The genus *Typhonium* (Araceae) in Taiwan

Jenn-Che Wang\(^{1,3}\) and Kuoh-Cheng Yang\(^{2}\)

\(^{1}\)Department of Biology, National Taiwan Normal University, Wenshan, Taipei, Taiwan 117, Republic of China

\(^{2}\)Department of Biology, Taiwan Forestry Research Institute, Chungcheng, Taipei, Taiwan 106, Republic of China

(Received January 6, 1996; Accepted March 12, 1996)

**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*), Hettterscheid 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. trifolatum*, 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.

\(^{3}\)Corresponding author. Fax: (02) 931-2904.

**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 sagitate, hastate or trilobed. Inflorescence monoeccious, 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, accresent; 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 accresent 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.
Inflorescence 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*


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, unusually 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. Stamineate 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.


**Distribution.** East and southeast Asia. Introduced into Luzon, Guam, Carolines (Karor), Africa (Comoro, 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.


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. Stamineate 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).](image-url)
as long as sterile flower zone. Sterile flowers filiform, spreading and slightly decurved, yellow, weakly papilllose. Fruit not seen.


Distribution. South and central Malasia but reaching south India and Sri Lanka. Introduced into northeast India, Luzon, east Africa, east Malasia (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. 1A).

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 cornlets 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.

Acknowledgments. We wish to express our gratitude to Dr. J. Murata, Tokyo Metropolitan University, for confirming T. roxburghii, sending us useful literature, and for his critical reading of the manuscript. We would also like to thank Drs. D. H. Nicolson, Smithsonian Institution, A. Hay, Royal Botanic Gardens, Australia, and Ching-I Peng, Academia Sinica/National Museum of Natural Science, Taiwan for critical reviews of the manuscript and helpful suggestions for improvement. We are also grateful to Dr. T. C. Huang, Professor of the Department of Botany, National Taiwan University, for his encouragement. Thanks are also due to the directors and curators of the herbaria cited, for allowing us to examine the specimens. This work was supported in part by National Science Council grants NSC79-2011-B003-02 and NSC83-2011-B003-007 to JCW.

Literature Cited

台灣產天南星科土半夏屬植物之分類訂正

王震哲¹  楊國禎²

¹國立台灣師範大學生物學系  
²臺灣省林業試驗所生物學系

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，較寬葉片及略下緣之不孕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半島，可能係無意間伴隨其他植物引入台灣，並利用植物體上繁殖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。