

CALLITRICHACEAE WATER-STARWORT FAMILY

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Aquatic or terrestrial annual (or facultatively perennial) herbs, generally glabrous, with adventitious roots; monoecious or rarely dioecious. STEMS delicate, simple or branched, usually 1-4 dm long. LEAVES opposite, simple, often polymorphic, estipulate, the margins entire; submerged leaves narrow linear, the apices generally emarginate or bifid, 1-nerved; terrestrial and floating leaves obovate to oblanceolate to spatulate, 3- to several-nerved; floating leaves crowded at the ends of the branches forming rosettes. INFLORESCENCE of 1-3 sessile flowers in the axils of the leaves. FLOWERS hypogynous, inconspicuous, usually subtended by a pair of small, white, falcate or obliquely oval bracteoles; perianth absent. STAMINATE FLOWERS consisting of a single stamen on a slender elongate filament. PISTILLATE FLOWERS with 2 united carpels; pistil 4-lobed (often keeled or winged and apically indented between the lobes), appearing 4-chambered by a false septum, compressed dorso-ventrally; styles 2, slender, often much longer than the ovary. FRUIT separating at maturity into 4, 1-seeded nutlets. $2n = 6-40$. --A monogeneric family, 40-60 spp., worldwide.

Callitriche L. Water-Star, Water-Chickweed

Characters of the family. --(Greek: *callos* = beautiful + *trichos* = hair, from the delicate growth form). Fassett, N. C. 1951. *Rhodora* 53:137-155; 161-182; 185-194; 209-222. --Taxonomically and nomenclaturely difficult because most species are polymorphic.

1. Plants wholly submerged at maturity; upper leaves slender, 1-nerved, the apices usually bifid, the leaf bases clasping, not connected by a wing at the node; floral bracteoles absent; faces of the mericarps obscurely and irregularly pitted *C. hermaphroditica*
- 1' Plants usually with shoot-tips floating at maturity; upper leaves broadened, 3- to several-nerved, the apices rounded or emarginate or bifid, the leaf bases connected by a wing at the node; a pair of floral bracteoles usually present, especially in immature flowers; faces of the mericarps conspicuously pitted.
 2. Mature fruit about as wide as long, wingless (immature specimens may appear winged if the ovules have not expanded); fruit margins obtuse or rounded, often deeply cleft between the carpels; groove between carpels inconspicuous; pits on the faces of the mericarps mostly irregular, not in vertical rows; bases of leaf pairs generally separated but joined by a wing at the node *C. heterophylla*
 - 2' Mature fruit slightly longer than wide, narrowly winged at least at the apex (usually evident on mature specimens); fruit margins obtuse, rounded or straight, rarely deeply cleft between the carpels; groove between carpels evident; pits on the faces of the mericarp tending to be in vertical rows; bases of leaf pairs adjoining or separated by a wing at the node
..... *C. palustris*

Callitriche hermaphroditica L. (after the Greek: Hermaphroditus). --Annuals, usually wholly submerged. LEAVES 1-nerved, linear-lanceolate, uniform, 5-25 mm long, 0.5-1.5 mm wide, usually dark metallic green with narrow white, entire margins, the apices usually bifid or broadly notched, bases clasping the stem, the base pairs often overlapping but never connected by a wing at the node. INFLORESCENCE usually a single flower in each axil. FLOWERS without floral bracteoles; styles 1-6 mm long, usually longer than the ovary, sharply reflexed, soon breaking off and leaving a persistent short base between the tips of the developing fruit. FRUIT brown at maturity, sessile or shortly pedicellate, 1.1-1.6 mm long, 1.2-1.8 mm

wide, obovate, flattened or slightly rounded, the surface obscurely and irregularly pitted, the carpel margins flattened appearing wing-like, the groove between carpels deep and narrow between the wings. $2n = 6$. [*C. autumnalis* L.]. --Lakes, ponds and slow moving streams: Apache, Coconino cos.; 2700 m (8900 ft); Jun-Sep (fr. Aug-Oct); circumboreal.

Callitriche heterophylla Pursh emend. Darby (various leaves). --Annuals, mostly submerged but usually with a floating rosette of leaves, or terrestrial. LEAVES polymorphic; submerged leaves linear, 1-15 mm long, 0.5-1.0 mm wide, the margins entire, the apices bifid or emarginate with the single nerve often extending to a callous point, the bases clasping the stem, the basal pairs usually separated but connected by a ridge or wing at the node, or less often adjoining; floating or terrestrial leaves petioled, 3-nerved, obovate to oblanceolate to spatulate, 1-15 mm long, 1-5 mm wide, the apices rounded to slightly retuse, the bases as above, the surface covered with minute scales and appearing punctate. INFLORESCENCES with usually single staminate and pistillate flowers in each axil. FLOWERS subtended by a pair of whitish inflated bracteoles, 0.5-1.5 mm long, usually deciduous in fruit; styles 1-6 mm long, erect or spreading, often persistent. FRUIT brown at maturity, sessile, 0.5-1.3 mm long, 0.6-1.1 mm wide, broadly-obovate, usually deeply notched between the carpels, overall appearing cordate, the margins wingless (immature material may appear wing-like when the seed fails to fill the mericarp, the unexpanded margin appears thin and wing-like, but pitted like the surface of the mericarp), rounded, the groove between carpels very shallow or inconspicuous, not at all sharp-edged; surface pitted, but the pits not obviously aligned in vertical rows. --2 vars., New World.

Var. ***heterophylla***. --The two varieties differ primarily in the size of the fruit, the Arizona specimens are of the common var. *heterophylla* with fruits 0.6-0.8 mm long, rather than in var. *bolanderi* (Hegelm.) Fassett with fruits 0.8-1.3 mm long. $2n = 20$. --Lakes, ponds and slow-moving streams: Apache, Cochise, Coconino, Gila, Graham, Pima, Pinal cos.; 900-2750 m (3000-9000 ft); Feb-Aug (fr. May-Oct); throughout N. Amer., scattered in W. Ind., C. Amer., S. Amer. and New Zealand.

Callitriche palustris L. (of the marshes). --Annuals, mostly submerged but usually with a floating rosette of leaves, or terrestrial. LEAVES polymorphic; submerged leaves linear, 1-15 mm long, 0.3-1.0 mm wide, the margins entire, the apices bifid or emarginate with the single nerve often extending to a callous point, the bases clasping the stem, the leaf base pairs usually adjoining or less often separated by a ridge or wing at the node; floating or terrestrial leaves petioled, 3-nerved, obovate to oblanceolate to spatulate, 1-15 mm long, 1-5 mm wide, the margins entire, the apices rounded to slightly retuse, the bases as above, the surface covered with minute scales and appearing punctate. INFLORESCENCES with usually 1 staminate and 1 pistillate flower in each axil. FLOWERS subtended by a pair of whitish inflated bracteoles, 0.5-1.5 mm long, usually deciduous in fruit; styles 1-6 mm long, erect or spreading, often persistent. FRUIT brown at maturity, sessile, 0.5-1.4 mm long, 0.6-1.2 mm wide, usually 0.2 mm longer than wide, obovate, the margins flattened, winged (conspicuous on mature material), widest at the apex, often inconspicuous on the sides and bases, the groove between carpels evident between the wings, the surface pits appearing more or less aligned in vertical rows. $2n = 20$. [*C. verna* L. emend. Kützing]. --Lakes, ponds and slow-moving streams: Apache, Coconino, Navajo cos. [present occurrence in Pima Co. is doubtful, although there is a single collection, (*Lemmon s.n.*, Apr. 1881); the identification of a sterile collection from the Santa Maria Mts. in Yavapai Co. cannot be confirmed]; 2050-2850 m (6700-9400 ft); May-Aug (fr. Aug-Oct); circumboreal.