

18. **TYPHONIUM** Schott, Wiener Z. Kunst 1829: 732. 1829.

犁头尖属 li tou jian shu

Li Heng (李恒 Li Hen); Wilbert L. A. Hettterscheid

Herbs, seasonally dormant. Underground part a long or short tuberous rhizome. Leaves entire, sagittate-hastate, 3-lobed or -partite. Inflorescence simultaneous with or preceding leaves; peduncle short or long. Spathe divided into a strongly convolute basal part with a ± strong apical constriction and a spreading lanceolate to ovate-triangular limb. Spadix as long as or longer than spathe, with 4 zones: a proximal female zone, an intermediate sterile zone with staminodes all over (in *Typhonium flagelliforme* only) or only at base, a male zone, and a sessile or stipitate appendix. Female flowers 1-loculed with 1 or 2(or 3) orthotropous basal ovules. Staminodes variable, spatulate to filamentous or variously reduced. Male flowers with 1–3 stamens opening by slits or pores; connective sometimes prolonged. Fruiting zone with spathe remaining (sometimes splitting open at maturity); berries ovoid, 1(or 2)-seeded. Seeds with endosperm.

About 50 species: from India to Polynesia; distributions in Africa and the West Indies are the result of human introductions; nine species (four endemic) in China.

The number of species given here for China is expected to be a considerable underestimation in view of the high species numbers in N Thailand and N Vietnam.

Recent molecular investigation of the tribe Areae (Cusimano et al, Taxon 59: 439–447. 2010) suggested that *Typhonium* sensu Hettterscheid and Boyce (Aroideana 23: 48–55. 2000) is polyphyletic and transferred several species to *Sauromatum*. The latter genus in its new monophyletic circumscription was shown not to be the direct sister genus to *Typhonium* sensu stricto.

- 1a. Sterile zone between female and male zone fully covered by staminodes ..... 4. *T. flagelliforme*
- 1b. Sterile zone between female and male zone with basal staminodes only, rest naked.
  - 2a. Staminodes vermiform, thin, long, irregularly curving and twisting in all directions.
    - 3a. Staminodes numerous, proximal ones covering most of female zone; spathe limb broadly triangular; underground part a short, tuberous rhizome ..... 9. *T. trilobatum*
    - 3b. Staminodes few, female zone readily visible; spathe limb lanceolate; underground part a long, cylindrical rhizome ..... 5. *T. hunanense*
  - 2b. Staminodes different, when filiform then not curving in all directions.
    - 4a. Spathe limb broadly triangular, or basal part triangular and apical part lanceolate, purple.
      - 5a. Basal part of spathe limb triangular, apical part narrowed, lanceolate; leaf entire and linear, or deeply 3-lobed, lobes linear ..... 8. *T. trifoliatum*
      - 5b. Spathe limb broadly triangular, not narrowed to apex; leaf entire and triangular to triangular-hastate or triangular-sagittate, or ± deeply 3-lobed, lobes ovate or ovate-lanceolate.
        - 6a. Staminodes downcurved ..... 7. *T. roxburghii*
        - 6b. Staminodes upcurved ..... 3. *T. blumei*
    - 4b. Spathe limb lanceolate, pale purple or ± cream-colored.
      - 7a. Staminodal flowers present just below base of appendix, a naked axis part between these and male zone, staminodes above female flowers 3–4 mm ..... 2. *T. baoshanense*
      - 7b. Staminodal flowers absent above male flowers.
        - 8a. Staminodes few, all vertical, parallel to spadix axis, 3–4 mm ..... 1. *T. albidinervium*
        - 8b. Staminodes numerous, at least partly oblique or horizontally spreading, 6–7 mm ..... 6. *T. jinpingense*

1. ***Typhonium albidinervium*** C. Z. Tang & H. Li, Acta Phytotax. Sin. 15(2): 105. 1977.

白脉犁头尖 bai mai li tou jian

Underground part a short tuberous rhizome, ca. 2 cm, producing annual offsets. Petiole pale green or pale dull brownish, 15–25 cm; leaf blade ovate-cordate to ovate-hastate, 4–13 × 3.5–8 cm, base cordate, apex acute. Peduncle 2–5 cm. Spathe outside yellowish green, with reddish stripes and spots, inside ± cream-colored, base ovoid or conic, 1.5–1.8 × 1–1.2 cm, distinctly constricted at apex; limb arching forward, purplish brown or pale brown outside, dark to pale brown inside, margins sometimes ± cream-colored, apex pale green, ovate-lanceolate, 9–15 cm, ca. 1.5 cm in diam. at base, tapering to apex. Spadix ± as long as spathe; female zone conic, 3–4 mm, 3–4 mm in diam. at base; ovary pale green, broadly cylindrical,

ca. 1 mm; stigma sessile; sterile zone 1.3–2.5 cm, with 2 or 3 whorls of staminodes at base, rest naked and terete; staminodes solitary or 2 or 3 fused with their bases, ± cream-colored to yellowish, base violet or dark pink, fusiform-clavate, 3–4 mm; male zone cylindrical, 5–6 × 2–3.5 mm; anthers yellow; appendix brownish purple or pale brown, filiform, 9–16 cm, ca. 2 mm in diam. at base. Infructescence obconic, with spathe base persistent. Berries pale green, obconic, ca. 6 mm. Fl. May.

Guangdong, Hainan; also cultivated in Guangdong and Yunnan [N Thailand].

2. ***Typhonium baoshanense*** Z. L. Dao & H. Li, Acta Phytotax. Sin. 45: 236. 2007.

保山犁头尖 bao shan li tou jian

Underground part a short tuberous rhizome, irregularly

shaped, ca. 3 × 2 cm, developing several small globose offsets with leaves. Petiole greenish, 8–14 cm, smooth; leaf blade 2–10 × 2–10 cm, variable, ovate, hastate or sagittate to 3-lobed, deeply cordate at base, apex acute; lateral lobes (when present) ovate-oblong, ca. 4.5 × 3 cm. Inflorescence appearing with leaves; peduncle whitish, hidden in soil, 1.3–4.5 cm. Spathe pale green outside, ca. 18 cm; tube ellipsoid, ca. 2 × 1.5 cm; limb convolute at base, purple on both surfaces, margins and apical part pale green, lanceolate, to 15 × ca. 3 cm, tapering to apex. Spadix sessile, as long as spathe or slightly longer, 18–20 cm; female zone conic, ca. 5 mm, ca. 7 mm in diam. at base; ovary yellowish, ovoid; stigma brown; sterile zone to 2.5 cm, basal part with staminodes, rest naked, terete; staminodes yellow, fusiform, 3–4 × ca. 1 mm, obtuse; male zone cylindrical, ca. 5 mm, ca. 3 mm in diam.; stamens yellow; anthers subsessile; appendix dark purple, filiform, ca. 14.5 cm, ca. 3 mm in diam. at base, base with 2 verticils of dysfunctional stamens; sterile male flower at base of appendix subglobose or fusiform, without pollen; anthers yellow; connective purple. Fl. Jun–Jul.  $2n = 10^*$ .

- About 1700 m. W Yunnan (Gaoligong Shan: Baoshan).

**3. *Typhonium blumei*** Nicolson & Sivadasan, *Blumea* 27: 494. 1981.

犁头尖 li tou jian

Underground part a broad and flattened rhizome, to 5 × 2.5 cm, to 1.8 cm high, producing numerous small, fusiform offsets. Petiole green, 20–40 cm; leaf blade pale green abaxially, green adaxially, entire, cordate-hastate, ovate or deltoid in outline, 7–10 × 7–9 cm, terminal lobe ovate, basal lobes ovate to deltoid. Inflorescence appearing alongside leaves; peduncle pale green, 9–11 cm. Spathe convolute at base, green, ellipsoid to ovoid, 1.6–4 cm × 8–15 mm, distinctly constricted at apex; limb spreading, inside greenish purple to dark purple, ovate, 12–18 × 4–5 cm, long cuspidate. Spadix erect, subequaling spathe; female zone conic, 1.5–3 mm, 3–4 mm in diam. at base; ovary cream-colored; stigma sessile, reddish or pale pinkish; sterile zone 1.7–4 cm, proximal 7–8 mm covered with densely congested staminodes, rest naked, terete; staminodes ascending or variously curved, yellow or basal part reddish, narrowly fusiform, ca. 4 mm; male zone 4–9 mm; stamens yellow, subsessile; anthers orange; appendix narrowly conic, 10–13 cm, proximally corrugate, distally smooth, tapering to sharply acute apex, base truncate or obliquely truncate, usually with a stipe 5–7 mm. Fl. May–Jul.  $2n = 52$ .

Croplands, grasslands, between rocks; below 1200 m. Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi, Sichuan, Taiwan, Yunnan, Zhejiang [Cambodia, India, Indonesia, Japan, Myanmar, Thailand, Vietnam; introduced in Africa, Nepal, Neotropics, Philippines, and Pacific islands].

In FRPS (13(2): 111. 1979), the name *Typhonium divaricatum* (Linnaeus) Decaisne was misapplied to this species.

**4. *Typhonium flagelliforme*** (Loddiges) Blume, *Rumphia* 1: 134. 1837.

鞭檐犁头尖 bian yan li tou jian

*Arum flagelliforme* Loddiges, *Bot. Cab.* 4: t. 396. 1819; *A. cuspidatum* Blume; *Typhonium cuspidatum* (Blume) Decaisne.

Underground part a short, tuberous rhizome, depressed, 1–2 cm. Petiole green, 15–30 cm; leaf blade 5–25 × 0.5–18 cm, extremely variable, linear, lanceolate, elliptic, or hastate. Inflorescence appearing alongside leaves; peduncle 5–20 cm, thin. Spathe convolute at base, green, ovoid, globose, or depressed, 1.5–3.5 × 1.2–2 cm, constricted at apex, outside with 1 or a few keels; limb convolute-tubular at base, expanded and sharply flexed horizontally at apex, green on both sides or base flushed purple, lanceolate, 7.5–25 cm, tapering to long acuminate apex. Spadix shorter than, as long as, or slightly longer than spathe; female zone subcylindric, slightly fusiform, 1.5–1.8 cm × 8–10 mm; ovary pale green, elongate, angulate; sterile zone 1–2 cm, entirely covered with staminodes, these distant; staminodes dimorphic; proximal ones ca. 6 mm, with a horizontal white base, apically sharply upcurved, spatulate-lingulate and with or without a purple apex; distal ones downcurved, white, subulate, aristate; male zone ca. 5 mm; appendix subsessile, 16–17 cm, base swollen and often deeply grooved, apically filiform, erect, horizontal, or downcurved. Berries pale greenish, 2- or 3-seeded. Fl. Apr–May.

In shallow water by streams, water fields, moist meadows; sea level to 400 m. Guangdong, Guangxi, SE Yunnan [Bangladesh, Bhutan, Cambodia, NE and S India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Sri Lanka, N Thailand; N Australia].

**5. *Typhonium hunanense*** H. Li & Z. Q. Liu, *Bull. Bot. Res.*, Harbin 3(2): 155. 1983.

湖南犁头尖 hu nan li tou jian

Rhizome cylindrical, 3–6 cm × 4–10 mm, usually curved and branched. Petiole 11–26 cm; leaf blade green, sometimes purple, oblong-sagittate to ovate, distal part ovate, 6–14 × 5–6 cm, base cordate or truncate, apex abruptly acuminate or acute; basal lobes, if present, spreading, ovate, deltoid, or oblong. Peduncle 6–9 cm, slender. Spathe convolute at base, yellowish, with purple spots, 6–10 cm, basal 2–3 cm ovoid, constricted at apex; limb spreading or slightly recurved, purple, lanceolate, 4–6 cm, apex long acuminate. Spadix shorter than spathe, 5–7 cm; female zone ca. 3 mm; ovary subglobose, 1-loculed, 1-ovuled; stigma subsessile, violet; sterile zone 1.5–2 cm, proximal 5–7 mm with densely congested staminodes, rest naked; staminodes variously curled, filiform, 3–4 mm; male zone cylindrical, 6–8 × 1.5–2 mm; appendix sessile, erect, narrowly conic, 2–3.9 cm × 3–4 mm, base truncate. Fl. Apr–May, fr. Jun.

- Bamboo forests, thickets; ca. 100 m. Hunan.

**6. *Typhonium jinpingense*** Z. L. Wang, H. Li & F. H. Bian, *Novon* 12: 287. 2002.

金平犁头尖 jin ping li tou jian

Underground part a short, tuberous rhizome, 2–2.5 × 0.7–1 cm, producing annual offsets. Petiole green, 10–17 × ca. 0.1 cm, smooth; leaf blade cordate, 5–8 × 4–10 cm, base usually cordate-hastate or deeply cordate. Peduncle ca. 1 cm. Spathe pale green, dark purple at apex, base ovoid, ca. 1.5 × 0.5 cm; limb slightly arching, whitish with purple base, narrowly lanceolate, ca. 11 cm, ca. 1 cm in diam. at base, apex long acuminate. Spadix slightly longer than spathe, to ca. 14 cm; female zone ca. 5 mm; ovary with short style and dark purple stigma; sterile zone ca. 2.4 cm, densely covered with staminodes at

base, rest naked; staminodes erect or spreading, yellowish, clavate, 6–7 mm; male zone ca. 5 mm; male flowers yellow; appendix erect, purple, cylindric, ca. 10 cm × 2 mm. Fl. late Apr–Aug.  $2n = 10^*$ .

• Yunnan (Jinping).

**7. *Typhonium roxburghii*** Schott, Aroideae, 12. 1855.

金慈姑 jin ci gu

Underground part a short, tuberous rhizome, subglobose or globose. Petiole 10–35 cm; leaf blade yellowish green abaxially, dark green adaxially, reniform-hastate, triangular in outline, shallowly or deeply 3-lobed; terminal lobe ovate, (5–)9–17 × 4–14 cm, acuminate; lateral lobes spreading, obliquely ovate or narrowly ovate. Inflorescence appearing after leaves; peduncle creamy red with dark purple dots, 2–9 cm. Spathe outside whitish or pale green with purple striae, inside purple, base ovoid, 2–3.5 × ca. 1.5 cm; limb outside purplish mixed with dirty green flush or striae, or purple all over, inside deep rich purple, ovate-lanceolate, abruptly tapering from below middle, usually twisted at tip, 13–15 × ca. 5 cm. Spadix subequalling spathe; female zone 4–5.5 mm; ovary white or yellowish, ovoid; stigma purple, 1-loculed, 1-ovuled; sterile zone 1.5–2.2 cm, proximal 5–7 mm densely covered with staminodes, rest naked; staminodes downcurved, yellow or pale yellow, subcylindric, 8–9 mm, acute; male zone 7–12 mm; male flowers consisting of 2 or 3 stamens, yellow; anthers sessile, opening with apical pore; appendix dark purple, narrowly conic, 12–15 cm, 3–4 mm in diam. at base, base truncate with a pale red stipe ca. 2 mm. Berries pale green at first, white when mature, ovoid or ellipsoid, 1-seeded. Fl. and fr. May–Aug.

Taiwan, Yunnan [Bangladesh, India, Indonesia, Japan (Bonin Islands), Malaysia, New Guinea, Philippines, Sri Lanka, Thailand; introduced in E Africa, W Australia, and South America].

**8. *Typhonium trifoliatum*** Wang & Lo ex H. Li, Y. Shiao & S. L. Tseng, Acta Phytotax. Sin. 15(2): 105. 1977.

三叶犁头尖 san ye li tou jian

Underground part a short, tuberous rhizome, ca. 1.5 × 1.2 cm. Petiole 6–12 cm; leaf blade rarely entire and then linear, usually deeply 3-lobed or 3-partite; segments sessile, linear; terminal segment 8–10 cm × 3–8 mm, acuminate; lateral segments horizontally spreading, 1.7–4.5 cm × 3–4 mm. Inflores-

cence appearing after leaves; peduncle 8–10 cm. Spathe convolute at base, dark purple, basally ovoid, ca. 1.5 × 1.2 cm, apex constricted; limb ovate-lanceolate, ca. 17 × 5–6 cm, distal half narrowed, linear, recurved. Spadix shorter than spathe, 13–17 cm; female zone ca. 5 mm; ovary ovoid, 1-loculed, 1-ovuled; stigma disciform; sterile zone ca. 1.4 cm, proximal 1–2 mm covered with staminodes, rest naked; staminodes downcurved, filiform; male zone 8–18 mm; appendix shortly stipitate, suberect, 10–13 cm, base swollen, 3–5 mm in diam., subtruncate. Berries ovoid, 1-seeded. Fl. and fr. Jul–Aug.

• Hebei, Nei Mongol, Shaanxi, Shanxi.

**9. *Typhonium trilobatum*** (Linnaeus) Schott, Wiener Z. Kunst 1829: 732. 1829.

马蹄犁头尖 ma ti li tou jian

*Arum trilobatum* Linnaeus, Sp. Pl. 2: 965. 1753.

Underground part a short, tuberous rhizome, subglobose or subcylindric, producing few annual offsets or splitting up. Petiole green or variously flushed with purple, 25–40 cm; leaf blade cordate-ovate in outline, usually deeply 3-lobed, rarely 5-lobed; central lobe ovate, 10–15 × 6–11 cm, acuminate, sometimes mucronate; lateral lobes 8–13 cm. Inflorescence appearing after leaves; peduncle 5–10 cm, elongating in fruit. Spathe convolute at base, outside green, inside green, to 30 cm, ovoid or ellipsoid, 2.5–3.5 × 1–1.5 cm, constricted at apex; limb spreading, outside green, inside dark purple to reddish purple, ovate-lanceolate, ca. 15 × 5–8 cm, apex acuminate. Spadix shorter than spathe; female zone slightly conic, 7–10 mm; ovary yellowish green; stigma sessile, dark or mid-purple, disciform; sterile zone 2–3 cm, proximal half densely covered with staminodes, distal half naked; staminodes strongly curled but mostly directed downward and covering most of female zone, filiform, 7–12 mm; male zone 1.5–2 cm; stamens pink; appendix shortly stipitate, glossy purple or reddish, narrowly conic, 5–12 cm × 4–7 mm, base truncate, apex acute or subacute. Fruiting zone with spathe remaining; berries at first green with purple spots, white when mature, ellipsoid, 1- or 2-seeded. Fl. May–Jul.

Tropical secondary forests, thickets, grasslands, roadsides; below 700 m. Guangdong, Guangxi, Hainan, S Yunnan [Bangladesh, Bhutan, Cambodia, India, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand; introduced in W Africa, W Borneo, Neotropics, Philippines, and Singapore].

Fl. China 23: 34–36. 2010.