

## CELASTRACEAE STAFF-TREE FAMILY, BITTER-SWEET FAMILY

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Shrubs or small trees, sometimes thorny, often glabrous or nearly so. LEAVES alternate or opposite, simple, persistent (or scale-like and caducous), sessile to shortly petiolate; stipules small and caducous, or absent. FLOWERS perfect, small, actinomorphic, 4- or 5-merous, hypogynous or slightly perigynous; sepals connate to distinct, usually imbricate; petals distinct, sometimes imbricate; stamens distinct, seated on or outside the usually well-developed nectary disk (this rudimentary or absent in *Canotia*), typically in a single series alternate with the petals; ovary usually 2-5-loculed; style terminal, generally short, with a capitate or lobed stigma. FRUIT a capsule (sometimes indehiscent). SEEDS often arillate. --About 50 genera and 800 spp., pantropical (especially in se Asia) and with a lesser number of genera and spp. in temperate regions. Species of *Euonymus* and other genera from this family are cultivated as ornamentals. *Glossopetalon* [*Forsellesia*], formerly included in the Celastraceae, is now assigned to the Crossosomataceae.

1. Trees or shrubs appearing leafless; stem tips forming stout thorns; fruits persistent, more than 1 cm long ..... *Canotia*
- 1' Shrubs with conspicuous evergreen leaves; stem tips never thorn-like; fruits falling after maturation, to 7 mm long.
  2. Shrubs low, creeping; leaves mostly opposite, glabrous; petals red to brown ..... *Paxistima*
  - 2' Shrubs upright, intricately branched; leaves alternate, scabrous; petals white ..... *Mortonia*

### *Canotia* Torr.

Essentially glabrous shrubs or small trees with numerous, naked, pale green branches that usually end in stout thorns; twigs with minute parallel longitudinal grooves, these adorned by minute white epidermal wax dots; vicinities of both bud and leaf scale scars rough, black, glandular (red and crystalline on fresh spring growth). LEAVES represented merely by a few alternate, widely spaced, soon deciduous, deltoid scales 1-2 mm long; stipules apparently absent. INFLORESCENCES: cymes short, few-flowered, axillary, often several arising together from a single leaf axil; bracts numerous, minute, deltoid. FLOWERS perfect; calyx lobes 5, imbricate in bud, brown, deltoid, small; petals 5, longer than the calyx lobes; stamens 5, tending to persist at base of fruit; pistil of (3-)5 carpels on a short, thick gynophore, the style 2-3 mm long, with 5 erect, deltoid, adaxially stigmatic apical lobes. CAPSULES oblong, externally fleshy at first, later drying over an internal woody layer, persistent for a year or more, dark brown or blackish, with the (3-)5 carpels splitting apically into 2 subulate beaks for about 1/3 of the capsule's length. SEEDS 1(-2) per locule, hard, brownish, oval to oblong, strongly compressed laterally, membranously winged below. --2 spp., 1 in AZ; se CA, s UT; Son., Chih., Mex. (A nineteenth century Mexican name for the plants.)

*Canotia holacantha* Torr. (entirely thorns). Crucifixion Thorn. --Plants 2-5(-10) m tall; branches straight, slender, ascending. LEAVES obtuse apically. FLOWERS: sepals 1 mm long and wide, acute, firm, tending to persist after anthesis; petals distinct, imbricate in bud, oblong to narrowly obovate, greenish white to yellowish white, 3.5-4 mm long; stamens slightly shorter than the petals, the anthers obcordate; style slender, columnar, the apical lobes ca. 0.2 mm long. CAPSULES 15-33 mm long at maturity, the seed-bearing portion ellipsoidal. SEEDS 7-8 mm long, minutely papillose, winged, the body 3-3.5 mm long, the wing membranaceous, as wide as body and about as long. --Sonoran Desert, desert grassland, juniper, and chaparral communities, often calcareous (and perhaps gypsiferous) slopes, sometimes locally dominant: all cos. except Apache, Cochise, La Paz, Navajo, Pima, Santa Cruz; (350-)600-1600 m [(1100-)2000-5200 ft]; (Mar-)May-Aug(-Sep); se CA, s UT; Son., Mex. Two unrelated leafless AZ shrubs are also called

crucifixion thorn: *Koeberlinia spinosa* Zucc. (Koeberliniaceae) and *Castela emoryi* (A. Gray) Moran & Felger (Simaroubaceae).

### Mortonia A. Gray

Shrubs evergreen, rounded, yellowish. LEAVES small, alternate, simple, entire, subsessile, closely crowded, ascending, 1-nerved, coriaceous, often with thickened or revolute margins; stipules minute, glandlike, caducous. INFLORESCENCES crowded bracteate racemes or raceme-like thyrses terminating some of the branches. FLOWERS 5-merous throughout, distinctly perigynous; hypanthium 5- or 10-ribbed, cupulate or turbinate-campanulate; nectary disk a ring or crown around the inside top of the hypanthium, the green sepals and short white petals clearly external to the disk, but the filaments arising as lobes from it; ovary imperfectly 5-loculed; style short, persistent, the stigmas 5, linear, spreading or recurved. FRUITS small, dry, oblong-cylindric, light brown to light green, capsule-like but indehiscent. SEEDS 1 per locule, oblong, straw-colored, without an aril. --5-8 spp., 1 in AZ; sw U.S. and n Mex. (For S. G. Morton).

**Mortonia scabrella** A. Gray (scabrous). --Scabrous shrubs to 2m tall, about as wide as high; branches erect, stiff, rather brittle. LEAVES ascending, thick, broadly elliptic or elliptic-obovate, commonly 1-2(-2.5) times as long as wide, mostly 3-15 mm long, 2.5-10 mm wide; petioles to 1 mm long. INFLORESCENCES 1-10 cm long. FLOWERS: calyx lobes 1-3 mm long, with whitish-scarious margins; petals obovate to short-spatulate, finely ciliate with glandular hairs, subequal to or clearly surpassing the sepals, 1-3 mm long, persistent in fruit. FRUIT surpassing the perianth, thick-cylindric, greenish, 3.5-5 mm long, tipped by the stylar beak. --2 vars., both in AZ; s NV and se CA to w TX and adjacent Mex. *Mortonia scabrella* (at least var. *utahensis*) has been cultivated, but with difficulty.

1. Leaves usually 3-5 mm wide, 3-10 mm long; shrubs of Cochise, Gila, Pima, and Santa Cruz cos.  
..... var. *scabrella*
- 1' Leaves usually 6-9 mm wide, 9-15 mm long; shrubs of n Mohave and n Coconino cos.  
..... var. *utahensis*

Var. **scabrella**. --LEAVES mostly 3-10 mm long, 3-5 mm wide. FLOWERS: calyx lobes 1(-2) mm long; petals 1-2(-3) mm long. --Dry plains, hillsides, and mesas in the desert, often on limestone; Cochise, Gila, Pima, Santa Cruz cos.; 900-1700 m (3000-5500 ft); Mar-Sep; e to w TX and adjacent Mex.

Var. **utahensis** Coville ex. Trel. (of Utah). --LEAVES mostly 9-15 mm long but sometimes shorter, 6-9 mm wide. FLOWERS: calyx lobes (1-)2(-3) mm long; petals (1-)2-3 mm long. [*Mortonia utahensis* (Coville ex. Trel.) A. Nelson]. --Rocky places in the desert, on limestone or less often on calcareous sandstone: Coconino, Mohave cos.; 550-750 m (1800-2400 ft); Mar-Jun; se CA, s NV, and sw UT.

### Paxistima Raf. Box-leaf

Low, evergreen, glabrous shrubs with subterranean rhizomes and sometimes adventitious roots on portions of the lower stems. LEAVES opposite, simple, serrulate to crenulate (rarely subentire), coriaceous, short-petioled, smooth; stipules small, caducous. INFLORESCENCES axillary cymes, often reduced to 1 flower. FLOWERS: calyx lobes 4, small, imbricate, green, widely ovate; petals 4, red-brown, longer than the calyx lobes; stamens 4, inserted in the edge of a broad nectariferous disk; ovary 2-carpellate, 2-loculed, superior, but sunken into the disk; style short to obsolete; stigma capitate to linear-clavate (rarely obscurely 2-lobed). CAPSULES oblong. SEEDS 1 or 2, oblong, erect, enclosed in a membranaceous, white, cleft aril. --2 spp., 1 in AZ; widespread in N. Amer. (Perhaps from the Greek: *pachys* = thick + stigma). The generic name has a complex history including 4 different spellings; *Paxistima* appears to be the correct choice.

**Paxistima myrsinites** (Pursh) Raf. (after the genus *Myrsine*). Mountain-Lover. --Usually densely branched shrubs 2-10 dm tall, the lower portion of the stems sometimes prostrate, sometimes with adventitious roots; branches tending to form flat sprays. LEAVES crowded, 1-2(-4) pairs per cm; blades ovate to lanceolate (sometimes elliptic or oblanceolate), (6-)8-27(-40) mm long, (3-)4-10(-15) mm wide, glabrous, glossy green above, pale beneath; margins serrulate to crenulate (occasionally entire), often

revolute or thickened; apex rounded to obtuse; base acute, rounded, or obtuse; petioles usually 1-2 mm long. INFLORESCENCES of 1-2(-3) flowers. FLOWERS: petals commonly maroon (those from buds of the previous season), occasionally green (those from buds of the current season), ovate, 1.5-2 mm long; filaments scarcely 1 mm long. CAPSULES 4-7 mm long. SEEDS about 2/3 covered by the aril. --2 subspp., 1 in AZ; sw Can. to Tamps., Mex.

Subsp. *myrsinites* --Shrub (2-)3-10 dm tall. LEAVES 1-2 pairs per cm of branch length; blades lanceolate to oblanceolate or obovate, typically 11-27 mm long. INFLORESCENCES averaging 10 per branch. [*Paxistima myrtifolia* (Nutt.) L. C. Wheeler]. --Shady places of various forest communities in the mountains: Apache, Cochise, Coconino, Gila, Graham cos.; 1450-2950 m (4800-9600 ft); Apr-Jul; sw Can. to AZ and NM.

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#### REFERENCES

- CRONQUIST, A., N. H. HOLMGREN, and P. K. HOLMGREN. 1997. Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A. Vol. 3A. New York Botanical Garden, Bronx, New York.
- JOHNSTON, M. C. 1975. Synopsis of *Canotia* (Celastraceae) including a new species from the Chihuahuan Desert. *Brittonia* 27:119-122.
- KEARNEY, T. H., R. H. PEEBLES and collaborators. 1960. Arizona Flora. Ed. 2, with supplement by J. T. Howell, E. McClintock and collaborators. University of California Press, Berkeley, California.
- NAVARO, A. M. and W. H. BLACKWELL. 1990. A revision of *Paxistima* (Celastraceae). *Sida* 14:231-249.
- PRIGGE, B. A. 1983. Studies on *Acanthothamnus*, *Mortonia*, and *Orthosphenia* (Celastraceae); anatomy, ecology, and systematics. Ph. D. dissertation, Claremont Graduate School, Claremont, California.
- PRIGGE, B. A. 1993. Celastraceae. Pp. 498-499. In: J. C. Hickman (ed.). *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley, California.
- SHREVE, F. and I. L. WIGGINS. 1964. *Vegetation and Flora of the Sonoran Desert*. Stanford University Press, Stanford, California.
- WELSH, S. L. 1993. Celastraceae. Pp. 127-128. In: S. L. Welsh, N. D. Atwood, S. Goodrich, and L. C. Higgins (eds.). *A Utah Flora*. Ed. 2. Brigham Young University Print Services, Provo, Utah.

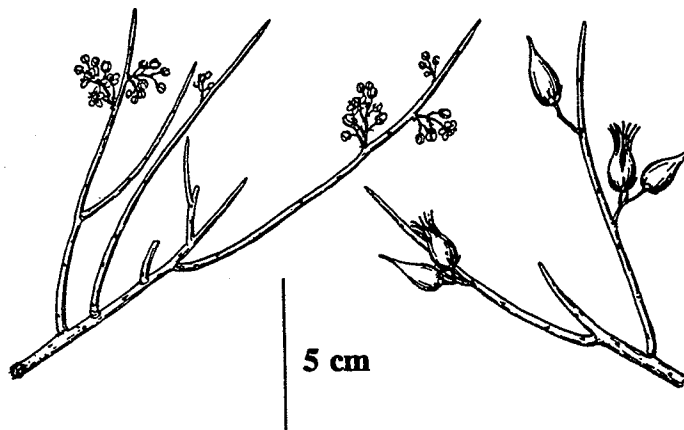


Figure 1. *Canotia holacantha* branches in flower (left) and fruit (right). From C. S. Sargent, 1922, *Manual of the Trees of North America*, ed. 2. Houghton Mifflin, Boston, Massachusetts.

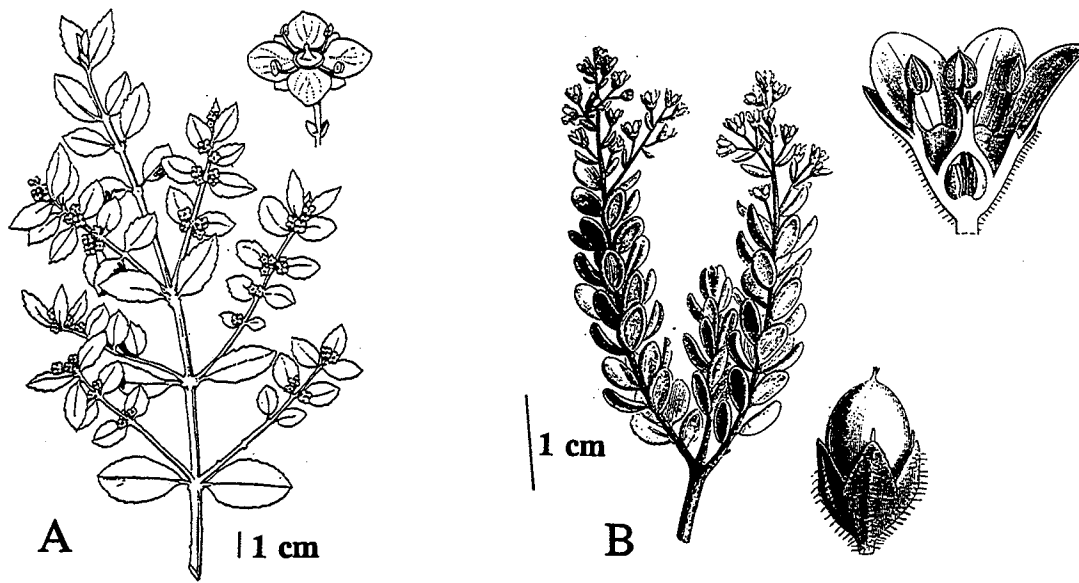


Figure 2. A, *Paxistima myrsinites* subsp. *myrsinites* flowering branch and enlarged flower. From W. L. Jepson, 1925, *Manual of the Flowering Plants of California*, University of California Press, Berkeley, California. B, *Mortonia scabrella* var. *scabrella* flowering branch, enlarged flower cross section, and enlarged fruit. From Lösener (1897), *Celastraceae*. In: A. Engler and K. Prantl, *Die Natürlichen Pflanzenfamilien* iii v. 218, Wilhelm Engelmann, Leipzig.

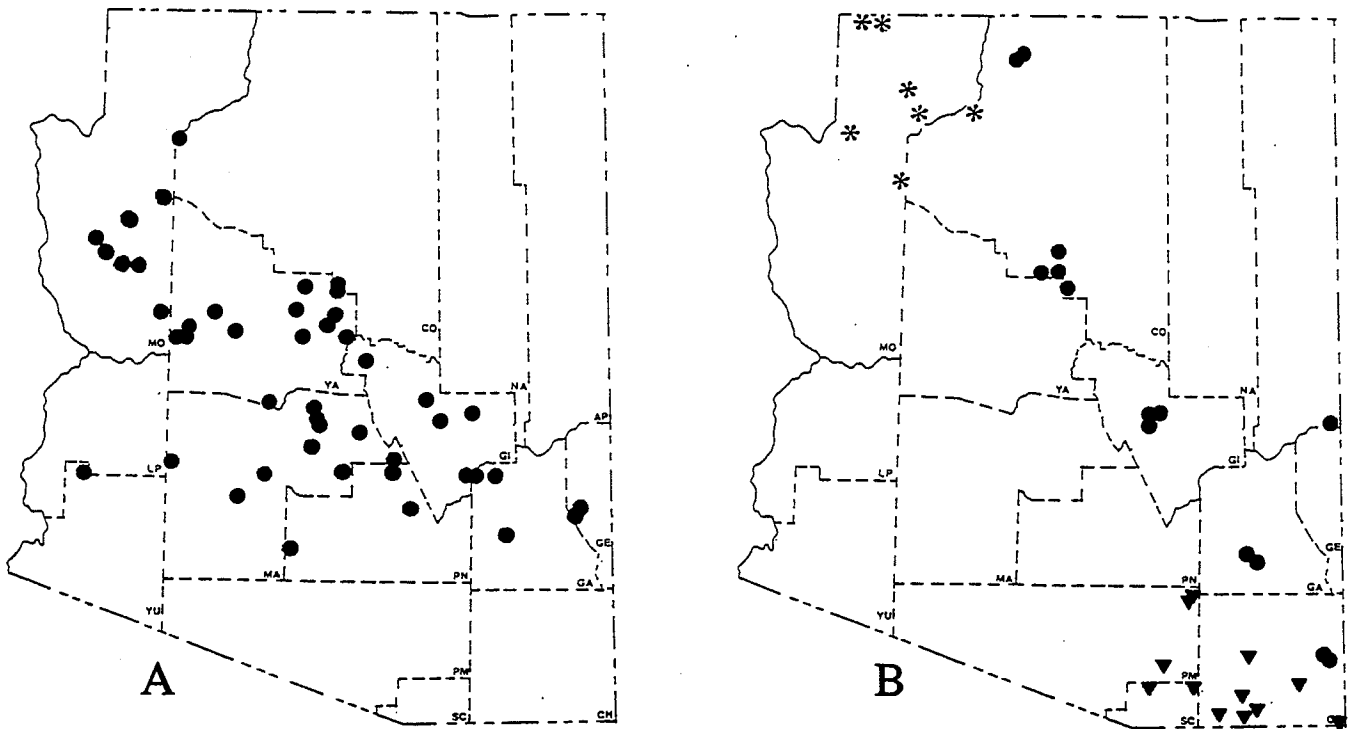


Figure 3. Distributions of: A, *Canotia holacantha*; B, *Paxistima myrsinites* subsp. *myrsinites* (dots), *Mortonia scabrella* var. *wahensis* (asterisks), and *M. scabrella* var. *scabrella* (triangles).