavender; filaments white, cream, green, pale yellow, purple or magenta, the anthers yellow; style cream, light green, pink or purple; stigma 7-10 lobed, green to yellowish-green; ovary with large papillae and appearing granular, or with small papillae and appearing smooth. FRUITS thin-walled, cylindrical, 0.8-2.5 cm long, 0.6-1.5 cm wide, green, often turning red, naked or with a few broad, thin scales, drying at maturity and opening with 2-4 irregular short, vertical slits above the base, or indehiscent. SEEDS 1.5-3 mm long, 2-3.5 mm in diameter, 1-1.5 mm thick, dark brown or black, papillate, furrowed. Species 13, in the sw U. S. Circumscription of genus is debated: here to include *Coloradoa* Boissevain & Davidson and *Toumeyia* Britt. & J. N. Rose, but distinct from *Ancistrocactus* Britt. & J. N. Rose, *Echinomastus* Britt. & J. N. Rose, *Glandulicactus* Backeb., *Homalocephala* Britt. & J. N. Rose and *Pediocactus* Britt. & J. N. Rose. (Greek: *sclero* = hard or cruel, referring to the spines + *kaktos* = a spiny plant). Heil, K. H. and J. M. Porter. 1994. *Haseltonia* 2:20-46.

1. Central spines (0-)1(-4) papery, flattened, flexible, twisting or curled, with an obscure adaxial midrib, lacking a hook; if central spine lacking, then radial spines strongly flattened *S. papyracanthus*
- 1' Central spines (0-)1-6(-11) round to rhomboidal in cross-section, though upper central may be flattened and lacking a hook, the lower centrals strongly hooked; if central spine lacking, then radial spines not flattened.
 2. Fruit dehiscent along 2-4 vertical slits; flowers whitish, yellow, sometimes suffused with brown; stems depressed globose, up to 5.5 cm tall; Coconino co., north of the Colorado River *S. sileri*
 - 2' Fruit indehiscent or dehiscent along a basal suture; flowers rose to purple, pink, yellow, or rarely white; stems depressed globose, globose to elongate cylindrical, 3-27 cm tall; Apache, Coconino, Navajo cos.
 3. Upper central spine flat and ribbon-like in cross-section; flower buds rounded apically; stems mostly 3-7 cm long *S. whipplei*
 - 3' Upper central spine flat or angled in cross-section, if flat, then not ribbon-like; flower buds pointed apically; stems mostly greater than 7 cm long *S. parviflorus*

Sclerocactus papyracanthus (Engelm.) N. L. Taylor (paper-spine). Grama Grass Cactus. —STEMS solitary, cylindrical, 2.5-10 cm long, 1.2-2.5 cm in diameter; tubercles elongate-mammillate to elongate-conical, 3-5 mm long and broad, spirally arranged. SPINES more or less obscuring the stem; central spines (0-)1(-4), upper ones smaller, curving upward, 2-3 cm long, 1-1.5 mm at the base, white, pale brown, changing to gray, flexible, strongly flattened, the midrib evident on adaxial side; radial spines 6-8 spreading, flexible, the longest up to 3.5 cm long, 0.5 mm broad, flat, thin, white to pale gray. FLOWERS at apex of stem, 2-2.5 cm long, 2-2.5 cm wide; outer tepals spatulate, to 20 mm long, 2.5-3 mm broad, scarious, with a few irregular marginal teeth, purple to reddish-brown midribs and white margins; inner tepals

oblanceolate, 15-20 mm long, up to 4.5 mm broad, mucronate, entire, white; filaments white, the anthers pale yellow; style green; stigma lobes 5. FRUITS 4-6.5 mm long, to 4.5 mm in diameter, dry at maturity, green, changing to tan with a few or no scales, subglobose, ovary wall thin, dehiscent irregularly when dry. SEEDS to 2.5 mm long, 3 mm broad, 1 mm thick, black, papillate-tessellate. [*Pediocactus papyracanthus* (Engelm.) L. D. Benson, *Toumeyia papyracantha* (Engelm.) Britt. & J. N. Rose, *Mammillaria papyracantha* Engelm., *Echinocactus papyracanthus* Engelm.]. —Grassland and pinyon-juniper woodland communities, especially in sandy soils: Navajo co.; 1500-2200 m (5000-7200 ft); May; NM, TX.

Sclerocactus parviflorus Clover & Jotter (small-flowered). Eagle-claw Cactus. —STEMS solitary or clustered, depressed-globose to elongate-cylindrical, 5-27 cm long, 4.5-13 cm diameter; tubercles 1.5-2 cm apart. SPINES dense, obscuring the stem, the central spines 4(-6), the lower central spine hooked, 1.5-7.2 cm long, 0.6-1 mm wide, white, yellow, brown, reddish-brown, pink to purplish-pink or black, the 2-4 laterals similar to the lower one, usually shorter, usually not hooked; the upper central 1.7-6.2 cm long, 0.7-1.5(-3) mm wide, mostly white, rarely gray, straw-yellow, pink, or reddish-brown, flat, rhombic or rounded in cross-section, rarely contorted; radial spines 3-17, 0.6-3.6 cm long, mostly white, but may be brown or purplish-pink. FLOWERS 3-5.7 cm long, 2.5-5.5 cm in diameter; ovary granular-papillose; outer tepals oblanceolate, 2.5-4.5 cm long, 6-10 mm broad, with greenish or brownish-purple midribs and rose to purple, pink, yellow or white entire margins, mucronate; inner tepals oblanceolate, 1.5-5 cm long, 6-12 mm broad, rose to purple, pink, yellow or rarely white, mucronate; filaments purple, yellow, or green; style papillose, green or pink to purple; stigma lobes 5-10, purple or green. FRUITS 1-2.5 cm long, 1-1.5 cm diameter, green turning reddish-pink, with a few membranous-fringed scales. SEEDS 1.5-3 mm long, 2.5-3.5 mm diameter, 1 mm thick, dark brown to black, covered by evenly spaced papillae. —3 subspp., all in flora.

1. Flowers yellow; upper central spines 1.5 mm wide; spines not obscuring the stem (in AZ); upper pinyon-juniper and sagebrush communities subsp. *terrae-canyonae*
- 1' Flowers purple to pink-purple, rarely white; upper central spines 1-2 mm wide; spines obscuring the stem.
 2. Upper central spine mostly 1 mm wide; juniper and blackbrush communities subsp. *parviflorus*
 - 2' Upper central spines mostly 1.5-2 mm wide; upper blackbrush saltbush, and pinyon-juniper woodland communities subsp. *intermedius*

Subsp. **intermedius** (Peebles) D. Woodruff & L. D. Benson (intermediate). —SPINES: lower central spine hooked, 1.7-5.9 cm long, 0.5-1 mm diameter, white, dark brown, purplish-pink or black; upper central spine 1.9-5.7 cm long, mostly 1.5-2 mm wide, mostly white, rarely purple to pink, mostly angled, rarely flat or rhombic in cross-section. FLOWERS: inner tepals purple, rose, pink or rarely white. $2n = 22$. [*Sclerocactus intermedius* Peebles, *S. whipplei* (Engelm. & J. M. Bigelow) Britt. & J. N. Rose var. *intermedius* (Peebles) L. D. Benson, *S. parviflorus* Clover & Jotter var. *blessingae* W. H. Earle]. —Blackbrush communities and pinyon-juniper woodlands: Apache, Coconino, Mohave, Navajo cos; mostly at mid elevations, 1350-2000 m (4500-6500 ft); May-Jun; CO, NM, UT.

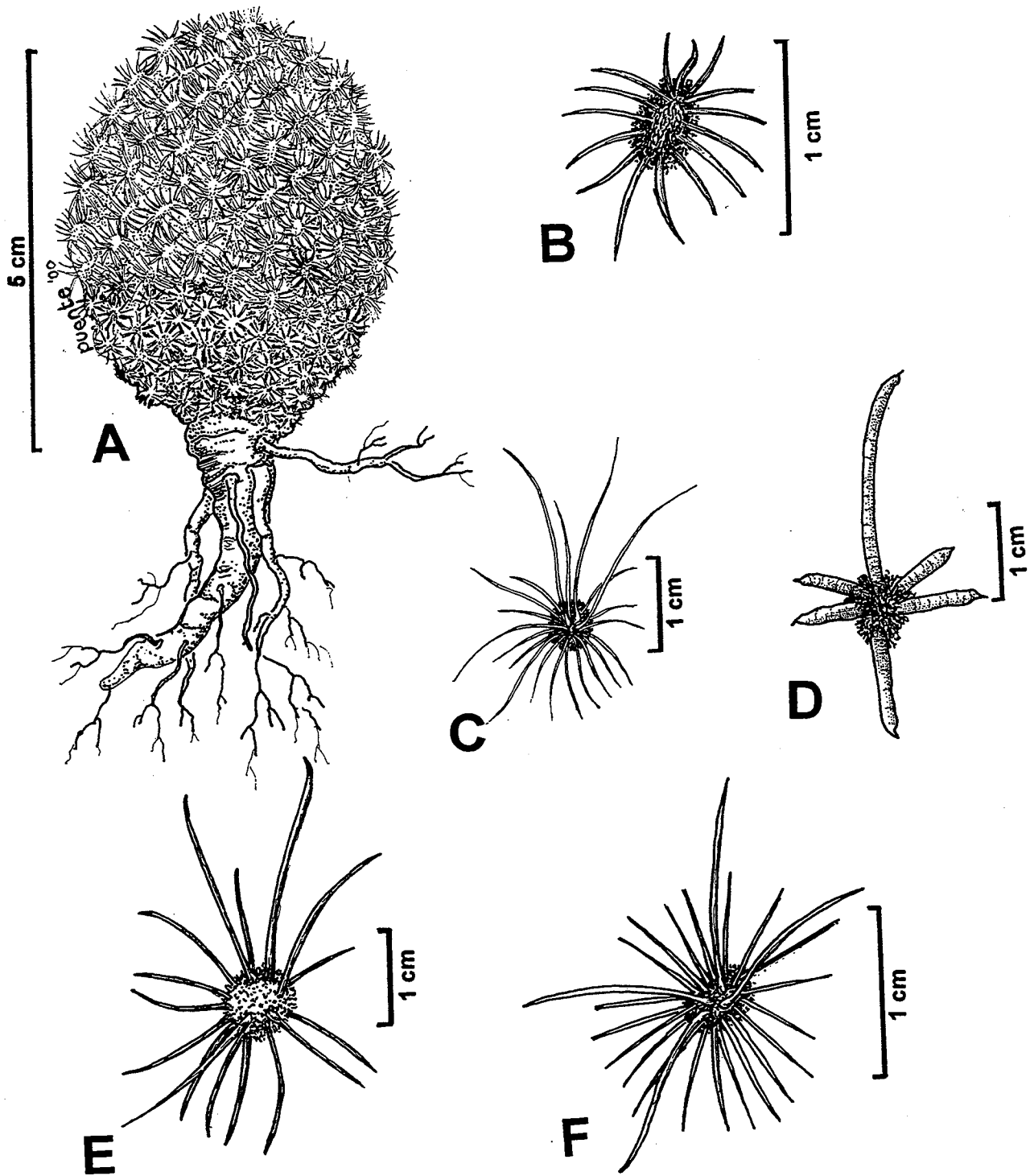
Subsp. **parviflorus** —SPINES: lower central spine hooked, 2-6.3 cm long, 0.6-1 mm diameter, mostly white or straw; upper central spine 1.7-6.2 cm long, mostly 1 mm wide, mostly white or straw, rarely pink, mostly angled, rarely flat or rhombic in cross-section. FLOWERS: inner tepals rose or purple. [*Echinocactus parviflorus* (Clover & Jotter) L. D. Benson, *S. havasupaiensis* Clover, *S. havasupaiensis* Clover var. *roseus* Clover, *Echinocactus parviflorus* (Clover & Jotter) L. D. Benson var. *havasupaiensis* (Clover) L. D. Benson, *Echinocactus parviflorus* (Clover & Jotter) L. D. Benson var. *roseus* (Clover) L. D. Benson, *Sclerocactus*

whipplei (Engelm. & J. M. Bigelow) Britt. & J. N. Rose var. *roseus* (Clover) L. D. Benson, *S. contortus* K. D. Heil]. —Along major river drainages in blackbrush communities: Coconino, Mohave, Navajo cos.; mostly at lower elevations, 1050-1500 m (3500-5000 ft); May-Jun; CO, UT.

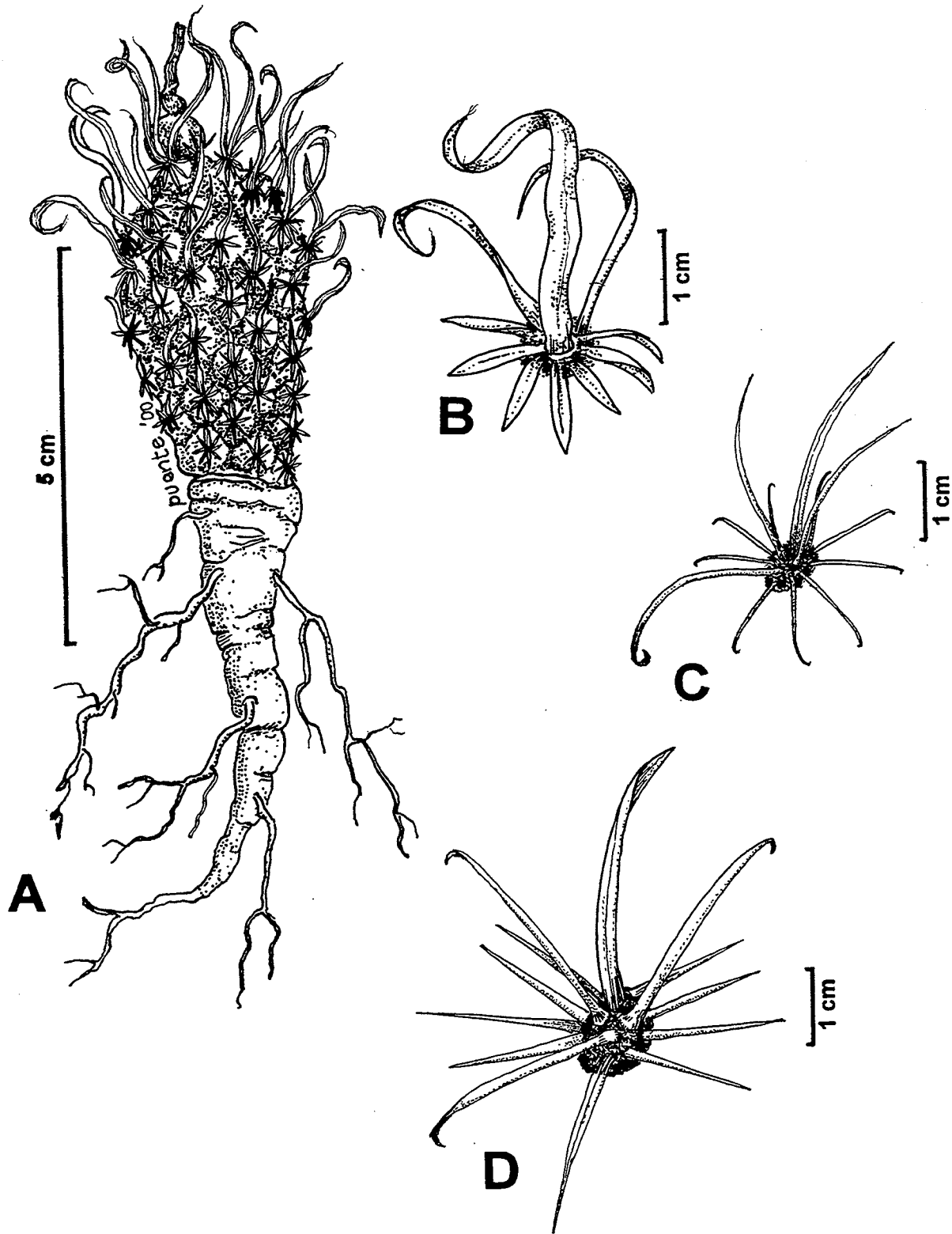
Subsp. **terrae-canyonae**: (K. D. Heil) K. D. Heil & J. M. Porter (canyon-lands). Canyonland Eagle-claw Cactus. —SPINES lower central spine hooked, 2.9-8.2 cm long, 0.75-2 mm diameter, mostly white, light brown, reddish-brown, dark brown or purplish-pink; upper central spine 2.6-6.2 cm long, mostly 1.5 mm wide, mostly white or rarely reddish-brown, flat, rhombic or rounded in cross-section. FLOWERS: inner tepals yellow. [*Sclerocactus terrae-canyonae* Heil]. —Upper pinyon-juniper woodland and sagebrush communities: Coconino, Navajo cos.; mostly at higher elevations, 2000-2300 m (6500-7500 ft); May-Jun; UT.

Sclerocactus sileri (L. D. Benson) K. D. Heil & J. M. Porter (for A. L. Siler). Siler Eagle-Claw Cactus. —STEMS 1(-2), depressed globose, up to 5.5 cm long, 3.5-5.5 cm in diameter, green; ribs usually 13, poorly developed; tubercles 7-12 mm long, 6-15 mm broad and protruding above the ribs. SPINES 4, 1.2-3 cm long, 0.5-1 mm wide, the lowest one white, gray or purple tinged, angled, strongly hooked, slightly contorted, turned or curving somewhat downward, the lateral central spines 2, similar to the lowest one but a bit shorter, and usually not hooked, the uppermost central spine 1.3-3 cm long, 0.75-2 mm wide, white to tan, recurved, strongly flattened, conspicuous, erect; radial spines 6-8, basally 0.5-0.75 mm wide, acicular, elliptic in cross-section. FLOWERS 2.5-3 cm long, 2-3 cm in diameter; external floral tube glabrous; outer tepals 10-15 mm long, 5-8 mm broad, with brownish midrib and yellowish margins, the larger ones oblanceolate, mucronate, marginally membranous and crisped or minutely toothed; inner tepals 15-25 mm long, 5-7 mm at the broadest point, yellow, sometimes suffused with brown, the largest lanceolate, mucronate; filaments white, 7-10 mm long; anthers yellow; style papillose; yellowish-green, stigma lobes 5-8. FRUITS ovoid, 0.8-2.2 cm long, 0.8-1.4 cm broad, green, turning red, with a few membranous scarious-margined, minutely toothed or fimbriate scales, opening along 2-4 vertical slits. SEEDS 2.3-2.5 mm long, 2.7-3 mm diameter, pyriform, black. [*Sclerocactus pubispinus* (Engelm.) D. Woodruff & L. D. Benson var. *sileri* L. D. Benson, *Sclerocactus whipplei* (Engelm. & J.M. Bigelow) Britt. & J. N. Rose subsp. *busekii* F. Hochstätter]. —Rocky and sandy soils in desert grasslands and pinyon-juniper woodlands: endemic to Coconino co.; 1360-1800 m (4500-6000 ft); May-Jun.

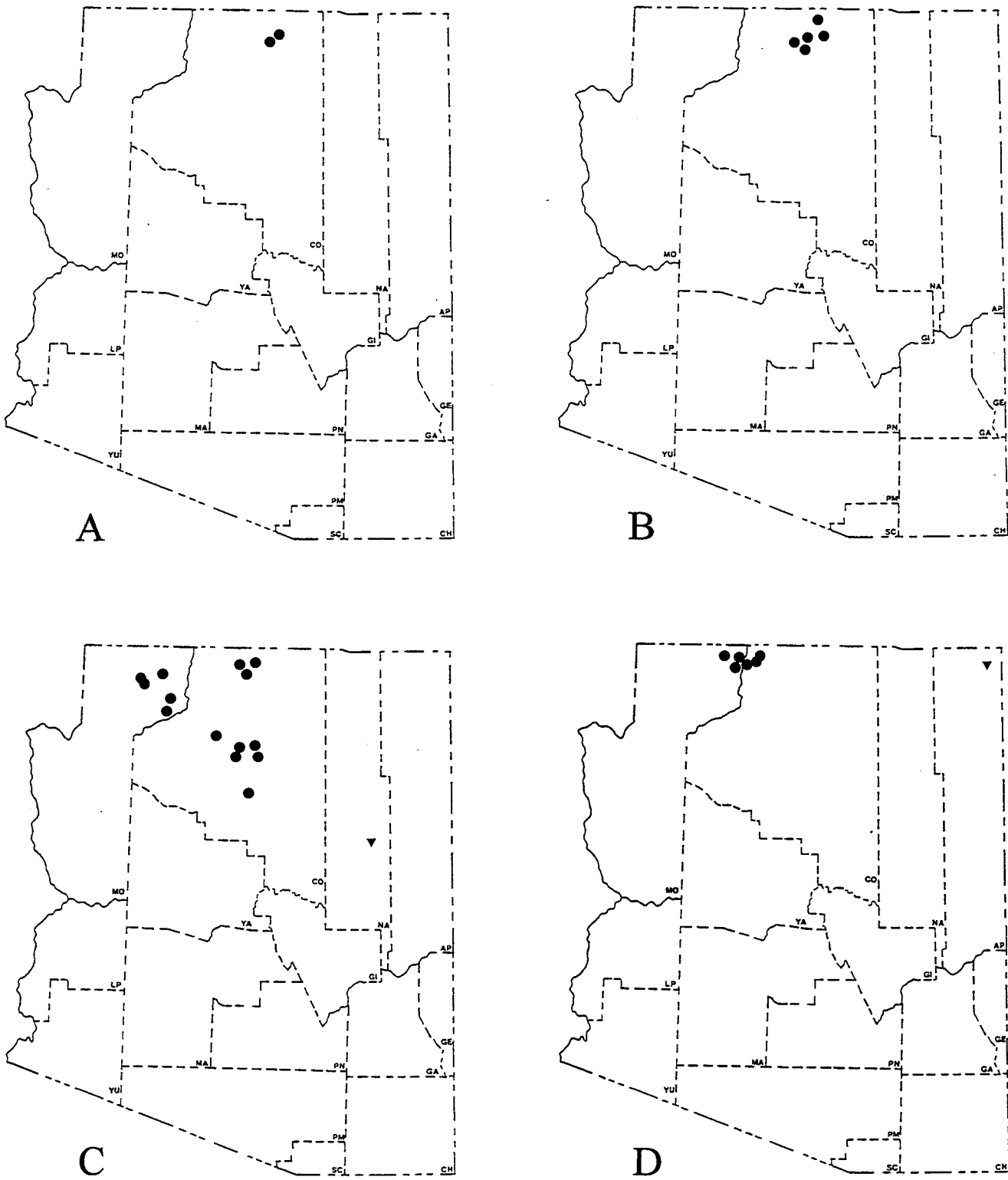
Sclerocactus whipplei (Engelm. & J. M. Bigelow) Britt. & J. N. Rose (for A. W. Whipple). Whipple Cactus. —STEMS: usually solitary, depressed-globose to elongate-cylindrical, 3-7(-14) cm long, 4-7(-11) cm in diameter; ribs 13-15, formed by confluent tubercles. SPINES densely covering the stem; central spines 4, the lower ones hooked, 1.6-4.5 cm long, 0.5-1 mm in diameter, purplish-pink or reddish-brown, somewhat angled in cross-section; the two lateral spines 1.4-4.5 cm long, mostly 1 mm in diameter, purplish-pink to white; the upper central 1.7-6.5 cm long, mostly 1.5-2(-2.5) mm wide, white, mostly flat, dagger-shaped; radial spines 5-12, 0.6-2.4 cm long, white except for the two lowermost, which are mostly purple-pink. FLOWERS 2.2-3.2 cm long, 1.5-2 cm in diameter; outer tepals oblanceolate, ca. 2 cm long, 5 mm broad, with greenish midribs and yellow margins; inner tepals oblanceolate, ca. 2.5 cm long, 6 mm broad, yellow; filaments yellow; style papillose, green or tinged with yellow; stigma lobes 5-6, light green. FRUITS 0.8-2.5 cm long, 0.6-1.5 mm in diameter, green or tan, usually reddish at maturity, ovoid with a few scarious-margined minutely toothed, membranous-fringed scales, dehiscing along an irregular cleft. SEEDS 2 mm long, 2 mm broad, 1.5 mm wide, pyriform, shiny black, papillose. [*Echinocactus whipplei* Engelm. & J. M. Bigelow, *Sclerocactus whipplei* (Engelm. & J. M. Bigelow) Britt. & J. N. Rose var. *pygmaeus* Peebles, *Pediocactus whipplei* (Engelm. & J. M. Bigelow) Arp]. —Gravelly and sandy hills, canyon rims and mesas in juniper, desert grassland, salt deserts scrub and blackbrush communities: Apache, Coconino, Navajo cos.; 1500-1850 m (5000-6000 ft); May-Jun; UT.



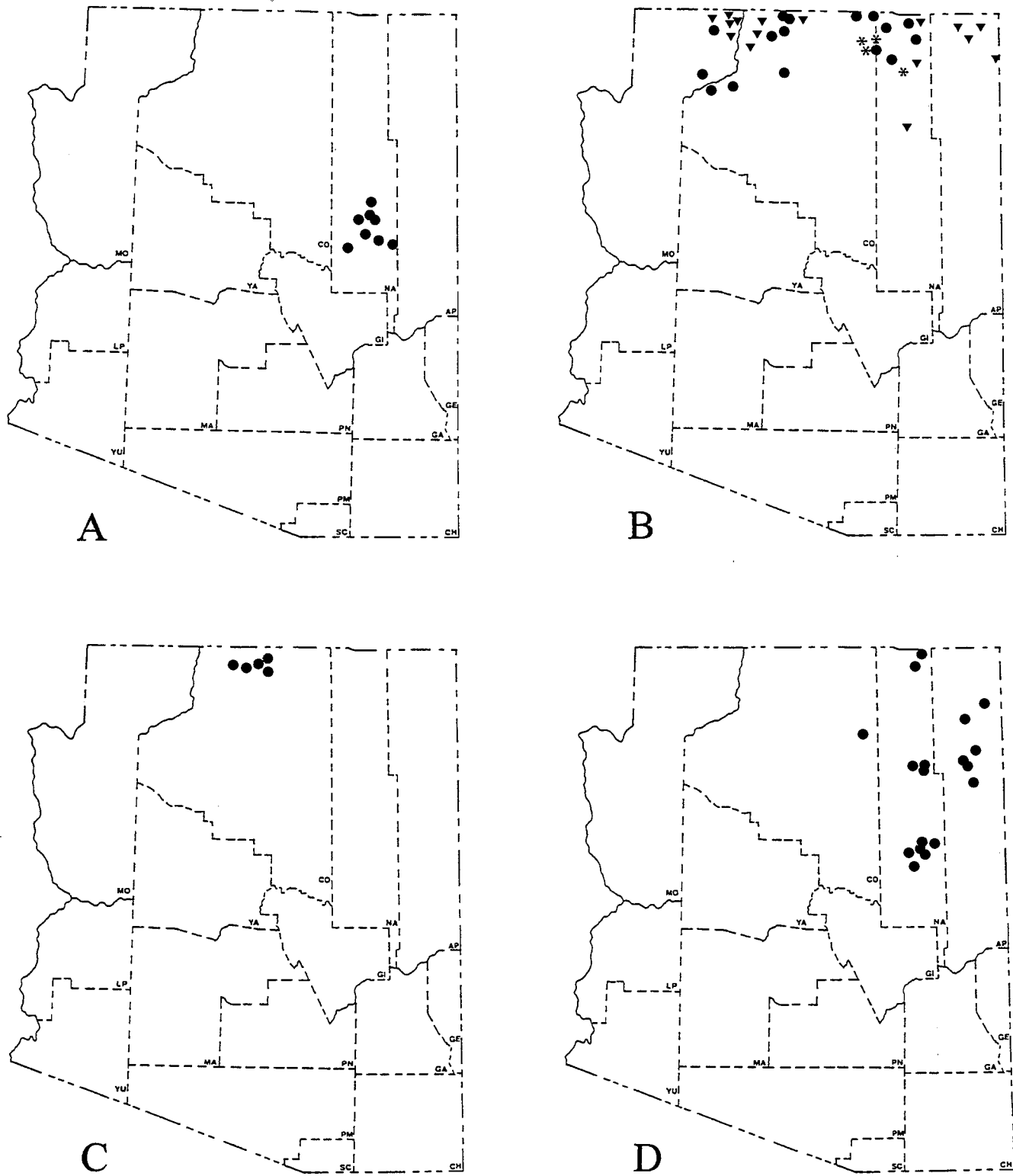
Cactaceae. Fig. 1. .A, *Pediocactus bradyi*; B-F, detail of areole: B, *P. bradyi*; C, *P. paradinei*; D, *P. peeblesianus*; E, *P. sileri*; F, *P. simpsonii*.



Cactaceae. Fig. 2. A, *Sclerocactus papyracanthus*; B-D, detail of areole; B, *S. papyracanthus*; C, *S. parviflorus* ssp. *terrae-canyonae*; D, *S. whipplei*.



Cactaceae. Fig. 3. Distribution of *Pediocactus*: A, *P. bradyi*; B, *P. paradine*; C, *P. peeblesianus* subsp. *fickeiseniae* (dots) and subsp. *peeblesianus* (triangles); D, *P. sileri* (dots), *P. simpsonii* (triangles).



Cactaceae. Fig. 4. Distribution of *Sclerocactus*: A, *S. papyracanthus*; B, *S. parviflorus* subsp. *intermedius* (triangles), subsp. *parviflorus* (dots), subsp. *terrae-canyonae* (asterisks); C, *S. sileri*; D, *S. whipplei*.