

## 1. HIPPURIS Linnaeus, Sp. Pl. 1: 4. 1753.

杉叶藻属 shan ye zao shu

Morphological characters and geographic distribution are the same as those of the family.

- 1a. Leaves (4-)8-12-whorled, lanceolate to linear, 1.5-6 × 0.1-0.2 cm, submerged leaves longer than emergent leaves ..... 1. *H. vulgaris*  
1b. Leaves (2-)4(-6)-whorled, ovate, elliptic, or lanceolate, 0.4-1.2 × 0.5-0.7 cm, submerged leaves shorter than emergent leaves ..... 2. *H. tetraphylla*

### 1. *Hippuris vulgaris* Linnaeus, Sp. Pl. 1: 4. 1753.

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*Hippuris eschscholtzii* Lamarck; *H. montana* Reichenbach; *H. spiralis* D. Yu; *H. vulgaris* var. *ramificans* D. Yu.

Stems 10-150 cm or longer in running water. Leaves (4-)8-12-whorled, often spreading, lanceolate to linear, 1.5-6 × 0.1-0.2 cm, longest at mid-shoot, margin entire to weakly denticulate, apex somewhat thickened, subacute; submerged leaves longer than emergent leaves. Flowers purplish. Stamens ca. 1.5 mm. Ovary ca. 1 mm. Achene ovoid-ellipsoid, 1.5-2.5 mm, smooth. Fl. Apr-Sep, fr. May-Oct.

Stagnant and slow-running waters, lakes, bogs, streams, river shores, paddy fields; near sea level to 5000 m. Gansu, Guangxi, Guizhou, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Sichuan, Taiwan, Xinjiang, Xizang, Yunnan [temperate regions worldwide].

The character of leaves spirally arranged seems not to be true for *Hippuris spiralis*. In fact, in that entity the leaves are whorled but the whorls are oblique. This variation may be caused by twisted shoots, especially in running water. Terminal subshoots are a common variant in *H. vulgaris*. For these reasons, both *H. spiralis* and *H. vulgaris* var. *ramificans* are treated here as synonyms of *H. vulgaris*.

### 2. *Hippuris tetraphylla* Linnaeus f., Suppl. Pl. 81. 1782.

四叶杉叶藻 si ye shan ye zao

Stems 10-50 cm. Leaves (2-)4(-6)-whorled, ovate, elliptic, or lanceolate, 0.4-1.2 × 0.5-0.7 cm, fleshy, margin entire, apex subacute; submerged leaves shorter than emergent leaves. Flowers purplish. Stamens ca. 1 mm. Achene ovoid. Fl. and fr. Aug.

Bogs, salt marshes. NE Nei Mongol (Mangui) [Japan; Europe, North America].

This species is very similar to *Hippuris vulgaris* but is traditionally separated by its shorter, 4-whorled leaves. These characters are to some extent under environmental control, being present at low temperatures or high salinity. *Hippuris tetraphylla* is commonly recognized in Europe and North America but less so in Asia.

