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Hippuris (Plantaginaceae)
Reidar Elven, David F. Murray, and Heidi Solstad
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X. HIPPURIS Linnaeus, Sp. Pl. 1: 4. 1753; Gen. Pl. ed. 5, 4. 1754 * Mare's tail [Greek *hippouris*, horsetail, alluding to appearance of stem and leaves]

Reidar Elven

David F. Murray

Heidi Solstad

Herbs, perennial; rhizomatous, (emergent aquatics in fresh or brackish water). **Stems** erect, glabrous. **Leaves** cauline, in whorls at nodes, leathery or not; petiole absent; blade margins entire. **Inflorescences** of solitary flowers, axillary; bracts absent. **Pedicels** present (proximal flowers) or absent (distal flowers); bracteoles absent. **Flowers** bisexual or unisexual; calyx reduced to a minute rim adhering to summit of inferior ovary; petals 0; stamen 1, adnate to ovary, filaments glabrous, staminode 0; ovary 1-locular, placentation apical; stigma linear along surfaces of style. **Drupes** symmetric. **Seed** 1, brownish, globular, not winged. $x = 8$.

Species 4 (4 in the flora): North America, South America, Eurasia; introduced in Australia.

Leaf characteristics of *Hippuris* used here are derived from whorls on the emergent portions of the stems; morphology of submerged leaves differs sharply from that of emergent shoots.

M. E. McCully and H. M. Dale (1961) proposed that the taxa treated below all could be expressions of phenotypic plasticity of *Hippuris vulgaris* developed in different regimes of salts and photoperiod, but this was not accepted by E. Hultén (1973), nor is it accepted here. Number of leaves in a whorl varies among plants, even on the same stem. Nevertheless, there are clear limits and discontinuities in leaf number and shape among taxa, which are well-correlated with less variable characters as well as with ecology and geography.

Previously, *Hippuris* has been placed in the Halagoraceae or in Hippuridaceae as a monogeneric family. Molecular phylogenetic studies now place it in a much-expanded Plantaginaceae containing parts of Scrophulariaceae in the broad sense and related families (D. C. Albach et al. 2005).

SELECTED REFERENCE McCully, M. E. and H. M. Dale. 1961. Heterophylly in *Hippuris*, a problem in identification. Canad. J. Bot. 39: 1099--1116.

1. Flowers unisexual; leaves 2--10 mm, midveins often conspicuous, lateral veins absent; stems 1.5--10 cm; rhizomes 1 mm diam.....1. *Hippuris montana*
1. Flowers bisexual; leaves 3--35 mm, midveins inconspicuous, lateral veins present, sometimes obscure; stems 8--50 cm; rhizomes (2--)3--7 mm diam.
   2. Leaves (7--)8--9(--12) on mid portions of emergent shoots, tips often curled in dried material; filaments longer than anthers ..... 2. *Hippuris vulgaris*
   2. Leaves 3--6(--7) on mid portions of emergent shoots, tips not curled in dried material; filaments equal to or shorter than anthers.
      3. Leaves (5--)6(--7) on mid portions of emergent shoots, leaves linear to narrowly oblong or lanceolate, 0.5--1.5 mm wide, apices subacute .....3. *Hippuris lanceolata*
      3. Leaves 3--5(--6) on mid portions of emergent shoots, leaves oblanceolate or oblong to obovate, often broadly so, 2--8 mm wide, apices obtuse, rounded, or blunt .....4. *Hippuris tetraphylla*

1. Hippuris montana Ledebour ex Reichenbach, Iconogr. Bot. Pl. Crit. 1: 71, plate 86, fig. 181. 1823 **E**

Stems 1.5--10 cm. **Rhizomes** 1 mm diam. **Leaves** on mid portions of emergent shoots, 5--7 in whorls, linear, 2--10 x 0.2--0.5 mm, midvein often conspicuous, lateral veins absent, apex acute (with translucent callous tip), tip not curled in dried material. **Flowers** unisexual, pistillate flowers in leaf whorls distal to staminate flowers, proportion of staminate and pistillate flowers variable, filaments longer than anthers. **Drupes** 1.2 x 1 mm. ***2n*** = 16.

Flowering summer. Shallow streams, stream banks, bogs, seeps of upper montane and alpine zones; 100--1400 m; Alta., B.C., N.W.T., Yukon; Alaska, Wash.

Hippuris montana is the most distinctive species in the genus, because of its diminutive size and the tendency for the plants to be woven into the moss carpet; it is probably often overlooked by collectors.

The single occurrence reported by N. N. Tzvelev (1980) in the Russian Far East (lower Amur River) of an otherwise North American endemic needs confirmation.

2. Hippuris vulgaris Linnaeus, Sp. Pl. 1: 4. 1753 * Hippuride vulgaire **F W**

Stems 10--40 cm. **Rhizomes** (2--)3--5 mm diam. **Leaves** on mid portions of emergent shoots, (7--)8--9(--12) in whorls, linear to narrowly oblong or lanceolate, 3--35 x 0.5--2.5 mm, midvein inconspicuous, lateral veins present, sometimes obscure, apex subacute to acute or attenuate, tip often curled in dried material. **Flowers** bisexual, filaments longer than anthers. **Drupes** 1.5--2 x 0.8--1 mm. ***2n*** = 32.

Flowering summer. Shallow freshwater pools, pond margins; 0--2900 m; St. Pierre and Miquelon; Alta., B.C., Man., N.B., Nfld. and Labr., N.W.T., N.S., Nunavut, Ont., P.E.I., Que., Sask., Yukon; Alaska, Ariz., Calif., Colo., Ill., Ind., Maine, Mass., Mich., Minn., Mont., Nebr., Nev., N.H., N.Mex., N.Y., N.Dak., Oreg., S.Dak., Utah, Vt., Wash., Wis., Wyo.; s South America; Eurasia; introduced in Australia.

Hippuris vulgaris is the most common and widespread species of the genus but largely absent from the Canadian Arctic Archipelago and Greenland. All specimens seen by us from that region are *H. lanceolata*.

The distribution of *Hippuris vulgaris* is bipolar, occurring also in southern South America (Patagonia: Argentina and Chile) and Australia; it exists in some areas as a naturalized introduction, possibly from being used in aquaria and ornamental pools. In many areas, *H. vulgaris* is being monitored for its potential to become noxious by spreading rapidly in shallow waterways.

3. Hippuris lanceolata Retzius, Observ. Bot. 3: 7, plate 1. 1783 * Hippuride à feuilles lancéolées **F**

Stems 10--50 cm. **Rhizomes** 4--7 mm diam. **Leaves** on mid portions of emergent shoots, (5--)6(--7) in whorls, linear to narrowly oblong or lanceolate, 5--20 x 0.5--1.5 mm, midvein inconspicuous, lateral veins present, sometimes obscure, apex subacute, tip not curled in dried material. **Flowers** bisexual, filaments equal to or shorter than anthers. **Drupes** 1.8--2 x 0.6--1.2 mm. ***2n*** = 32 (Russian Far East).

Flowering summer. Shallow fresh and brackish pools, pond margins; 0--300 m; Greenland; Man., Nfld. and Labr. (Labr.), N.W.T., Nunavut, Ont., Que., Yukon; Alaska; Eurasia.

N. N. Tzvelev (1980) speculated that *Hippuris lanceolata* arose from hybridization between *H. tetraphylla* and *H. vulgaris* or precursors to those species. Although *H. lanceolata* is intermediate in some features, and is often misplaced with either *H. tetraphylla* or *H. vulgaris*, it is fertile and there is no indication of pollen abortion or failure of seed set. No transitional material has been seen, and hybrid origin appears unlikely. The range of *H. lanceolata* extends well north of that of either putative parent, especially that of *H. vulgaris*. *Hippuris lanceolata* is the sole species of the genus in many areas of the Arctic.

4. Hippuris tetraphylla Linnaeus f., Suppl. Pl., 81. 1782 * Hippuride à quatre feuilles **F**

Stems 8--45 cm. **Rhizomes** 3--5 mm diam. **Leaves** on mid portions of emergent shoots, 3--5(--6) in whorls, oblanceolate or oblong to obovate, often broadly so, 6--15 x 2--8 mm, midvein inconspicuous, lateral veins present, sometimes obscure, apex obtuse, rounded, or blunt, tip not curled in dried material. **Flowers** bisexual, filaments equal to or shorter than anthers. **Drupes** 1.8--2 x 0.6--1.2 mm. ***2n*** = 32.

Flowering summer. Saline or brackish lagoons and pools of maritime coastlines; 0 m; B.C., Man., Nfld. and Labr. (Labr.), N.W.T., Nunavut, Ont., Que., Yukon; Alaska; Eurasia.

The leaves of *Hippuris tetraphylla* tend to be fleshy or leathery, which is typical of obligate halophytes.