

# The genus *Typhonium* (Araceae) in Taiwan

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**Abstract.** A taxonomic revision of the genus *Typhonium* (Araceae) in Taiwan is provided in this paper. In addition to *Typhonium blumei* Nicolson & Sivadasan (as *T. divaricatum*), the only species previously reported from Taiwan, we report our discovery of a second species, *T. roxburghii* Schott, from southern Taiwan. The latter is easily distinguished from the former in having broader leaves and slightly decurved sterile flowers. It was possibly unintentionally introduced and naturalized recently. A key to the species along with a description, taxonomic notes, a line drawing, and a photograph is provided.

**Keywords:** Araceae; Taxonomy; *Typhonium*; *Typhonium blumei*; *Typhonium divaricatum*; *Typhonium roxburghii*; Taiwan.

## Introduction

In recent years members of Taiwanese Araceae have been studied by Wang (1992; *Arisaema*), Hetterscheid and Peng (1995; *Amorphophallus*), and Wang (1996; *Arisaema*). In this study, a taxonomic account of the genus *Typhonium* of Taiwan is given.

*Typhonium* comprises about 40 species distributed widely in tropical and subtropical Asia and extends southward to Australia. An early monograph was presented by Engler (1920) who recognized 23 species. However, many species were added by later authors. Four common but confused species, namely *T. blumei*, *T. flagelliforme*, *T. roxburghii*, and *T. trilobatum*, were critically revised by Nicolson and Sivadasan (1981). Hay (1993) revised the Australasian species and added six new species. Sriboonma et al. (1994) revised the genus and proposed a new infrageneric classification based on a phylogenetic analysis of morphological and palynological data, together with data from restriction fragment length polymorphisms (RFLP) of chloroplast DNA from their previous study (Sriboonma et al., 1993).

Hitherto, only one species, *T. blumei* Nicolson & Sivadasan (as "*T. divaricatum*"), a weedy species widely distributed in the lowlands throughout the island, was reported from Taiwan (Matsumura and Hayata, 1906; Huang, 1960; Liu and Huang, 1963, 1978; Hotta, 1970). Recently, a second species, *T. roxburghii* Schott, was collected from Hengchun, southern Taiwan by the second author. A taxonomic treatment of the genus *Typhonium* in Taiwan follows.

## Materials and Methods

Materials used in the present studies were collected from the field, pressed and dried for voucher specimens, and deposited in the Herbarium of the Department of Biology, National Taiwan Normal University (TNU) and the Herbarium of the Taiwan Forestry Research Institute (TAIF). Living material for the study was cultivated in the shade house of the Department of Biology, National Taiwan Normal University. In addition, specimens preserved in HAST, HCT, TAI, TAIF, TNU were examined.

## Taxonomic Treatment

### *Typhonium* Schott

Small perennial herb, often with thickened rhizomatous or tuberous subterranean stems. Leaves few to several, long petiolate; petiole with vaginate sheath at base; blade mostly simple and sagittate, hastate or trilobed. Inflorescence monoecious, solitary; peduncle shorter than petiole, base subtended by leaf sheath; spathe base globose to ovoid, convolute, margins overlap, constricted at apex, mostly greenish on outer surface, accrescent; spathe blade flag-like, widely ovate to lanceolate, often reddish adaxially, deciduous. Spadix sequencing from base with pistillate zone, a sterile flower zone, usually a naked zone, staminate zone, and a terminal appendix; lower spadix (pistillate and sterile flower zones) enclosed by accrescent spathe base; appendix usually elongate, stipitate. Flowers unisexual, without perianth. Male flowers sessile, with 1–3 stamens; anther dehiscent by lateral slits or apical short slits to pores. Female flowers sessile; ovary unilocular, with 1 to few orthotropous ovules at base. Sterile flowers capitate, clavate, subulate, or filiform.

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Infructescence housed within accrescent spathe base; fruit a berry, green to whitish. Seeds one or two.

*Key to Species of Typhonium of Taiwan*

1. Sterile flowers upcurved; leaf blades usually longer than broad ..... 1. *T. blumei*  
 1. Sterile flowers spreading and slightly decurved; leaf blades mostly as broad as long ..... 2. *T. roxburghii*

**1. *Typhonium blumei*** Nicolson & Sivadasan, *Blumea* 27: 494, fig. 4, 1981; A. Hay, *Blumea* 37: 373, fig. 17, 1993; Sriboonma, Murata & Iwatsuki, *J. Fac. Sci. Univ. Tokyo III* 15: 305, 1994. Figure 1

*Typhonium divaricatum* auct. non. Bl., nom. illegit.: Matsumura & Hayata, *J. Coll. Sci. Imp. Univ. Tokyo (Enumeratio Plantarum Formosananarum)* 22: 461. 1906; Huang, *J. Forest. Natl. Taiwan Univ.* 27: 12, fig. 19. 1960; Liu & Huang, *Quart. J. Taiwan Mus.* 16: 141. 1963; Liu & Huang in H. L. Li et al., *Fl. Taiwan* 5: 815, pl. 1530. 1978; Hotta, *Mem. Fac. Sci. Kyoto Univ. B.* 4: 95. 1970; Li in Wu & Li, *Fl. Reip. Pop. Sin.* 13 (2): 111. 1979.

Rhizome tuberous, creeping to erect. Leaves long-petiolate, deep green, shining, often lighter along veins in colors; petiole up to 20 cm long, slender; blade cordate-hastate, ovate in outline, herbaceous, 5–12 cm long, usu-

ally longer than broad, apiculate-acuminate at apex. Inflorescence on a short peduncle, solitary or sometimes double or triple. Accrescent spathe base ellipsoid to ovoid; spathe blade spreading, ovate, long-cuspidate at apex. Lower spadix enclosed by accrescent spathe base; appendix slender, as long as spathe blade. Staminate flower zone about 0.7 cm long; anthers dehiscent by slit. Pistillate flower zone 0.2–0.3 cm long, shorter than sterile flower zone. Sterile flowers filiform, upcurved, yellow to orange, finely papillose. Fruits not seen. Chromosome number  $2n=52$ .

*Specimens examined.* TAIPEI CITY: Campus of National Taiwan Normal Univ., Science College, *J. C. Wang 9526* (HAST, TNU); Campus of National Taiwan Univ., *C. C. Hsu, 3070* (TAI), *3116* (TAI), *C. H. Fan 8* (TAI); Taipei, 30 May 1909, *Kawakami & Shimada s. n.* TAIPEI HSIEN: Hsieh, *Hsiuluanshan*, 27 May 1972, *H. Y. Yu s. n.* (TNU); Neihu, May 1967, *Y. T. Lee s. n.* (TNU); Tomita-cho, 2 Jul 1934, *Odashima s. n.* (TAI); Hsintien, 19 May 1940, *Ohta s. n.* (TAI); Wulai, *J. C. Wang 9599* (TNU). MIAOLI HSIEN: Shihtan, *C. I Peng 15061* (HAST); Hsienshan to Nanchuang, *C.H. Lin 533* (HAST). TAICHUNG HSIEN: Taichung, *M. T. Kao 9696* (TAI). NANTOU HSIEN: Shuili, Tai Power Company, *C. I Peng 11393* (HAST). PINGTUNG HSIEN: Hengchun Tropical Arboretum (Kenting Park), 17 Jun 1995, *K. C. Yang s. n.* (HCT, TAIF, TNU).

*Distribution.* East and southeast Asia. Introduced into Luzon, Guam, Carolines (Karor), Africa (Comero, Madagascar, Mauritius, south Africa, Ghana), Australia (Hay, 1993), and Neotropics (Cuba, Martinique, Surinam) (Nicolson and Sivadasan, 1981). Taiwan, at low altitude throughout the island.

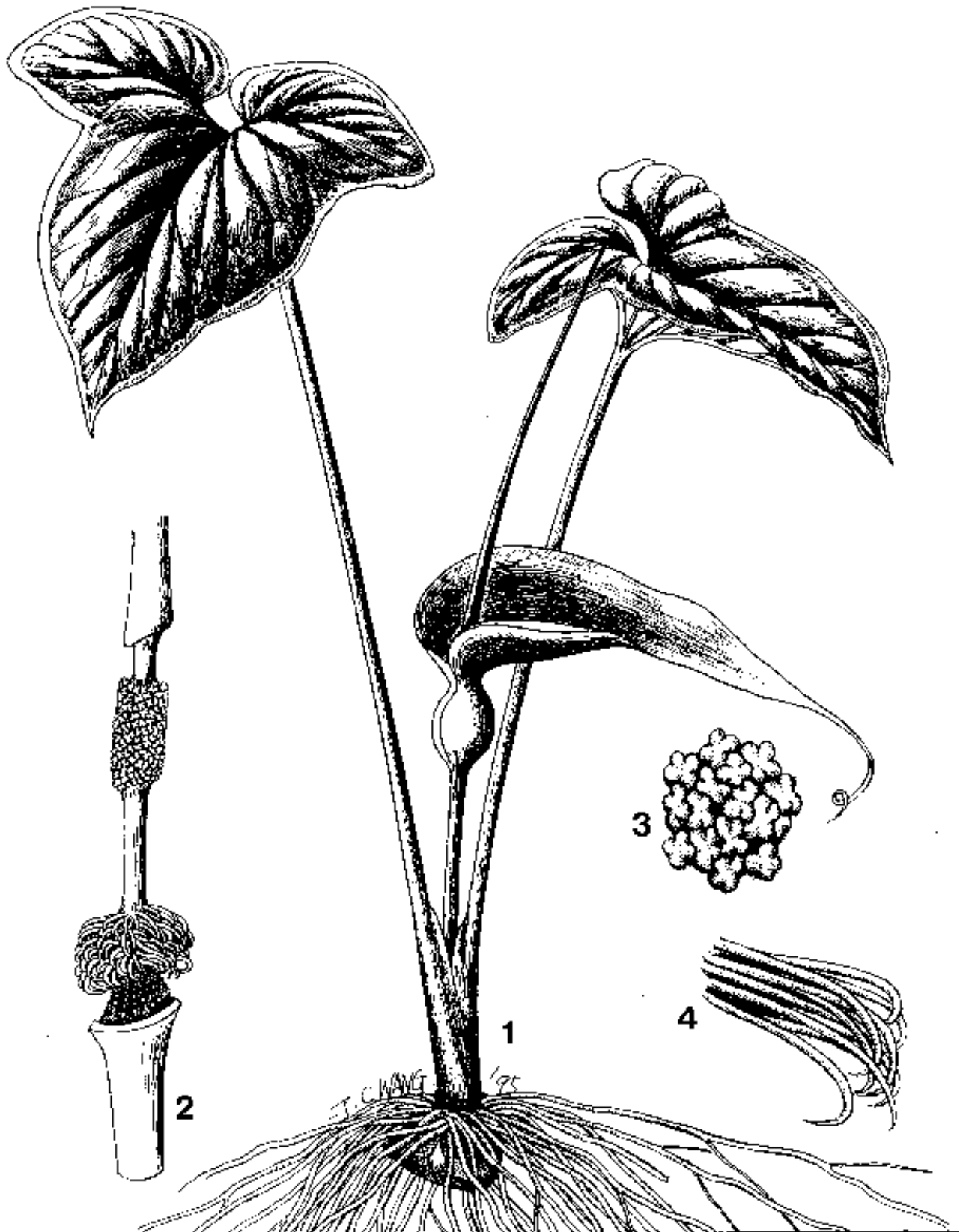
*Notes.* The species was erroneously called *T. divaricatum* before, and was critically revised and nomenclaturally changed by Nicolson and Sivadasan (1981). In Taiwan, the species is abundant and widely distributed in the lowlands throughout the island. However, they are often overlooked by collectors and, consequently, few specimens are preserved in the herbaria of Taiwan.

**2. *Typhonium roxburghii*** Schott, *Aroideae*: 2, t. 17. 1855; Nicolson & Sivadasan, *Blumea* 27: 492, fig. 3. 1981; A. Hay, *Blumea* 37: 373. 1993; Sriboonma, Murata & Iwatsuki, *J. Fac. Sci. Univ. Tokyo III* 15: 305. 1994. Figures 1, 2

Subterranean stem subglobose to globose. Leaves long-petiolate, light green, not shining; petioles up to 25 cm long, slender, with basal sheath; blade reniform-hastate, triangular in outline, chartaceous, 7–11 cm long, usually as long as broad, cuspidate-acuminate at apex. Inflorescence on a short peduncle, usually solitary. Accrescent spathe base ellipsoid to ovoid; spathe blade spreading, ovate, long-cuspidate at apex. Lower spadix enclosed by accrescent spathe base; appendix slender, as long as spathe. Staminate flower zone 0.7–0.9 cm long; anthers dehiscent by slit. Pistillate flower zone ca. 0.4 cm long,



**Figure 1.** Inflorescences of *Typhonium blumei* (right) and *T. roxburghii* (left).



**Figure 2.** *Typhonium roxburghii* Schott. 1, Habit; 2, Spadix; 3, Male flowers; 4, Sterile flowers. (Aug. 5, 1994, K. C. Yang s. n.)

as long as sterile flower zone. Sterile flowers filiform, spreading and slightly decurved, yellow, weakly papillose. Fruit not seen.

*Specimens examined.* TAIPEI CITY: nursery, Taipei Botanical Garden, 2 Jul 1995, *K. C. Yang s. n.* (TAIF). PINGTUNG HSIEN: Hengchun Town: Kanko Work Post, 15 Jun 1995, *K. C. Yang s. n.* (HAST, HCT, TAIF, TNU); Hengchun Tropical Arboretum (Kenting Park), 16 Jun 1995, *K. C. Yang s. n.* (HAST, HCT, TAIF, TNU), 17 Jun 1995, *K. C. Yang s. n.* (HAST, HCT, TAIF, TNU), 5 Aug 1994, *K. C. Yang s. n.* (TNU).

*Distribution.* South and central Malesia but reaching south India and Sri Lanka. Introduced into northeast India, Luzon, east Africa, east Malesia (Hay, 1993), and Neotropics (Brazil) (Nicolson and Sivadasan, 1981). Taiwan, at low altitude of southern part.

*Notes.* After comparing with descriptions of Nicolson and Sivadasan (1981) and Sriboonma et al. (1994) in detail, the authors find that our specimens collected from the southern tip of Taiwan closely resemble *T. roxburghii* Schott of southern India and Malay Archipelago, which is previously unrecorded from Taiwan. The sterile flowers of the Taiwanese plants however, are slightly more slender than those of Nicolson & Sivadasan (1981: fig. 3) and Sriboonma et al. (1994: fig. 14A).

The species was recently found to be abundant in the Hengchun Tropical Arboretum and elsewhere in southern Taiwan. Probably, it was incidentally introduced and naturalized in Taiwan. The authors have never seen this species in fruit, although Nicolson & Sivadasan (1981) and Sriboonma et al. (1994) reported that the berry contains one or two seeds. It is possible that the species quickly spreads by its abundant production of cormlets which could be transported by nursery soil.

The species is easily distinguished from *T. blumei* Nicolson & Sivadasan in having subglobose subterranean stem, broader leaves, and decurved sterile flowers.

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## 台灣產天南星科土半夏屬植物之分類訂正

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依據台灣植物誌及過往分類文獻之記載，台灣產之土半夏屬植物僅有一種—土半夏 (*Typhonium divaricatum*)，此種之學名已由 Nicolson and Sivadasan 於 1981 年訂正為 *T. blumei* Nicolson & Sivadasan。本文報導最近在台灣南部發現之本屬新紀錄種—金慈姑 (*T. roxburghii* Schott)，本種植物可以其亞球形之地下莖，較寬葉片及略下彎之不孕性花等特徵而與前種區別。往昔文獻記載此種植物分布於印度南部及馬來群島，可能係無意間伴隨其他植物引入台灣，並利用植物體上繁生之小球莖蔓延而成歸化狀態。本文就台灣產本屬植物進行分類訂正，並提供檢索表、彩色照片及植物繪圖。

**關鍵詞：**天南星科；土半夏屬；土半夏；金慈姑；分類訂正；台灣。