Cactaceae Cactus Family
Part Five.
Pedioactus Britt. & J. N. Rose and Sclerocactus Britt. & J. N. Rose

Kenneth D. Heil
Math-Science Department, San Juan College
Farmington, NM 87402-4609
and
J. Mark Porter
Rancho Santa Ana Botanic Garden
Claremont, CA 91711-3101

Pedioactus Britt. & J. N. Rose  Pedioactus, 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 cory; 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, oblong-cuneate, obovate-oblong-cuneate 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, Pilicanthus B. W. Benson & Backeb. and Pedioactella 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 Pedioactus, Navajoa, Toumeya, Revised. Tistisee-Neustat, Netherlands. The status of Pedioactus 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, *Toumeya bradyi* (L. D. Benson) W. H. Earle, *Pediocactus simpsonii* subsp. *bradyi* (L. D. Benson) J. J. Halda). —Desertsrub: endemic to Coconino co.; 1050-1200 m (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 midrib; 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. *(Philocactus 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, 2.5-5.5 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 midrib; 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, *Toumeya peeblesiana* (Croizat) W. T. Marshall, *Echinocactus peeblesianus* L. D. Benson, *Utahia peeblesiana* (L. Croizat) L. Kladiwa. —Desertscrub: endemic to Navajo co.; 1500 m (5100 ft); Apr-May.

Subsp. *fickeisenii* (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. *fickeisenii* 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 porrect, 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-oblong and acute, 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

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 funnelform; bracteoles soft and scale-like, succulent, the margins hyaline, entire or fimbriate, the axils naked or sparsely hairy; outer tepals, ob lanceolate, 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 ob lanceolate, 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 Coloradocactus Boivinsevain & Davidson and Toumeya Britt. & J. N. Rose, but distinct from Ancistrocactus Britt. & J. N. Rose, Echinomasus 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 centralts strongly hooked; if central spine lacking, then radial spines not flattened.

2. Fruit dehiscing along 2-4 vertical slits; flowers whitish, yellow, sometimes sulfused with brown; stems depressed globose, up to 5.5 cm tall; Coconino co., north of the Colorado River ......................................................... S. sleri

2' Fruit indehiscent or dehiscing 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, dehiscing irregularly when dry. SEEDS to 2.5 mm long, 3 mm broad, 1 mm thick, black, papillate-tessellate. *Pediocactus papyracanthus* (Engelm.) L. D. Benson, *Toumeya 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 oblongolate, 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 oblongolate, 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. *terrea-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. Benson var. *roseus* (Clover) L. D. Benson, *Sclerocactus*
**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 papillate; 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 papillate, 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, papillate. *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) Arnp. —Gravelly and sandy hills, canyon rims and mesas in juniper, desert grassland, salt desertscrub 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. paradisi; D, P. pfefferianus; 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. paradinei*; 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.