

TYPHACEAE

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Juss., Gen. Pl. (1789) 25, nom. cons.; Henderson, Malay. Wild Fls., Monocot. (1954) 211; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 3 (1968) 128; Keng et al., Concise Fl. Singapore, vol. 2, Monocot. (1998) 51; Kubitzki in Kubitzki (ed.), Fam. Gen. Vasc. Pl. 4 (1998) 457; Seberg in Heywood et al., Fl. Pl. Fam. World (2007) 405. **Type:** *Typha* L.

Sparganiaceae Hanin, Cours Bot. (1811) 400, nom. cons. **Type:** *Sparganium* L.

Perennial, amphiphytic, glabrous herbs with stems up to 3(–4) m tall. **Rhizome** sympodial, starchy, with scales, growing on wet soil, emergent from shallow water or fully submersed. **Leaves** alternate, distichously arranged; with a sheathing base forming a pseudostem; lamina simple, linear, keeled or flat, concave and usually spongy in cross-section. **Inflorescences** terminal, racemose, consisting of globose, complex unisexual heads, female heads positioned below male heads (*Sparganium*), or very dense cylindrical spikes with two parts along the same axis, usually separated by a short sterile portion with female portion placed basally (*Typha*), bearing very many flowers. **Flowers** unisexual, hypogynous. **Perianth** of 1–several inconspicuous tepals or more or less numerous scales or bristle-like hairs. **Male flowers** with (1–)3(–8) stamens, filaments distinct or connate; anthers basifixed; tetrasporangiate, dithecal. **Female flowers** with superior, usually pseudomonomerous ovary (rarely ovary with 2–3 fully developed connate carpels); ovules solitary, one per locule, pendulous, from near the top of the locule, apotropous, anatropous, bitegmic, crassinucellar; stigmas or branches of the style 1–3 according to number of developed carpels, in *Typha* on an elongated stipe (gynophore) densely covered in long hair. **Fruit** a spongy drupe (*Sparganium*) or small dry, achene-like follicle, indehiscent or dorsally dehiscent (*Typha*). **Seeds** with straight embryo surrounded by abundant mealy endosperm containing starch, protein and oil, and thin perisperm.

Distribution. A family of 2 genera, *Typha* and *Sparganium*, and about 25 species. They are widely distributed, mainly in the northern hemisphere (except in arctic and arid areas), with *Typha* extending into tropical regions of all continents.

Ecology. Marsh or aquatic perennials often forming vast monospecific stands.

Uses. While there are fairly extensive uses recorded for *Typha* (for details see below), almost no uses, except for brief records of local medicinal use, are known for *Sparganium*.

Taxonomy. Although Sparganiaceae was previously recognised as a separate family by some authors, current morphological and molecular evidence (APG IV, Bot. J. Linn. Soc. 181 (2016) 1–20) unequivocally supports placing Sparganiaceae within Typhaceae.

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TYPHA L.

(Greek, *typhos* = marsh habitat, or Greek, *typhe* = cat's tail;
referring to the appearance of the inflorescence)
Bulrush, *cattail* (English), *banat* (Malay)

Sp. Pl. 2 (1753) 971; Kronfeld, Verh. K. K. Zool.-Bot. Ges. Wien 39 (1889) 136; Backer, Fl. Males., ser. 1, 4(3) (1951) 243; Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 3 (1968) 128; Kubitzki in Kubitzki (ed.), Fam. Gen. Vasc. Pl. 4 (1998) 460. **Type:** *Typha angustifolia* L. (lectotype designated by Green, Nom. Prop. Brit. Bot. (1929) 187).

Marsh or aquatic perennial herbs up to 4 m tall, with creeping rhizomes, forming large clumps. **Stems** erect, solid, submerged at base. **Leaves** alternate, distichously arranged, elongate-linear, thick and spongy, with sheathing base (secreting slime on inner side). **Inflorescences** terminal, erect, spike-like, with a lower pistillate portion and upper staminate portion (contiguous or separated by a sterile gap), each portion bearing very many flowers closely packed in groups of 2 (rarely 3). **Flowers** unisexual, with perianth lacking or represented by scales or trichomes. **Male flowers** consisting of 3 flat hairs surrounding 1–3(–8) monadelphous stamens dehiscing longitudinally. **Female flowers** with or without a very narrow bracteole, unicarpellate, ovary with a single ovule; style thin, stigma broadened, unilateral, linear or spatulate; stipe (gynophore) elongated with dense long hair producing the fluff of mature spikes. **Fruit** minute, single-seeded achene-like follicle, falling off together with the stipe and a tuft of perigone hairs, wind-dispersed and finally longitudinally dehiscent. **Seeds** pendulous, striate, with mealy endosperm, thin perisperm and straight embryo nearly as long as the seed.

Distribution. Widespread on all continents except Antarctica; 8–13 species. In Singapore 1 naturalised species.

Ecology. Marshy perennials occurring in wetlands, in shallow pools of fresh or brackish water. Several species are considered to be weeds and of concern in some countries due to their ability to form large monospecific clonal stands.

Uses. All parts of *Typha* are edible. The rhizomes are rich in starch and can be ground into flour. Young shoots are consumed as pickles. The young staminate spikes and pollen of *Typha* can also be used for human consumption. The leaves are used in basketry, thatching and matting. Parts of the ripe female spadices have been used as pillow stuffing, while dried spikes have been utilised for decorations. Some species are considered ornamentals.

Taxonomy. There is no recent revision or monograph of *Typha* covering its entire range. Backer (Fl. Males., ser. 1, 4(3) (1951) 243) subsumed all Malesian material under *Typha angustifolia*. Given the variability of this material, and recent findings confirming the parphyly of *Typha angustifolia*, the description below is based only on Singapore material and selected material from Peninsular Malaysia which is morphologically consistent with it. *Typha latifolia* L. has also been recorded from Singapore, but only in cultivation (Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 88, 183, 261).

Typha angustifolia L.

(Latin, *angusti-* = narrow, *-folia* = leaves; with narrow leaves)

Sp. Pl. 2 (1753) 971; Backer, Fl. Males., ser. 1, 4(3) (1951) 243, s.l.; Henderson, Malay. Wild Fls., Monocot. (1954) 211 (as '*Typha angustata*'); Backer & Bakhuizen van den Brink, Fl. Java (Spermatoph.) 3 (1968) 128, s.l.; Tan et al., Gard. Bull. Singapore 44(2) (1993 ['1992']) 132; Turner, Gard. Bull. Singapore 45 (1993) 221; Chew et al., Gard. Bull. Singapore 49(2) (1999 ['1997']) 223; Keng et al., Concise Fl. Singapore, vol. 2, Monocot. (1998) 51; Chong et al., Checkl. Vasc. Pl. Fl. Singapore (2009) 88, 183, 269. **Synonyms:** *Typha latifolia* var. *minor* Ambrosi, Fl. Tirolo Mer. 1 (1854) 797 – *Massula angustifolia* (L.) Dulac, Fl. Hautes-Pyrénées (1867) 47. **Type:** *Collector unknown s.n.* [Herb. van Royen], 'Europe' (lectotype L [L0052631], designated by Vázquez et al., Taxon 62 (2013) 1285). **Fig. 1.**

Amphiphytic perennial clump-forming herb, 1.5–2(–3) m tall, with creeping rhizomes. **Stems** erect, solid, submerged at base. **Leaves** alternate, distichously arranged, with sheathing base basally (striate in dry material), lamina linear, 1–2(–2.5) m long, c. 5–8(–10) mm wide, mat green, thick and spongy, shallowly semilunar in cross-section in basal part, flat distally. **Inflorescences** terminal, erect, spike-like, with a gap of 2–6.5 cm between pistilate and staminate portions, lower pistilate portion cylindrical, 9–19 cm long, 1–1.3 cm in diam. (broader at full maturity, c. 1.8 cm in diam.), obliquely rounded at base, rounded at apex, green when young, turning dark brown at maturity, upper staminate portion 15–23 cm long, c. 5–6 mm in diam. at base, tapering towards apex, flowers falling off soon after pollination. **Male flowers** consisting of 2–3 stamens on a minute common stalk intermixed with narrowly linear to narrowly spatulate hairs, anthers c. 1.5 mm long, dehiscing longitudinally. **Female flowers** c. 6 mm long, intermixed with bracteoles, bracteoles filiform with thickened brownish apex, stipe (gynophore) elongated with dense white hair, c. 5 mm long, producing the fluff of mature spikes, ovary fusiform, 0.7–1 mm long; style thin, stigma broadened. **Fruit** single-seeded, achene-like follicle, fusiform, 1.5–2 × 0.3 mm, rusty brown, with persistent style.

Distribution. Widespread, cosmopolitan, but only naturalised in Singapore. According to Tan et al. (Gard. Bull. Singapore 44(2) (1993 ['1992']) 132), *Typha angustifolia* was accidentally introduced to Singapore with a clump of *Cyperus papyrus* L. in the 1930s from Bangkok by Mr Lee Peck Hoon, who gifted the *Typha* to Singapore Botanic Gardens. It was planted out in the 1st Lake (currently known as Swan Lake) from where several herbarium specimens were made and are present in the Gardens' Herbarium (the earliest specimen is *Burkill s.n.*, 11 Jul 1932). It is believed that the species naturalised elsewhere in Singapore from this introduction. While Tan et al. (Gard. Bull. Singapore 44(2) (1993 ['1992']) 132) state that it can be found in many stagnant pools or other water bodies in open fields, reclaimed land and construction sites, it appears to be much rarer nowadays and mostly only known in cultivation. The following specimens support its status as being naturalised in Singapore: Tampines (*Niissalo & Leong-Škorničková SING2018-893*, 4 Nov 2018, SING [SING 0267138]), Pulau Ubin (*Turner 117*, 22 Jun 1990, SINU; *Ali Ibrahim et al. SING2007-427*, Dec 2007, SING [SING0114760]), Jalan Ulu Seletar (*Chua et al. s.n.*, 31 Mar 1992, SINU) and Sengkang (*Tan 1498*, 18 Jul 2006, SINU). The remaining collections are, or are likely to be, from cultivated plants.

Ecology. In Singapore it chiefly occurs in shallow open marshes.



Figure 1. *Typha angustifolia* L. **A.** Habit. **B.** Inflorescence, note pistillate and staminate portions separated by a sterile gap. **C.** Pistillate portion of inflorescence. **D.** Male flowers. **E.** Cluster of female flowers. **F.** Seed. (A–C, E from Singapore, Tampines Niissalo & Leong-Škorničková SING2018-893; D from Singapore, exact locality uncertain, GCP 2-95; F from Peninsular Malaysia, Corner SFN 37900. Photos: J. Leong-Škorničková).

Provisional conservation assessment. Globally Least Concern (LC). Not native in Singapore.

Vernacular names. *Lesser bulrush, narrow-leaved cattail* (English), *banat* (Malay).

Taxonomy. Contrary to the phylogenetic study by Kim & Choi (Taxon 60 (2011) 1417–1428), Ciotir & Freeland (Hydrobiologia 768 (2016) 1–14) and Zhou et al. (Sci. Reports 8:8813 (2018) 1–7) concluded that *Typha angustifolia* is paraphyletic and consists of two lineages. No taxonomic conclusion was made and no Singapore or Malesian material was included. Further studies are needed to establish from which lineage the Singapore material originated.

