

THE LOASACEAE IN THE SOUTHEASTERN UNITED STATES¹

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LOASACEAE Dumortier, Comment. 58. 1822, "Loaseae," nom. cons.
(STICK-LEAF FAMILY)

Perennial herbs [to woody or annual], usually scabrous with barbed hairs. Flowers bisexual, regular, epigynous. Perianth cyclic, usually 5[4–7]-merous and 2-seriate. Sepals persistent. Corolla apopetalous [to sympetalous, sometimes with petaloid staminodia alternate with the petals]. Stamens usually many [sometimes fascicled, petaloid, or 5 and alternate with the petals]; anthers basifixed, laterally dehiscent by longitudinal slits, usually 2-locular at anthesis [or seldom 1-locular, subsessile, and epipetalous]; pollen 3-colporate. Gynoecium syncarpous; stigmas usually connate; style often persistent; ovary inferior, usually 1-locular, with 3 [1, 4–6] parietal placentae; ovules few [or 1 and pendent, to numerous], anatropous, 1-integumented. Fruits dry, $\pm$ dehiscent [to indehiscent and 1-seeded]. Seeds various; embryo straight or somewhat hooked. TYPE GENUS: *Loasa* Adanson.

About 14 genera and perhaps 200 species of temperate and tropical America to altitudes above 4,000 m. Only *Fissenia* R. Br. ex Endl. [*Kissenia* of authors], exceptional in several respects, occurs in the Old World with one species in South-West Africa and another near the mouth of the Red Sea. About four genera, all with ranges extending southward at least into Mexico, occur in the United States; two species of *Mentzelia* occur in our area.

Loasaceae have been divided into three subfamilies: Gronovioideae Gilg have five stamens and indehiscent, one-seeded fruits presumed to be formed of a single carpel; Loasoideae [including the aberrant *Fissenia*] have many centrifugal stamens in fascicles opposite the petals and elaborate, petaloid staminodia alternate with the petals; and Mentzelioideae Gilg usually have many centripetal stamens, sometimes a few of them petaloid.

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Loasaceae are well marked, particularly in the Northern Hemisphere, by the characteristic barbed, rigid hairs lending a scabrous or adhesive quality to the herbage and giving rise to the names "stick-leaf" and "sandpaper plant." The hairs, seldom important taxonomically, are exceedingly variable, often with several forms on one plant, in some instances smooth, glassy, needle-sharp, and swollen at the base. They appear to be primarily one-celled, often from multicellular platforms, and sometimes with a cystolith-like body; multicellular as well as glandular hairs are also reported.

The elaborate development of the staminodia in the Loasoideae, the timing of anthesis of some Mentzelioideae, the tendency for a tubular corolla in some taxa (probably all favoring certain pollinators), and the nature of the seeds are significant taxonomically. An inconsistency in floral symmetry is evident when there are as many placentae as sepals; in some instances the placentae are opposite the sepals and in others alternate with them.

Although relationships with other families have been supposed by several authors (see Gilg, p. 529), Loasaceae are without close morphological allies.

A few showy-flowered species are grown for ornament or novelty.

Chromosome numbers of $2n = 16, 18, 20, 22, 24, 26, 28, 30, 36, 40, 42, 46, 54, 67,$ and 72 have been reported.

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Subfam. MENTZELIOIDEAE Gilg

1. **Mentzelia** Linnaeus, Sp. Pl. 1: 516. 1753; Gen. Pl. ed. 5. 233. 1754.

Adhesive, usually brittle, intricately branched perennials [simple annuals, or rarely arborescent], pubescent throughout with unicellular, usually variously reflexly barbed to smooth hairs. Leaves alternate [to opposite], pinnately veined and lobed, $\pm$ petiolate, reduced upward. Flowers solitary and axillary, or in terminal, $\pm$ cymose, bracteate inflorescences, sessile to $\pm$ pedicellate, often with a short hypanthium. Perianth 5-merous, usually 2-seriate. Petals 5 [or rarely apparently 8 or 10, sometimes grading into staminodia], $\pm$ free, yellow [or whitish to reddish-orange]. Stamens few [to many]; filaments elongate, filiform [sometimes expanded or bicuspidate apically], usually unequal, $\pm$ fused basally and adnate to the petals. Stigmas represented by 3 furrows or a tuft of hairs; style filiform; ovary with 3 [rarely 5] placentae; ovules few [to many] in 2 vertical rows on each placenta. Fruit $\pm$ sessile, apically truncate and somewhat discoid, $\pm$ indehiscent [or forming 3 or 5 valves]. Seeds few [to many], pendent [to horizontal], narrowly oblong or flattened pyriform [wrinkled to irregularly angled or orbicular and sometimes winged]. TYPE SPECIES: *M. aspera* L. (Named for Christian Mentzel, 1622–1701, physician and botanical author of Brandenburg.) — STICK-LEAF, BLAZING-STAR.

About 60 species of temperate and tropical America, concentrated in the southwestern United States and Mexico, divided on characteristics of the stamens, placentae, and seeds (the last probably the most significant) into six sections by Gilg, seven sections by Urban & Gilg, and four sections by Darlington. *Mentzelia arborescens* Urb. & Gilg in Gilg, the only species of § DENDROMENTZELIA Urb. & Gilg in Gilg, is arborescent, has flat, winged seeds, and $\pm$ opposite leaves. Section MENTZELIA (§ *Eument-*

zelia Torr. & Gray), largely of Mexico and South America, is represented in our area by two species.

Mentzelia floridana Nutt. ex Torr. & Gray, poor-man's patches, $2n = 20$,² with enlarged roots, reported from hammocks, sand dunes, and shell mounds, may be restricted to Florida and the Bahama Islands. The seeds, about six per fruit, are flattened pyriform and eventually $\pm$ loose in the broad, brittle fruits. The closest affinities are with *M. aspera*, of Texas, with *M. adhaerens* Benth., $2n = 20$,² of Baja California, and with *M. hispida* Willd., of Mexico.

Mentzelia oligosperma Nutt. ex Sims, $2n = 22$,² also with enlarged roots, is known in our area from northern Arkansas and westward from Texas, Missouri, and South Dakota to Colorado. The seeds, about three per fruit, are oblong, $\pm$ 3-sided and are held tightly within the narrow, hard fruits. The seeds resemble those of the monotypic § MICROMENTZELIA Urb. & Gilg of the western United States.

The stamens in *Mentzelia*, often unequal, are shorter toward the center; maturation of the microsporocytes proceeds centripetally. The filaments are $\pm$ connate basally and $\pm$ adnate to the base of the corolla, thus tending to hold the petals together when they fall off. In some species, the outermost filaments are expanded, apically bicuspidate, or petaloid.

The ovules are usually in two vertical series on each of the three placentae, a feature not clearly evident in a single transverse section of the ovary, especially when there are only a few ovules or seeds. The shapes of the seeds, spectacularly diverse, and the time of anthesis of the flowers, which may open in bright daylight or at dusk, provide important biological and taxonomic criteria.

The affinities of *Mentzelia* are with *Eucnide* Zucc. (primarily of Mexico), which is clearly distinct in its tendency toward somewhat more tubular corollas and in its five placentae bearing numerous, minute, furrowed or ribbed seeds. The genus *Schismocarpus* Blake, of Oaxaca and Chiapas, Mexico, placed with the tribe Mentzelieae by Blake, is discordant in the Mentzelioideae.

Chromosome numbers of $2n = 18, 20, 22, 28, 36, 54$, and 72 have been reported.

A few of the species are cultivated for their showy flowers.

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² The chromosome numbers given above are new reports, determined from squash preparations of microsporocytes, with the following vouchers: ten pairs of chromosomes were observed in *Mentzelia floridana* (Chambers 1280 [LA], Lower Matecumbe Key, Monroe County, Florida), and in *M. adhaerens* (Raven 14771, 14800 [LA], Baja California); and eleven pairs of chromosomes were observed in *M. oligosperma* (Thompson & Ernst 3113 [LA], Payne County, Oklahoma).

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