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X. AUREOLARIA  Rafinesque, New Fl. 2: 58. 1837  *  Yellow false foxglove [Latin *aureolus*, golden, and *-arius*, possession, alluding to corolla]

Jeffery J. Morawetz

Herbs, annual or perennial; hemiparasitic, caudex knotted. Stems erect, not succulent, glabrous, sparsely to densely puberulent, densely villose, or glandular-pubescent. Leaves basal and cauline, opposite, leathery; petiole present; blade margins entire to pinnatifid, or 2-pinnatifid. Inflorescences terminal, loose racemes; bracts present. Pedicels present; bracteoles absent. Flowers: sepals 5, calyx radially symmetric, campanulate or turbinate, lobes linear to deltate, sometimes lanceolate; petals 5, corolla yellow, campanulate, abaxial lobes 3, adaxial lobes 2; stamens 4, adnate to corolla, didynamous, (thecae apiculate), filaments glabrous or ciliate, staminode 0; ovary 2-locular, placentation axile; stigma truncate. Capsules symmetric, dehiscence loculicidal. Seeds 300--500, brown to blackish, ovoid to deltoid, winged or not winged.

Species 8 (7 in the flora): c, e North America, n Mexico.

Molecular phylogenetic analysis supports a close relationship of *Aureolaria* with *Agalinis*, *Esterhazya* J. C. Mikan, and *Seymeria* (J. R. Bennett and S. Mathews 2006). Further evidence for these relationships is similarities in floral morphology among these genera.

*Aureolaria greggii* (S. Watson) Pennell is the only species not represented in our flora, occurring broadly throughout northern Mexico.


1. Calyx lobes crenate or pinnatifid; plants annual.
   2. Leaf margins deeply 2-pinnatifid, sometimes undivided or less deeply divided on basal leaves; calyx tubes campanulate; corolla tubes floccose........................................... 1. *Aureolaria pectinata*
   2. Leaf margins shallowly pinnatifid to shallowly 2-pinnatifid (first division is deeper than second division when both are present); calyx tubes turbinate; corolla tubes glabrous or sparsely pubescent............................................................................... 2. *Aureolaria pedicularia*

1. Calyx lobes entire; plants perennial.
   3. Stems and leaves sparsely to densely brown-pubescent; capsules densely pubescent. 3. *Aureolaria virginica*
   3. Stems and leaves glabrous or white-puberulent; capsules glabrous.
   4. Leaf margins serrate to pinnatifid proximally, becoming entire on distal 1/4--1/2.4. *Aureolaria patula*
   4. Leaf margins entire to serrate or shallowly to deeply pinnatifid.
      5. Stems and leaves white-puberulent...................................................... 5. *Aureolaria grandiflora*
      5. Stems and leaves glabrous.
      6. Leaf margins usually entire to serrate, rarely proximal leaves pinnatifid 6. *Aureolaria levigata*
      6. Leaf margins usually shallowly to deeply pinnatifid or basal leaves 2-pinnatifid, rarely entire .................................................. 7. *Aureolaria flava*


*Gerardia pedicularia* Linnaeus var. *pectinata* Nuttall, Gen. N. Amer. Pl. 2: 48. 1818; *G. pectinata* (Nuttall) Bentham

Plants annual. Stems branched, 0.3--1.2 m, densely white-villosa, glandular-pubescent. Leaves lanceolate, (0.5--1.5) x 0.6--2.6 cm, margins deeply 2-pinnatifid, sometimes undivided or less deeply divided on basal leaves,

Gerardia pedicularia Linnaeus, Sp. Pl. 2: 611. 1753; Aureolaria pedicularia var. ambigens (Fernald) Farwell; A. pedicularia var. austromontana Pennell; A. pedicularia var. intercedens Pennell; G. pedicularia var. ambigens Fernald; G. pedicularia var. austromontana (Pennell) Fernald; G. pedicularia var. intercedens (Pennell) Fernald

Plants annual. Stems simple or branched, 0.4–1 m, glabrous or white-pubescent to sparsely glandular-pubescent. Leaves lanceolate, 1.2–7 x 0.8–3 cm, margins shallowly pinnatifid (less than 1/2 to midvein) to shallowly 2-pinnatifid. Pedicels (0.2–)0.8–1.3 cm, pubescent to glandular-pubescent. Flowers: calyx pubescent to glandular-pubescent, tube turbinate, 0.4–0.8 cm, lobes linear or sometimes narrowly lanceolate, 0.4–1.2 x 0.1–0.3 cm, margins crenate to pinnatifid; corolla tube 1.7–3.2 cm, glabrous or pubescent, lobes 0.8–1.6 x 0.5–1.3 cm, margins pinnatifid; filaments 1.5–2 cm, pubescent; style 2.5–2.7 cm. Capsules elliptic, 1–1.3 x 0.5–0.6 cm, hispid. Seeds not winged. 2n = 28.


Species of Aureolaria typically parasitize oaks (Quercus spp.); however, two studies have documented A. pedicularia parasitizing non-oak species: Pinus taeda Linnaeus and Vaccinium arboreum Marshall (L. J. Musselman and H. E. Grelen 1979), and unidentified Ericaceae (C. R. Werth and J. L. Riopel 1979). Further, in a study of seed coat morphology of Aureolaria and a selection of related genera, A. pedicularia was documented to be the only species in the genus with unwinged seeds (J. M. Canne 1980). F. W. Pennell (1935) recognized five infraspecific taxa within A. pedicularia based on subtle characters (for example, stem distally closely pubescent, not or only slightly glandular, and leaves puberulent, scarcely or not glandular, versus stem distally glandular-pubescent to hirsute, and leaves glandular puberulent to pubescent). Additionally, he recognized these infraspecific taxa at both the varietal and subspecific ranks, (at different times), and these both have been variously used by different authors. Partly for these reasons, no infraspecific taxa are recognized here.


Rhinanthus virginicus Linnaeus, Sp. Pl. 2: 603. 1753 (as virginica); Aureolaria dispersa (Small) Pennell; A. microcarpa Pennell; Gerardia virginica (Linnaeus) Britton, Sterns & Poggenburg

Plants perennial. Stems simple or branched, 0.5–1.5 m, sparsely to densely brown-pubescent. Leaves lanceolate to oblong, 2.4–14 x 0.8–3.1 cm, margins serrate to pinnatifid, brown-pubescent; petiole 0.2–0.5 cm. Bracts leaflike, 1.1–3.2 x 0.3–0.9 cm, margins entire to crenate. Pedicels 0.3–0.5 cm, pubescent. Flowers: calyx densely pubescent, tube campanulate, 0.5–0.6 cm, lobes deltate, margins entire, 0.4–0.9 x 0.2–0.3 cm; corolla tube 2.5–3.5 cm, glabrous, lobes 0.9–1.4 x 1–1.5 cm, margins glabrous or ciliate; filaments 0.9–1.4 cm, ciliate; style 2.1–3.3 cm. Capsules pyriform, 0.8–1.5 x 0.6–0.8 cm, densely pubescent. Seeds winged.

Dasystoma patulum Chapman, Bot. Gaz. 3: 10. 1878 (as patula); Gerardia patula (Chapman) Chapman ex A. Gray

Plants perennial. Stems branched, 0.5--0.9 m, glabrous. Leaves lanceolate, 3--13 x 0.5--8.7 cm, margins serrate to pinnatifid proximally, becoming entire on distal 1/4--1/2 glabrous; petiole 0.3--3 cm. Bracts lanceolate, 1.5--3.6 x 0.6--0.7 cm, margins entire. Pedicels 1.1--2.3 cm, sparsely villose to puberulent. Flowers: calyx glabrous to sparsely pubescent, tube campanulate, 0.3--0.5 cm, lobes lanceolate, margins entire, 0.7--0.9 x 0.1--0.2 cm; corolla tube 1.8--2.7 cm, glabrous, lobes 1.1--1.2 x 1--1.3 cm, margins glabrous or ciliate; filament 1.5--2.8 cm, glabrous or ciliate; style 2.5--3 cm. Capsules ovoid to pyriform, 1--1.1 x 0.5--1 cm, glabrous. Seeds winged.

Flowering Aug--Oct. Limestone substrates near edges of lakes or rivers; 200--250 m; Ala., Ga., Ky., Tenn. 
Aureolaria patula is a poorly known species with the most restricted distribution within the genus. Very little information is available in the literature, and few specimens exist. This species is state-listed as threatened in Tennessee and of special concern in Kentucky.

5. Aureolaria grandiflora (Bentham) Pennell, Rhodora 20: 135. 1918 * Large-flower yellow false foxglove

Gerardia grandiflora Bentham, Compan. Bot. Mag. 1: 206. 1836; Aureolaria grandiflora var. cinerea Pennell; A. grandiflora var. pulchra Pennell; A. grandiflora var. serrata (Bentham) Pennell; G. grandiflora var. cinerea (Pennell) Cory; G. grandiflora var. pulchra (Pennell) Fernald

Plants perennial. Stems simple to branched, 0.5--1.5 m, white-puberulent. Leaves lanceolate, 5--10.5 x 3--4 cm, margins pinnatifid and serrate, rarely serrate and lacking pinnatifid divisions, puberulent; petiole 0.8--1.8 cm. Bracts leaflike, 1.5--2.2 x 0.3--0.7 cm, margins serrate to weakly pinnatifid at base. Pedicels 0.4--1.1 cm, puberulent. Flowers: calyx puberulent, tube campanulate, 0.6--1 cm, lobes linear to lanceolate, 0.3--1.2 x 0.1--0.4 cm, margins entire; corolla tube 3--4 cm, glabrous, lobes 0.7--1.1 x 1--1.6 cm, margins glabrous or ciliate; filaments 1.3--2.7 cm, ciliate; style 2.9--3.5 cm. Capsules pyriform, 1--1.6 x 0.8--1.2 cm, glabrous. Seeds winged.

Flowering Jul--Oct. Maple, pine, and oak woodlands, roadsides; 0--400 m; Ont.; Ark., Ill., Ind., Iowa, Kans., La., Mo., Okla., Tex., Wis.

J. C. McFeeley and E. P. Roberts (1974) documented Aureolaria grandiflora, typically a parasite of oaks, parasitizing Juniperus virginiana Linnaeus in addition to oak species. F. W. Pennell (1935) recognized four infraspecific taxa within A. grandiflora. These are differentiated based upon subtle characters (for example, bracts serrate versus more cut, leaf blades more versus less pinnatifid). Additionally, he recognized these infraspecific taxa at both the varietal and subspecific ranks (at different times), and these both have been variously used by different authors. For these reasons, no infraspecific taxa are recognized here.

There is a historic record of Aureolaria grandiflora from Houston County, Minnesota, collected in 1899.

6. Aureolaria levigata (Rafinesque) Rafinesque, New Fl. 2: 59. 1837 * Entire-leaf yellow false foxglove

Gerardia levigata Rafinesque, Ann. Nat. 1: 13. 1820

Plants perennial. Stems simple or branched, 0.4--2.5 m, glabrous [not glaucous]. Leaves lanceolate to oblong, 1.5--12.7 x 0.4--3.4 cm, margins usually entire to serrate, rarely proximal leaves pinnatifid, glabrous; petiole 0.2--0.3 cm. Bracts leaflike, 0.8--1.5 x 0.2--0.5 cm, margins entire. Pedicels 0.1--0.3 cm, glabrous. Flowers: calyx glabrous, tube campanulate, 0.5--0.7 cm, lobes lanceolate to narrowly deltate, margins entire, 0.5--0.6 x 0.2--0.3 cm; corolla tube 1.9--3 cm, glabrous, lobes 0.9--1.1 x 1.1--1.6 cm, margins glabrous or ciliate; filaments 1.2--2 cm, ciliate; style 2.1--2.9 cm. Capsules ovoid to pyriform, 0.8--1.2 x 0.6--0.7 cm, glabrous. Seeds winged.


In addition to occurring in northeastern Mississippi, Aureolaria levigata is disjunct in southwestern Mississippi. There is a well-documented affinity between the florals of the Appalachian and Ozark mountains and the loess hills of southwestern Mississippi (H. R. Delcourt and P. A. Delcourt 1975).

*Gerardia flava* Linnaeus, Sp. Pl. 2: 610. 1753; *Aureolaria calycosa* (Mackenzie & Bush) Pennell; *A. flava* var. *macrantha* Pennell; *A. flava* var. *reticulata* (Rafinesque) Pennell; *G. calycosa* (Mackenzie & Bush) Fernald; *G. flava* var. *macrantha* (Pennell) Fernald; *G. flava* var. *reticulata* (Rafinesque) Cory

**Plants** perennial. **Stems** branched, 0.4--2.2 m, glabrous, (glaucouscent). **Leaves** lanceolate, 6--16 x 1.2--6 cm, margins usually shallowly to deeply pinnatifid or basal leaves 2-pinnatifid, rarely entire, glabrous; petiole 0.7--2.5 cm. **Bracts** leaflike, 1--4.8 x 0.2--0.5 cm, margins entire to pinnatifid. **Pedicels** 0.7--1.2 cm, glabrous. **Flowers:** calyx glabrous, tube campanulate, 0.4--0.8 cm, lobes linear to narrowly deltate, margins entire, 0.4--0.7 x 0.1--0.2 cm; corolla tube 2.5--3.8 cm, glabrous, lobes 0.5--0.9 x 0.6--1.5 cm, margins glabrous or ciliate; filaments 1.2--2.6 cm, glabrous; style 2.7--3.1 cm. **Capsules** ovoid to pyriform, 1.1--1.3 x 0.9--1.1 cm, glabrous. **Seeds** winged. 2n = 24.


Despite the nuanced variation within this broadly distributed species recognized variously at both the varietal and subspecific levels by F. W. Pennell (1935), R. P. Wunderlin (1998) recognized a broad *Aureolaria flava* with no varietal designations; that concept is followed here.