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Phryma (Phrymaceae)

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3. PHRYMA Linnaeus, Sp. Pl. 2: 601. 1753; Gen. Pl. ed. 5, 262. 1754 * Lopseed
[Derivation unknown]

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Herbs, perennial, terrestrial; rhizomes fleshy, vertical. **Stems** erect, glabrous to puberulent. **Leaves** cauline, opposite, decussate, not fleshy; petiole present; blades margins crenate-serrate. **Inflorescences** terminal (or occasionally axillary in distal nodes), spikelike racemes, (long-pedunculate, elongate); bracts present. **Pedicels** present; bracteoles often present. **Flowers**: sepals 5, calyx bilaterally symmetric, narrowly campanulate, lobes triangular or subulate-uncinate; petals 5, corolla lavender to purple to white, bilaterally symmetric, bilabiate, abaxial lobes 3, adaxial lobes 2; stamens 4, adnate to corolla tube, included, filaments glabrous, staminode 0; ovary 1-locular, placentation basal; stigma 2-lobed, lobes unequal. **Achenes** enclosed in accrescent calyx, symmetric. **Seed** 1, yellowish brown or brown, narrowly ellipsoid, not winged. $x = 14$.

Species 1: e North America, e Asia.

The common name, “lopseed,” alludes to the fruit appearing to lop, or hang, as it matures, reflexes, and becomes appressed to the infructescence axis.

Phryma has often been included in the Verbenaceae based on presumed affinities with members of the tribe Lantaneae, particularly the genus *Stachytarpheta* (H. L. Whipple 1972). Others have placed it in the monotypic Phrymaceae based on its unusual gynoecium with only one ovule reaching maturity. Molecular evidence (P. M. Beardsley and R. G. Olmstead 2002; B. Oxelman et al. 2005) suggests that *Phryma* is allied with a group of genera traditionally placed in the Scrophulariaceae (*Mazus*, *Mimulus*, and others). This evidence has led to an expanded circumscription of Phrymaceae, followed here.

SELECTED REFERENCES Nie, Z. L. et al. 2006. Evolution of biogeographic disjunction between eastern Asia and eastern North America in *Phryma*. Amer. J. Bot. 93: 1343--1356. Venkata Ramana, R., P. S. Prakasa Rao, B. S. M. Dutt, and L. L. Narayana. 2000. Embryology of *Phryma leptostachya* L. (Verbenaceae) with considerations of its systematic status and affinities. Feddes Repert. 111: 231--248. Whipple, H. L. 1972. Structure and systematics of *Phryma leptostachya*. J. Elisha Mitchell Sci. Soc. 88: 1--17.

1. *Phryma leptostachya* Linnaeus, Sp. Pl. 2: 601. 1753 * American lopseed, phryma à épis grèles F

Varieties 2 (1 in the flora): c, e North America, Asia (Himalayas to e China, Japan, Taiwan, Russian Far East).

Phryma leptostachya is a classic example of the eastern Asian/eastern North American disjunction pattern, which has long fascinated botanists. Two varieties are traditionally recognized: var. *leptostachya* in North America, and var. *asiatica* H. Hara in eastern Asia. They are distinguished on minor differences in leaf size, shape of adaxial lip of the corolla, and length of the adaxial, spinulose calyx lobes (Nie Z. L. et al. 2006). Despite the morphological similarities, recent analyses demonstrate significant molecular divergence between the two varieties (N. S. Lee et al. 1996; Xiang Q. Y. et al. 2000; Nie et al. 2006, 2009) and a North American origin of the genus with subsequent dispersal to eastern Asia approximately 3--6 mya has been hypothesized (Xiang et al. 2000; Nie et al. 2006).

Ground roots of *Phryma leptostachya* and extracts of the entire plant have been used as insecticides in Asia (G. M. Hocking 1997), where the species has been used also to treat fevers, ulcers, ringworms, scabies, boils, carbuncles, and cancers (D. F. Austin 2004). In the New World, the Ojibwa reportedly used it in the treatment of sore throat and rheumatism (Austin), as did the Chippewa (F. Densmore 1928).

1a. *Phryma leptostachya* Linnaeus var. *leptostachya* E F

Phryma leptostachya var. *confertifolia* Fernald

Stems often reddish, simple or sparingly branched, terete toward base and 4-angled distally, 0.4--1 m, swollen directly distal to each node, some trichomes glandular. **Leaves:** petiole 2--5 cm; blade pinnately veined, ovate to ovate-lanceolate, 5--16 x 3--10 cm, base cuneate to truncate, apex acute to acuminate, glabrous or puberulent. **Racemes:** peduncle glabrous or puberulent; bracts cordate, leaflike. **Pedicels:** less than 1 mm, subtended by 3 persistent bracteoles; bracteoles often on peduncle 1/3--1/2 distance between base of inflorescence and proximal flowers. **Flowers:** opposite or lowest sometimes subopposite, erect in bud, becoming horizontal to ascending at anthesis and reflexed in fruit; calyx green, 5--8 mm, glabrous, abaxial lobes 2, triangular, 0.1--0.5 mm, adaxial lobes 3, reddish, subulate-uncinate and indurate in fruit, 2--3 mm; corolla glabrous externally, puberulent on abaxial lip at mouth, tube 8--12 mm, abaxial lobes white to lavender, horizontal, rounded, 2--4 mm, adaxial lobes erect, lavender to purple, 2--4 mm, acute and often emarginate; thecae parallel to divergent; ovule 1; style slightly exerted, glabrous, stigma lobes unequal. **Achenes** strongly reflexed and appressed to infructescence axis, 3--4 mm. $2n = 28$.

Flowering May--Aug; fruiting Jul--Oct. Moist, woods and edges; 10--1500 m; Man., N.B., Ont., Que.; Ark., Conn., Del., D.C., Fla., Ga., Ill., Ind., Iowa, Kans., Ky., La., Maine, Md., Mass., Mich., Minn., Miss., Mo., Nebr., N.H., N.J., N.Y., N.C., N.Dak., Ohio, Okla., Pa., R.I., S.C., S.Dak., Tenn., Tex., Vt., Va., W.Va., Wis., Wyo.

Variety *leptostachya* is largely restricted to eastern North America, occurring west to easternmost Wyoming and eastern Texas, south to northern Florida, and north to Manitoba and Quebec. *Phryma* had previously been reported as occurring as a garden waif in central California (C. Best et al. 1996), but has since been rejected as being naturalized in that state (J. A. Greenhouse and B. G. Baldwin, http://ucjeps.berkeley.edu/cgi-bin/get_cpn.pl?37935). Fruit dispersal is presumably via animals, with attachment facilitated by the uncinat lobes of the persistent calyx (P. D. Cantino 2004).