

FOUR FREQUENTLY CONFUSED SPECIES OF TYPHONIUM SCHOTT  
(ARACEAE)

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SUMMARY

*Typhonium trilobatum*, *T. flagelliforme*, *T. roxburghii*, and *T. blumei* are taxonomically distinct, but their epithets (including that of *T. divaricatum*, *nom. illegit.*) frequently have been interchanged, primarily because of nomenclatural problems involving synonymy and (mis)typifications. It is concluded that the last monographer (Engler, 1920) used the correct names for the four species, except for what he called *T. divaricatum*, here called *T. blumei*.

INTRODUCTION

*Typhonium* is an Old World genus native from India to Australia and northward into subtemperate areas of Eastern Asia. The species ( $25 \pm 5$ ) are not well understood because (1) their weedy tendencies obscure their native distributions, (2) they are frequently overlooked by collectors, (3) their definitions rest on floral characters which are often obscured or lost (due to insects) in herbarium specimens, (4) the biological significance of the species characters remains unknown, and (5) there is a fair amount of variability within as yet undefined limits.

This paper deals with the four commonest, most widely distributed, and most frequently collected species. Three (*T. blumei*, *T. roxburghii*, and *T. trilobatum*) are occasionally cultivated as curiosities and are adventive in the African and American tropics. The fourth species (*T. flagelliforme*) was included because its name and synonyms, along with those of the other three species, have been repeatedly misapplied. The four species are so frequently confused that they form a nomenclatural complex. One frequently cannot be sure what species an author has without study of a description, illustration, or a specimen.

In order to stabilize the species nomenclature in *Typhonium* for Nicolson's treatment of *Araceae* for 'A Revised Handbook to the Flora of Ceylon' and Sivadasan's doctoral thesis, 'Taxonomic Study of *Araceae* of South India,' it became necessary to review the typification of the various names applied to these and to obtain some perspective on their distribution. This led us far beyond the areas of our direct concern. Our conclusions are based on a thorough literature review, study of historical specimens loaned by the Rijksherbarium (Leiden) and the Royal Botanic Gardens (Kew), and visits to various herbaria (AA/GH, BM, K, M, NY, PDA).

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There are uncertainties about taxa described by Prain from northwestern India, Bangladesh, and northern Burma. There is a possibility that there are two distinct taxa with deflexed sterile flowers (*T. roxburghii* here), one with loose sterile flowers and one with densely compacted sterile flowers. Nonetheless we believe that further information will not affect the general conclusions apparent from the materials examined.

#### HISTORICAL OVERVIEW

The confusion among these four species of *Typhonium* can be divided into four historical periods: (1) Dutch or pre-Linnaean period – three species known, (2) Linnaean period – all four species known but only two named in *Arum* and two synonymized, (3) Roxburghian period – all four species named in *Arum* but the Linnaean species and the Linnaean binomials misapplied to the previously synonymized species, and (4) modern period – all four species named in *Typhonium* but with confusion in nomenclature and synonymy.

1. The pre-Linnaean or Dutch period was dominated by Hermann, Rheedee and Rumphius, who each illustrated one species. Hermann returned from Ceylon in 1677 to settle in Amsterdam and brought with him living material of *Typhonium trilobatum*. In 1688 Hermann was visited by Breyne of Danzig (Gdansk) who saw this species and cited it in his Prodrumus of 1689 as *Serpentaria zeylanica triphylla*. In the same year Hermann's *Paradisi Batavi Prodrumus* appeared, citing *T. trilobatum* as *Arum triphyllum humilius minus zeylanicum*. Hermann must have sent living material to England because, in 1692, Plukenet published the first illustration of *T. trilobatum*, calling it *Arum humile Arisarum dictum virginianense triphyllon*. Plukenet was clearly in error in referring to Virginia but the identification of his illustration is not in doubt. In 1697 Commelin published the second illustration of *T. trilobatum*, calling it *Arum ceylanicum humile latifolium, pistillo coccineo*. The third illustration was published by Hermann in 1698 in his *Paradisus Batavus*, now called *Arum zeylanicum trilobato folio humilius & minus*.

A second species, *T. flagelliforme*, was also known from Ceylon by Hermann but he did not have living material and it did not come into cultivation, nor did Hermann illustrate it. In his Prodrumus of 1689 Hermann called it *Arum zeylanicum minus Sagittariae folio*. The first illustration of *T. flagelliforme* appeared in 1692 in Rheedee's *Hortus Indicus Malabaricus* under the name *Nelenschena major*. In 1699 Morison renamed Rheedee's illustration as *Arum minus indicum foliorum auriculis reflexis*. Camellus found the species in the Philippines (unpubl. illustration among Sloane mss. at BM, Bloomsbury) and in 1704 Ray called it *Arisarum luzonis, polyflorum*.

The third species, *T. roxburghii*, was first described and illustrated by Rumphius in 1747, who called it *Arisarum amboinicum*. The illustration cannot be directly identified (sterile flowers not shown, nor described) but subsequent collection from Amboina and environs support this identification.

Thus, at the end of the pre-Linnaean or Dutch period, only three of the four species under discussion were known. The fourth species, *T. blumei* of eastern Asia (China, Japan, etc.) was not yet known.

2. Linnaean period. This begins in 1753 with Linnaeus calling the first

species *Arum trilobatum*, citing both the Commelin (1697) and Hermann (1698) illustrations of *Typhonium trilobatum*. The Linnaean binomial is lectotypified on Hermann materials (BM) which Linnaeus saw and numbered as '326,' the species number of *Arum acaule foliis trilobis flore sessili radicato* in his *Flora Zeylanica* (p. 155, 1747).

Simultaneously Linnaeus called the second species *Arum divaricatum* (= *T. flagelliforme*), citing Rheede's illustration of *Neleschena major* which must be regarded as the type.

In 1754 (Stickman's thesis) Linnaeus dealt with the third species, citing Rumphius' illustration of *Arisarum amboinicum* (= *T. roxburghii*) as a misidentified synonym of *Arum trilobatum*. This misidentification was maintained in the second edition of the *Species Plantarum* (1764).

In 1760 Philip Miller published *Arum ceylanicum humile latifolium, pistillo purpureo* with an illustration. Linnaeus (1764) added it to the synonymy of *Arum trilobatum*, which it, with its purple appendix ('pistillo'), patently is not. It is either the third species, *T. roxburghii* (native to Ceylon and Amboina), or it is the first published illustration of the fourth species, *T. blumei* (native to China and Japan). The illustration lacks the critical sterile flowers. We are inclined to believe that Miller's illustration is the first of four illustrations of plants in British horticulture which increasingly show characters of *T. blumei* and regard the reported introduction from Ceylon as either an error or that the species had earlier been introduced to Ceylon from China (possibly Japan).

The second illustration of *T. blumei* is by Curtis, *Bot. Mag.* 10 (1796) t. 339, as '*Arum trilobatum*' and it shows what can be interpreted as a roughened spadix appendix (known in *T. blumei* but not in *T. roxburghii*). The third illustration is by Loddiges, *Bot. Cab.* 6 (1821) t. 516, as '*Arum trilobatum*' and it clearly shows the roughened appendix of *T. blumei*. The fourth illustration is by Sims, *Bot. Mag.* 49 (1822) t. 2324, as '*Arum trilobatum* var. *auriculatum*' and not only shows the roughened appendix but also the erect sterile flowers of *T. blumei*.

It is not especially important to know whether Miller's 1760 illustration is *T. roxburghii* or *T. blumei*. What is important is that the fourth species, *T. blumei*, certainly was known by 1822 (undoubtedly much earlier) and was widely misidentified as *Arum trilobatum* and was erroneously believed to be native to Ceylon. These two errors contribute to the total confusion that developed in the Roxburghian period.

**3. R o x b u r g h i a n p e r i o d .** This period, exemplified by Wight's 1844 publication of Roxburgh's illustrations, confused the nomenclature by misapplying the Linnaean binomials to the hitherto unnamed species and giving new names to the actual Linnaean species.

The first species (*Typhonium trilobatum*, called *Arum trilobatum* by Linnaeus) was called *Arum orixense*, which Roxburgh correctly regarded as a native species of India. Roxburgh's concept appears in Wight, *Icon.* 3 (1844) 6, t. 801.

The second species (*T. flagelliforme*, called *Arum divaricatum* by Linnaeus) was also treated as a new species, *Arum flagelliforme*, which Roxburgh correctly regarded as a native of India. Roxburgh's concept appears in Wight, *Icon.* 3 (1844) 6, t. 791.

The third species (*T. roxburghii*, known to Linnaeus from the Rumphian illustration and synonymized by Linnaeus as *Arum trilobatum*) was misnamed *Arum trilobatum*, which was correctly regarded as introduced from the Moluccas, although Roxburgh did

not realize that it is also native in southern India. Roxburgh's concept appears in Wight, Icon. 3 (1844) 7, t. 803.

The fourth species (*T. blumei*, known to Linnaeus from Miller's illustration and synonymized by Linnaeus (1764) as *Arum trilobatum*) was misnamed *Arum divaricatum* which Roxburgh correctly regarded as introduced from China (Canton) where it is native. Roxburgh's concept appears in Wight, Icon. 3 (1844) 6, t. 790.

4. The modern period. This period is dominated by Blume, Schott, and Engler who began the clarification of the now confused nomenclature and established names in *Typhonium*, now segregated from the old *Arum sensu latissimo*.

The first species finally was established as *T. trilobatum* (L.) Schott and was firmly connected to *Arum trilobatum* and the Hermann type (BM). Schott initially accepted *T. orixense* (Roxb.) Schott but all authors ultimately realized it is only a synonym of *T. trilobatum*.

The second species was finally established as *T. flagelliforme* (Loddiges) Blume. The earlier name, *Arum divaricatum* Linnaeus and its priorable epithet, became unavailable in *Typhonium* when Blume (1834) established the binomial *T. divaricatum* for the third species, explicitly excluding the Linnaean type (*Nelenschena major* Rheede) of *Arum divaricatum* Linnaeus. This second species was also called *T. cuspidatum* (Blume) Blume, a name occasionally used by those confused by the correct application of the epithet *divaricatum* in *Typhonium*, but ultimately fell into synonymy of *T. flagelliforme* which has the earliest available epithet.

The third species was finally established as *T. roxburghii* Schott, which included (in addition to the lectotype, the basis of Schott's published drawing, 1855) Roxburgh's illustration of *Arum trilobatum sensu* Roxburgh in Wight, Icon. 3 (1844) 7, t. 803, *non* Linnaeus, a somewhat stylized drawing of the species but clearly showing the deflexed sterile flowers.

The fourth species, here called *T. blumei* *sp. nov.*, has not hitherto been known under an applicable name. It has generally been called '*T. divaricatum* (L.) Blume.' However, this binomial is not a new combination based on *Arum divaricatum* Linnaeus because Blume explicitly excluded the type of the Linnaean species (Rheede's illustration of *Nelenschena major*) which Blume included under *T. cuspidatum*. Blume's published illustration (Pl. 36A) is definitely the fourth species (sterile flowers erect) and most have interpreted his species concept based on his published illustration. Unfortunately, Blume's species concept was mixed, evidenced by (1) his characterizing the sterile flowers as at first deflexed (*T. roxburghii*) then erect (*T. blumei*), (2) citation of materials from China and Japan (*T. blumei*) and Indonesia (*T. roxburghii*), confirmed by study of specimens in his herbarium (L), and (3) sheets of mixed materials in his herbarium (L).

Unfortunately *T. divaricatum* Blume (1834) cannot be typified by Blume's illustration (published in 1837). In the first place, he described the species from Timor where *T. roxburghii* occurs (detached inflorescences were found mounted on a sheet of *T. flagelliforme* collected by Zippelius from Timor). More serious, *T. divaricatum* Blume is an illegitimate superfluous name, including the type of *Arum diversifolium* Blume (1823) from Java which is identifiable with *T. roxburghii*. Thus, the binomial *T. divaricatum* Blume *nom. illegit.* falls into synonymy of *T. roxburghii* and cannot be applied to the fourth species.

The most recent monograph of the family (Engler's treatment in *Das Pflanzenreich*, 1905–1920) used the correct name for all species but the fourth (*T. blumei*) which he called '*T. divaricatum* (L.) Decaisne.' He showed some confusion about synonymy, particularly in citing *Arum divaricatum* Linnaeus and its type (Rheede). He correctly cited it in synonymy of *T. flagelliforme* but also, incorrectly, in the synonymy of '*T. divaricatum*.'

Jonker-Verhoef and Jonker, *Acta Bot. Neerl.* 8 (1959) 148, following the logical consequences of the technical error of regarding *Arum divaricatum* L. as a 'basionym' of *T. divaricatum*, concluded that *T. divaricatum* (L.) Decaisne was applicable to what Engler called *T. flagelliforme*. Simultaneously they, without seeing a type, decided that the name *T. trilobatum* must be applied to the fourth species (*T. blumei*, called *T. divaricatum* by most authors). However, as *Arum trilobatum* had not been typified at that time, they based their opinion on the illustrations in Miller 1760 and in *Curtis Bot. Mag.* 10 (1796) t. 339 and 49 (1822) t. 2324.

Under their concept the first species (*T. trilobatum* in this paper) would be *T. orixense*, our second species (*T. flagelliforme*) would be *T. divaricatum*, the third species (*T. roxburghii* in our opinion) would be *T. roxburghii* as well, and the fourth species (*T. blumei*) would be *T. trilobatum*.

We, however, designated Hermann Icon. 177 (BM) as the lectotype of *Arum trilobatum*, thus dropping Jonker-Verhoef and Jonker's concept into disuse and bringing the nomenclature and specific epithets – with one exception – into accordance with Engler's monograph.

Backer and Bakhuizen van den Brink, *Fl. Jav.* 3 (1968) 123, went even further, misapplying the binomial *T. trilobatum* to the third species (*T. roxburghii*). They also describe the second species (*T. flagelliforme*) but, following Jonker-Verhoef and Jonker, misapply the name *T. divaricatum* to it.

The present study was undertaken to resolve the obvious conflicting opinions and determine the correct application of the names involved. The complexities are manifold and no criticism is intended of authors who did not reach the conclusions here advocated. The question is what must be accepted and why.

## SYSTEMATIC TREATMENT

### TYPHONIUM

*Typhonium* Schott, *Wiener Z. Kunst* 1829 (23 Jul 1829) 732; Engler, *Pflanzenr.* (IV. 23F) 73 (1920) 108.

Cormous herbs. *Leaves* sagittate-hastate, 3-lobed or -partite to pedatisect, venation reticulate, often with 2–3 submarginal veins. *Inflorescence* coetaneous with leaves. Peduncle short. Spathe divided into a green, persistent basal portion, separated by a constriction from a pale or reddish purple, withering blade. Spadix with four divisions: a lower pistillate portion, an intermediate area with sterile flowers or partially naked, a staminate portion, and a naked appendix which may be sessile or stipitate. *Pistillate flowers* unilocular with 1–2 basal, suborthotropous ovules. *Sterile flowers* variable, from spatulate to filamentous. *Staminate flowers* with 1–3 stamens opening by slits or pores, the connective sometimes prolonged. *Berries* ovoid, 1(–2)-seeded; seeds albuminous.

**L e c t o t y p e:** *T. trilobatum* (L.) Schott (*Arum trilobatum* L.), *vide* Nicolson, Taxon 16 (1967) 519.

KEY TO FOUR FREQUENTLY CONFUSED SPECIES OF TYPHONIUM

- 1a. Sterile flowers spreading, lower ones spatulate but upper ones increasingly subulate; spathe pale greenish, extremely narrow and elongate; leaves usually narrowly hastate ..... 2. **T. flagelliforme**
- b. Sterile flowers various, all subulate or filiform; spathe reddish to dark purple; leaves commonly trilobed ..... 2
- 2a. Sterile flowers filiform, curly; appendix shortly stipitate below a strongly truncate base; spathe blade gradually tapered from above the middle .... 1. **T. trilobatum**
- b. Sterile flowers subulate, erect or decurved; appendix smoothly tapered from a sometimes somewhat swollen base; spathe blade abruptly tapered from below the middle ..... 3
- 3a. Sterile flowers spreading and strongly decurved ..... 3. **T. roxburghii**
- b. Sterile flowers erect to slightly incurved ..... 4. **T. blumei**

**1. Typhonium trilobatum** (L.) Schott — Figs. 1 (spadix), 5 (map).

*T. trilobatum* (L.) Schott, Wiener Z. Kunst 1829 (1829) 732; Schott & Endl., Melet. Bot. (1832) 17; Bl., Rumphia 1 (1837) 132; Kunth, Enum. Pl. 3 (1841) 26; Schott, Aroid. (1855) 12, t. 16; Schott, Syn. (1856) 19; Miq., Fl. Ind. Bat. 3 (1856) 194; Schott, Prod. (1860) 108; Engler in DC., Monogr. Phan. 2 (1879) 614; Engler, Bull. Soc. Tosc.ortic. 4 (1879) 301; N. E. Br., J. Linn. Soc., Bot. 18 (1880) 261; Hook. f., Fl. Br. Ind. 6 (1893) 590; Hook. f. in Trimen, Handb. Fl. Ceylon 4 (1898) 353; Prain, Bengal Pl. (1903) 1106 (?); (833); Ridley, Mat. Fl. Mal. Pen. 3 (1907) 9; Engler, Pflanzenr. IV. 23F (Heft 73) (1920) 117; Haines, Bot. Bihar & Orissa 3 (1924) 906; Ridley, Fl. Mal. Pen. 5 (1925) 90; Fischer in Gamble, Fl. Madras 3 (1931) 1578 (1100); Blatter & McCann, J. Bombay Nat. Hist. Soc. 35 (1932) 22; Gagnep. in Lecomte, Fl. Gen. I.-C. 6 (1942) 1181; Hu, Dansk Bot. Arkiv 23 (1968) 450; Li in Wu & Li, Reipubl. Pop. Sinic. 13(20) (1979) 113, t. 19, figs. 4-7. — *Arum trilobatum* L., Sp. Pl. (1753) 965; L., Sp. Pl. ed. 2 (1764) 1369 (excl. Rumphius & Miller syn.); Miller, Gard. Dict. (1768) 965; L., Sp. Pl. ed. 2 (1764) 1369 (excl. Rumphius & Miller syn.); Miller, Gard. Dict. (1768) 965; L., Sp. Pl. ed. 2 (1764) 1369 (excl. Rumphius & Miller syn.); Willd., Sp. Pl. 4 (1805) 483; Moon, Cat. (1824) 64; Thw., Enum. Pl. Zeyl. (1864) 334. — **L e c t o t y p e:** *Herm. Icon. 177* (BM), Sri Lanka, note: *Icon. 453* is a copy with omissions; *Herm. Herb. 3: 25, 'no. 326'* and *4: 75, 'no. 326'* (BM) are each a single leaf.

[*Serpentaria zeylanica triphylla* Breyne, Prod. 2 (1689) 90.]

[*Arum triphyllum humilius & minus* Herm., Parad. Bat. Prod. (1689) 315.]

[*Arum humile Arisarum dictum virginense triphyllon* Pluk., Phytogr. 3 (1692) t. 148, f. 6.; Almagest. (1696) 52.]

[*Arum ceylanicum humile latifolium, pistillo coccineo* Commelin, Hort. Med. Amstelod. 1 (1697) 97, t. 51; Burm., Thes. Zeyl. (1737) 34.]

[*Arum zeylanicum trilobato folio humilius & minus* Herm., Parad. Bat. (1698) 78, t. 78; Ray, Hist. Pl. 3 (Suppl.) (1704) 575.]

[*Draunculus indicus, folio trifido* Tournef., Inst. Rei Herb. (1700) 161; J. Burm., Thes. Zeyl. (1737) 89.]

[*Dracontium indicum folio tripartito* Herm., Mus. Zeyl. (1717) 33.]

[*Arum zeylanicum tuberosum folio tripartito* Herm., Mus. Zeyl. (1717) 63.]

[*Arum acaule foliis trilobis flore sessili radicato* L., Fl. Zeyl. (1747) 155.]

*Arum orixense* Roxb. ex H. C. Andr., Bot. Repos. 5 (1804) t. 356 ('orixensis'); R. Br., Prod. Fl. Nov. Holl. (1810) 333; Edwards, Bot. Regist. 6 (1820) t. 540; Lodd., Bot. Cab. 4 (1820) t. 422; Roxb., Fl. Ind. 3 (1832) 503; Wight, Icon. 3 (1844) 6, t. 801. — *Typhonium orixense* (H. C. Andr.) Schott, Wiener Z. Kunst 1829 (1829) 732; Kunth, Enum. 3 (1841) 20; Schott, Syn. (1856) 27; Schott, Prod. (1860) 69. — *Desmesia orixensis* (H. C. Andr.) Raf., Fl. Tell. 3 (1837) 63. — **T y p e:** *Andrews, Bot. Repos. 5 (1804) t. 356.*

*Typhonium triste* Griff., Not. Pl. Asiat. 3 (1851) 145 ('trista'). — **T y p e:** *Griffith, EIC 5996* (K) Malaysia, 'Malacca, Nhinghull May 1842.'

*Typhonium siamense* Engler in DC., Mongr. Phan. 2 (1879) 615. — **L e c t o t y p e**: *Schomburgh 334* (K) Siam, 1859; 'Wawra 339 & 447' (B, destroyed?, *non vidi*) are also cited by Engler.

Corm to several cm diameter, roots from the top. *Leaves* with petiole to 40 cm, sheath persistent, to 10 cm; blade usually deeply 3-lobed, united for about 1/3–1/4 the length of the terminal lobe (more united in juvenile aspect), anterior lobe to 20×10 cm, lateral lobes unequal, slightly smaller than terminal lobe. *Peduncle* c. 5 cm (to ground level), elongating somewhat in fruit. *Spathe* 15±5 cm long, lower portion persistent, greenish outside, purplish inside, 2–5 cm long; upper portion soon withering, dark red, 1/2 to nearly as broad as long, gradually tapering from well above the middle. *Spadix* erect, several cm shorter than spathe; pistillate portion ca. 1 cm, pinkish; sterile portion 1–2 cm long, covered with whitish, intertwined, filamentous sterile flowers; naked interstice 1–2.5 cm long, greenish; staminate portion 2–3 cm long, pink with coral-colored pollen; appendix with stipe 0.5 cm long, truncate at base, 5–10 cm long, dark red.

**D i s t r i b u t i o n**: Indochina (Nepal through S. E. China) but reaching N. Malaysia and Sri Lanka. Believed introduced into Philippines and W. Borneo. Introduced into Singapore, W. Africa (Ivory Coast) and neotropics (Trinidad).

**R e p r e s e n t a t i v e s p e c i m e n s**:

NEPAL. Chitwan District, Royal Chitwan Park, 13 May 1976, *Troth 807* (US); 17 May 1976, *Troth 833* (BM, US).

BANGLADESH. Silhet, Apr 1824, *de Silva 1364*, *EIC 8929B* (BM, K).

INDIA. Bengal, Calcutta Bot. Gard., Govt. House, 8 Jul 1889, *Lane s.n.* (US); Gongachora 9 May 1809, *Hamilton EIC 8929A* (K); Calcutta Bot. Gard., *EIC 8929C* (K); Orissa, Barma, 21 Jun 1849, *Mooney 3432* (K).

SRI LANKA. Kandy District, Peradeniya, Mar 1862, *Thwaites, CP 2896* (PDA); Colombo District, Colombo, Aug. 1862, *Ferguson s.n.* (PDA); Kalautara District, Alugama, 3 Feb 1979, *Nicolson 4246* (US).

BURMA. Kachin Hills, Inetkina (Myitkyina?), Jun 1899, *Shaik Mokim 3* (GH).

THAILAND. Chiangmai, 1000 ft, 20 Jun 1911, *Kerr 1859* (K); Koh Chang, Mai Dan village, 18 Dec 1961, *Nicolson 1613* (K, US); Bangkok, 23 Jun 1923, *H. M. Smith 317* (US); Kwai Noi River Basin, 9 Jul 1946, *Kostermans Exped. 1043* (L, US).

CAMBODIA. Siem-Reap, 6 Jun 1938, *Poilane 27207* (K).

LAOS. Vientiane, legation garden, 20 Jul 1955, *Talbot de Malhide 41* (BM).

VIETNAM. Tonkin, Tuyen-quang, Jun 1925, *Petelot 3985* (NY, US).

PHILIPPINES. Luzon, Manila, 21 Oct. 1891, *Loher 2428* (K); Laguna Prov., Coll. Agric. Campus, 14 Dec 1960, *Nicolson 834* (L, US).

MALAYSIA. Pahang, Kuala Tekam, Jun 1917, *Evans s.n.* (K); Perak, near Port Weld, 23 Jul 1961, *Nicolson 1055* (US); Sarawak, Nov. 1871, *Beccari 717* (K); Sabah: Labuan, cult. Mr. Low's old garden, 1877–78, *Burbidge s.n.* (AA, BM, K); Singapore, outside Bot. Gard., 21 Nov 1948, *Sinclair s.n.* (L).

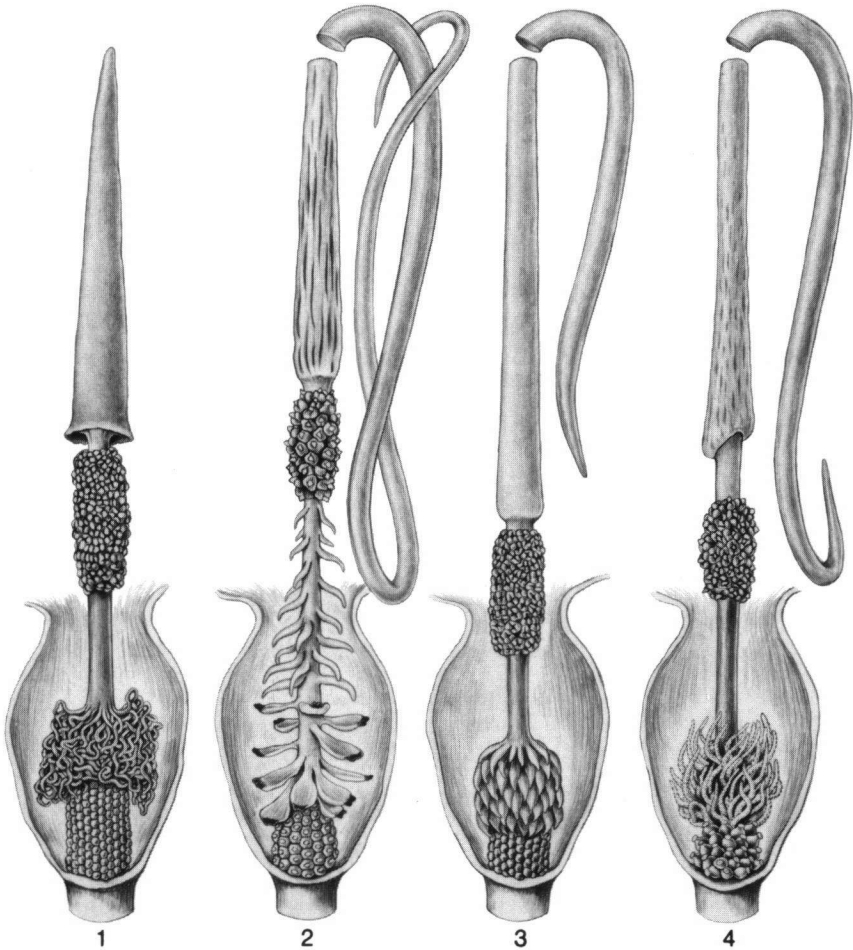
IVORY COAST. Bingerville, introduction, 11 Aug 1962, *Aké-Assi 6245* (K).

TRINIDAD. Bot. Gard. 'wild,' 9 Jul 1928, *Broadway 6992* (BM, K, US); St. Augustine, 8 Jul 1977, *Philcox 8021* (K).

**2. Typhonium flagelliforme (Lodd.) Bl. — Figs. 2 (spadix), 6 (map).**

*T. flagelliforme* (Lodd.) Bl., *Rumphia* 1 (1837) 134; Kunth, *Enum.* 3 (1841) 26; Voigt, *Hort. Suburb. Calcut.* (1845) 685; Schott, *Aroid* (1855) 12; Schott, *Syn. Aroid.* (1856) 19; Engler, *Pflanzenr.* IV.23F. (Heft 73) (1920) 112; Fischer in Gamble, *Fl. Madras* 3 (1931) 1578 (1100); Blatter & McCann, *J. Bombay Nat. Hist. Soc.* 35 (1932) 22; Gagnep. in Lecomte, *Fl. Gen.* 1.–C. 6 (1942) 1175; Li in Wu & Li, *Fl. Reipubl. Pop. Sinic.* 13 (2) (1979) 107. — *Arum flagelliforme* [Roxb., *Hort. Beng.* (1814) 65, *nom. nud.*] Lodd., *Bot. Cab.* 4 (1819) t. 396; Loudon, *Encycl. Bot.* (1829) 800, t. 13490; Roxb., *Fl. Ind.* 3 (1832) 502 ('*flagelliformis*'); Wight, *Icon.* 3(1) (1844) 6, t. 791; Griff., *Itin. Notes* 2 (1848) 13 ('*flagelliforma*'); Griff., *Not. Pl. Asiat.* 3 (1851) 144 ('*flagelliferum*'). —

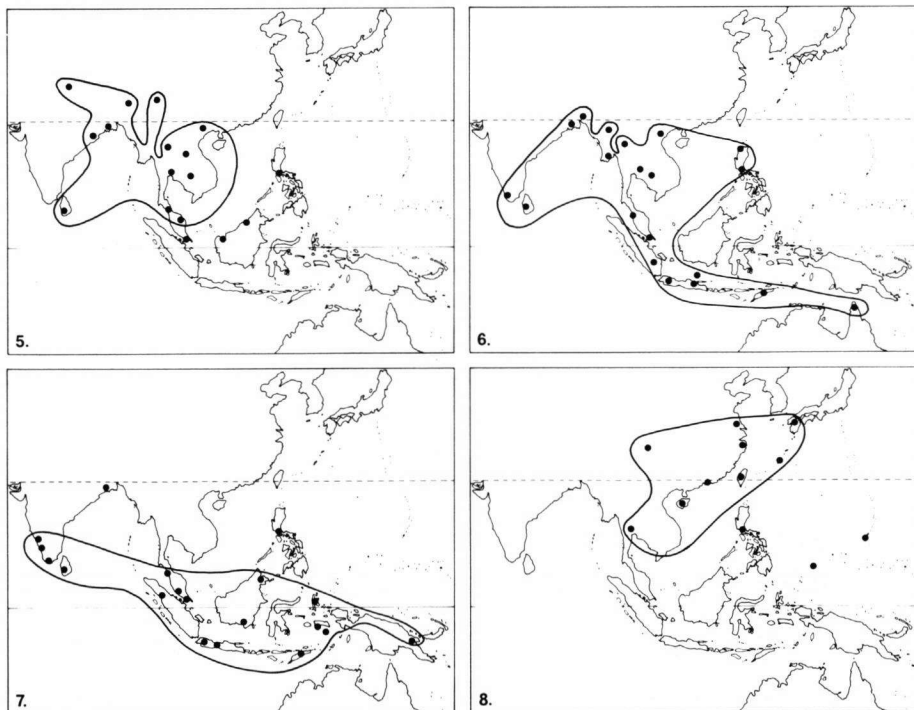
- Heterostalis flagelliformis* (Lodd.) Schott [attributed to Oesterr. Bot. Wochenbl. 7 (1857) 261, but the species not mentioned ], Gen. Aroid. (1858) t. 18; Schott, Prod. (1860) 109. — T y p e : India, Bengal, 'received from Rev. Dr. Carey of Serampore,' Lodd., Bot. Cab. 4 (1819) t. 396.
- [*Arum zeylanicum minus sagittariae folio* Herm., Parad. Bat. Prod. (1689) 315; Commelin, Fl. Malab. (1696) 9; Herm., Parad. Bat. (1698) 75; Ray, Hist. Pl. 3, Suppl. (1704) 575; J. Burm., Thes. Zeyl. (1736) 34.]
- [*Nelenschena major* Rheede, Hort. Malab. 11 (1692) 39, t. 20.]
- [*Arum minus indicum foliorum auriculis reflexis* Morison, Hist. Pl. 3 (1699) 544.]
- [*Arisarum luzonis polyflorum Camellus* in Ray, Hist. Pl. 3, Append. (1704) 35 ('Arizarum').]
- [*Arum acaule foliis subhastatis* L., Fl. Zeyl. (1747) 154 ('acule').]
- Arum divaricatum* L., Sp. Pl. (1753) 966; Miller, Gard. Dict. (1768) sp. #13; Burm.f., Fl. Ind. (1768) 193; Burm.f., Fl. Malab. (1769) 7; Willd., Sp. Pl. 4 (1805) 482; Sprengel, Syst. ed. 16, 3 (1826) 768, non *Typhonium divaricatum* Bl. (1834). — T y p e : Rheede, Hort. Malab. 11 (1692) t. 20; India, Kerala.



Figs. 1—4. Spadicis of four species of *Typhonium*. — 1. *T. trilobatum* (L.) Schott, from pickled material of *Nicolson 1700* (Petalung, Thailand); 2. *T. flagelliforme* (Lodd.) Blume, from pickled material of *Nicolson 1029* (Penang, Malaysia); 3. *T. roxburghii* Schott, from pickled material of *Nicolson 960* (Bogor, Indonesia); 4. *T. blumei* Nicolson & Sivadasan, from dried specimen of *Bogner s.n.* (Mujunga, Madagascar).



- Arum cuspidatum* Bl., Catal. (1823) 101. — *Typhonium cuspidatum* (Bl.) Bl. in Decaisne, *Nouv. Ann. Mus. Hist. Nat.* 3 (1834) 39; Bl., *Rumphia* 1 (1837) 133, t. 30, f. 1–2; Kunth, *Enum.* 3 (1841) 26; Schott, *Aroid.* (1855) 12; Schott, *Syn.* (1856) 19; Miq., *Fl. Ind. Bat.* 3 (1856) 194; Engler in DC., *Monogr. Phan.* 2 (1879) 216; N. E. Br., *J. Linn. Soc., Bot.* 18 (1880) 262; Hook. *f.*, *Fl. Br. Ind.* 6 (1893) 511; Hook. *f.* in Trimen, *Handb. Fl. Ceyl.* 4 (1898) 354; Prain, *Bengal Pl.* (1903) 1107 (834); Ridley, *Mat. Fl. Mal. Pen.* 3 (1907) 11; Cooke, *Fl. Bombay* 3 (1908) 823 (334); Ridley, *Fl. Mal. Pen.* 5 (1925) 91. — *T y p e* : *Blume s.n.* (L-898.90 – 268 and – 269) Java.
- Typhonium cuspidatum*  $\beta$  var. *ptychiurum* Bl., *Rumphia* 1 (1837) 134, t. 30, f. 3. — *L e c t o t y p e* : *Zippelius s.n.*, Timor. There are several specimens at L of which 898.90 – 277 represents a reasonable lectotype.
- Arum angulatum* Griff., *Not. Asiat.* 3 (1851) 143. — *T y p e* : *Griffith, EIC 5995* (K) Malacca, Jun 1842.
- Typhonium hastiferum* Miq., *Bot. Zeit.* 14 (1856) 563; Miq., *Fl. Ind. Bat.* 3 (1856) 194. — *S y n t y p e s* : *Horsfield 1416* (K) Java, Soerakarta ('Surokerto'), *Horsfield s.n.* (BM) Java, 'Fui Nao' (?). *Typhonium reinwardtianum* DeVriese & Miq. in Miq., *Fl. Ind. Bat.* 3 (1856) 195. — *T y p e* : *Reinwardt s.n.* (L-898.90 – 275) 'Java, bij Kolelah in een moeras'.
- Typhonium flagelliforme* var. *angustissimum* Ridley, *J. Straits Branch Roy. Asiat. Soc.* 59 (1911) 218; Engler, *Pflanzenr.* IV.23F. (Heft 73) (1920) 113. — *T. cuspidatum* var. *angustissimum* (Ridley) Ridley, *Fl. Mal. Pen.* 5 (1951) 91. — *T y p e* : *Keith s.n.* (SING, *non vidi*) Malaya, Perlis near Bukit Lagi, Kanga [Kangar?], Bangtaphan.
- Typhonium incurvatum* Blatter & McCann, *J. Bombay Nat. Hist. Soc.* 35 (1932) 22, pl. IV [note: spadix broken]. — *T y p e* : *McCann 998* (BLAT, *non vidi*) India, Bombay Island, Sion.
- Typhonium divaricatum* auct., *non* Bl. (1834): Backer & Bakhuizen van den Brink, *Fl. Java* 3 (1968) 123.



Figs. 5–8. Distribution of four species of *Typhonium*. — 5. *T. trilobatum* (L.) Schott; 6. *T. flagelliforme* (Lodd.) Blume; 7. *T. roxburghii* Schott; 8. *T. blumei* Nicolson & Sivadasan (see addendum!).

Corm depressed-globose, to 2 cm thick, rooting above. *Petiole* thin, 15–30 cm long, sheath to 10 cm; blade extremely variable, typically narrowly hastate with spreading basal lobes but sometimes elliptic, anterior lobe from 6–25×1–4 cm, lateral lobes horizontally spreading, 4–5×0.3–0.5 cm. *Peduncle* thin, 5–15 cm long. *Spathe* narrow, 15–30×0.5–0.8 cm, the lower part 1.5–3.5 cm long, finally withering, the upper whitish and soon withering. *Spadix* equaling the spathe, of 4 parts: lowest 0.5 cm pistillate, sterile for 2 cm with spreading, flat, darktipped rudiments for the lower 1 cm and the upper 1 cm with spreading to deflexing linear rudiments, staminate for 0.5 cm, yellow, the appendix subsessile (tapering from base), greenish yellow, to 14 cm long. *Berries* light greenish, 2–3-seeded.

**D i s t r i b u t i o n :** Indochina (N. E. India through S. E. China) and S. Malesia (W. Malaysia through Sunda Islands to N. Queensland) but reaching S. India, Sri Lanka and Luzon.

**N o t e :** Both *Typhonium reinwardtianum* De Vriese & Miq. (1856) and *T. flagelliforme* var. *angustissimum* Ridley (1911) represent this taxon in its most narrow-leaved aspect.

**R e p r e s e n t a t i v e s p e c i m e n s :**

INDIA. Bengal, *Griffith s.n.* (K) [Schott ined, Icon. 2060, W]; Kerala, Kottayam District, near Palai, 15 Oct. 1975, *Sivadasan 7828* (Calicut).

BANGLADESH. Dacca ('Dhaka'), 19 May 1872, *Clarke 17085A* (K).

SRI LANKA. Peradeniya Bot. Gard., 3 Jul 1926, [*Alston?*] *s.n.* (PDA); Colombo Lake, Jul 1886, *W. Ferguson s.n.* (PDA).

BURMA. Sagaing ('Segaen') on the Irrawaddy, 31 Oct 1829, *Wallich EIC 8931B* (K); Rangoon, *McClelland s.n.* (K).

THAILAND. Chiangmai, 24 May 1915, *Kerr 3415* (K); Sriracha, 3 Aug 1923, *Collins 936* (K).

CAMBODIA. Pursat ad Phuum, Jun. 1929, *Godefroy-Lebeuf 296* (K).

VIETNAM. Tonkin, Hanoi, Oct 1890, *Balansa 4569* (K); Hadong Prov., Nov 1926, *Petelot 5013* (US).

MALAYSIA. Malacca, Jun 1866, *Maingay 3186* (K); Singapore, Jun 1880, *Thurton s.n.* (K); Penang Bot. Gard., 20 Jun 1961, *Nicolson 1029* (US).

INDONESIA. Sumatra, Palembang, 25 Jul 1948, *deRaaf 61* (L); Java, Labuan, 8 Dec 1964, *Kostermans 21805* (K, L); Timor, *Zippel s.n.* (L) [type of *T. cuspidatum* var. *ptychurianum*].

PHILIPPINES. Luzon, Manila, *Merrill, Sp. Blancoanae 676, 970* (K, L, US); Cavite Prov., Jul 1905, *Merrill 4171* (NY); Ilocos Norte, Aug 1918, *Ramos 33140* (NY):

AUSTRALIA. Queensland, Cape York Penins., Iron Range, 20 m, 24 Jun 1948, *Brass 19314* (AA).

**3. *Typhonium roxburghii* Schott — Figs. 3 (spadix), 7 (map).**

*T. roxburghii* Schott, Aroid. (1855) 2, t. 17; Schott, Syn. (1856) 18; Schott, Prod. (1860) 106; Baker in Saunders, Refug. Bot. 4 (1871) t. 283; Hook. f., Fl. Br. Ind. 6 (1893) 510; Hook, f. in Trimen, Handb. Fl. Ceylon 4 (1898) 353; Prain, J. Asiat. Soc. Bengal 67 (1898) 303; Prain, Bengal Pl. (1903) 1106 (834); Engler, Pflanzenr. IV.23F (Heft 73) (1920) 119; Ridley, Fl. Mal. Pen. 5 (1925) 90. — *Arum roxburghii* (Schott) Thw., Enum. Pl. Zeyl. (1864) 432. — *Typhonium divaricatum* var. *roxburghii* (Schott) Engler in DC., Monogr. Phan. 2 (1879) 612. — L e c t o t y p e : *Thwaites, C. P. 3764* (K, basis of Schott's t. 17; dupl. BM, PDA) Ceylon.

[*Arisarum amboinicum* Rumphius, Herb. Amboin. 5 (1747) 319, t. 110, f. 2.]

*Arum diversifolium* Blume, Catal. (1823) 102 [non *Typhonium diversifolium* Wall. ex Schott, 1855].

— T y p e : *Blume s.n. (L-898.90 - 306)* Java.

*Typhonium divaricatum* Bl. in Decaisne, Nouv. Ann. Mus. Hist. Nat. 3 (1834) 367, *nom. illegit., incl.* type of *Arum diversifolium* Bl., 1823.

- Typhonium divaricatum* var. *robustum* Bl., Rumphia 1 (1837) 132; Kunth, Enum. Pl. 3 (1841) 26; Engler in DC., Monogr. Phan. 2 (1879) 612; Merrill, Interpr. Rumph. Herb. Amboin. (1917) 132. — **L e c t o t y p e**: 'Herb. jav. Burman,' (L-898.90 - 279) Java.
- Typhonium javanicum* Miq., Bot. Zeit. 14 (Aug 1856) 563; Miq., Fl. Ind. Batav. 3 (Dec 1856) 193; Miq., Ann. Mus. Lugd.-Bat. 3 (1867) 80, t. 3B. — **T y p e**: *Horsfield, Aroid. 11* (K) Java.
- Typhonium motleyanum* Schott, Prod. (1860) 106; Hook. f., Fl. Brit. Ind. 6 (1893) 510. — *T. divaricatum* var. *motleyanum* (Schott) Engler in DC., Monogr. Phan. 2 (1879) 612; Engler, Pflanzenr. IV.23F. (Heft 73) (1920) 116. — **T y p e**: *Motley 88* (K) Borneo, Bangarmassing.
- Typhonium schottii* Prain, J. As. Soc. Beng. 67 (1898) 303; Prain, Bengal Pl. (1903) 1106 (833). — *T. trilobatum* var. *schottii* (Prain) Engler, Pflanzenr. IV.23F. (Heft 73) (1920) 118. — **T y p e**: *Davies s.n.* (CAL, photo US). Bengal, wild in Hort. Bot. Calc., 14 Jul 1896.
- Typhonium amboinense* Blatter & McCann, J. Bombay Nat. Hist. Soc. 35 (1932) 23, *nom. illegit.*, *incl. type of T. roxburghii* Schott, 1855.
- Arum trilobatum* auct., *non* L. (1753): Roxb., Hort. Beng. (1814) 65; Roxb., Fl. Ind. 3 (1832) 505; Wight, Icon. 3 (1844) 7, t. 803.
- Arum divaricatum* auct., *non* L. (1753): Moon, Cat. (1824) 64.
- Typhonium trilobatum* auct., *non* (L.) Schott, 1829: Backer & Bakhuizen van den Brink, Fl. Java 3 (1968) 123.

Corm subglobose, to 3.5 cm diameter, rooting at top. *Petiole* to 30 cm, sheathing in lower third. Blade usually shallowly 3-lobed (sometimes deeply), usually broader than long. *Peduncle* to 10 cm long, a function of corm depth. *Spathe* to 30 cm long, lower portion persistent, ca. 3 cm long; upper portion withering, dark red to purple inside, usually 3–4 times longer than broad, abruptly tapering from below the middle, usually twisted at tip. *Spadix* subequaling the spathe, pistillate portion pink, ca. 0.5 cm, sterile portion to 1 cm long, covered with acicular, yellowish to reddish downturned rudiments, interstice naked, white, to 1.5 cm long; staminate portion coral pink, ca. 1 cm long; a somewhat contracted stipe ca. 1 cm long subtends the basally slightly swollen appendix which is dark red (reported as white in *T. schottii*), 8–15 cm long. *Berry* 1–2-seeded.

**D i s t r i b u t i o n**: S. and central Malesia but reaching S. India and Sri Lanka. Introduced into N. E. India, Luzon, E. Africa (Zanzibar) and neotropics (Brazil).

**N o t e s**: The typification of *Typhonium roxburghii* Schott (1855) deserves discussion. Two illustrations are involved, Roxburgh's illustration (published by Wight, Icon. 3 (1844) t. 803, as *Arum trilobatum*) and Schott's own illustration (Aroid. (1855) t. 17). No specimen has been found from which Roxburgh prepared his drawing of '*Arum trilobatum*' but Roxburgh (Hort. Beng. (1814) 65; Fl. Ind. 3 (1832) 682) said it was accidentally introduced to the Calcutta Botanic Garden in soil from the Moluccas.

Schott's illustration (Aroid. (1855) t. 17) appears to have been prepared from a Ceylonese specimen (*Thwaites, C. P. 3764*, K), judging by a comparison of Schott's drawing with this specimen. Schott nowhere explicitly cites the specimen (always cited simply as 'India orientalis') but it is annotated in Schott's hand as *Typhonium roxburghii* Schott.

David Prain (in King and Prain; J. As. Soc. Beng. 67 (1898) 301–305) had very complicated views on the taxonomy and nomenclature of *Typhonium* in northern India and Burma. Prain felt that the two illustrations of *T. roxburghii* (Roxburgh's and Schott's) represented different species. He typified *T. roxburghii* on Roxburgh's illustration and gave a new name to Schott's illustration, *T. schottii*, largely because he felt that the epithet '*roxburghii*' ought to be typified by a Roxburghian element. However, we feel that the typification of Schott's name should, in principle, be typified by the specimen used and illustrated by Schott, not on Roxburgh's illustration. It makes no difference in

the application of Schott's name since we, unlike Prain, regard the two illustrations as conspecific. It should be noted that the appendix of *T. schottii* is reported to be white.

*Typhonium inopinatum* Prain from Upper Burma is also described in this publication, the sterile flowers being 'slightly recurved.' Sivadasan has seen the type (K) and reports the sterile flowers are rather slender and scattered (as in *T. motleyanum* from Borneo). This sounds like a variant of *T. roxburghii*, which usually has thick, densely packed, and strongly recurved sterile flowers, but this identification is uncertain in view of the fact that the presence of *T. roxburghii* has yet to be confirmed in northern India and Burma, except as an introduction.

The distribution of *T. roxburghii* as a native species (not introduced) is still uncertain in marginal areas. It is weedy (escapes) and it is difficult to be certain whether a collection is from the wild or is an escape. Nonetheless, older collections (from 1800's) indicate the species is native in southern India, Sri Lanka, Malaysia, and Indonesia as far east as the Moluccas (Banda in 1832).

On the northern margin it is significant that the species is not cited (nor described) from Indochina (Gagnep. in Lecomte, Fl. Gen. Indoch. 6 (1942) 1174–1181). It is cited from western Yunnan in China (Li, Fl. Reipubl. Pop. Sinic 13(2) (1979) 114, t. 19, f. 1–3), but only as cultivated in gardens. The reports from northern India and Burma probably involve other species or an introduction. Reports from the Philippines are only from Manila (all cult.?).

#### Representative specimens:

INDIA. Bengal, Calcutta Bot. Gard., 14 Jul 1896, *Davies s.n.* (CAL, photos) [type of *T. schottii*]; Karnataka, Mangalore, frequent weed, 2 May 1980, *Saldanha and Singh, KFP 11379* (St. Joseph's Coll., Bangalore); Tamil Nadu, Coimbatore, cult. in pots, said to be from Kerala, 28 May 1970, *Nicolson 4152* (US); Kerala, Quilon, 11 Sep 1976, *Sivadasan 19093, 19098* (Calicut Univ. Herb.); Trivandrum, 23 Jun 1956, *Abraham 3117* (US).

SRI LANKA. Sine loc., *Thwaites, C. P. 3764* (BM, PDA, K, the latter the lectotype of *T. roxburghii*); Colombo District, Aug 1862; *Ferguson s.n.* (PDA); Danowita, 15 May 1967, *Amaratunga 1281* (PDA); Kandy District, Peradeniya, Mar–Jul 1862 [*Ferguson?*] *s.n.* (PDA); Univ. campus, 29 May 1965, *Amaratunga 806* (PDA).

MALAYSIA. Penang, Apr 1881, *Dr. King's Coll. [Kunstler] 1596* (K); Penang Bot. Gard., common weed, 20 Jun 1961, *Nicolson 1030* (US); Malacca, 1868, *Maingay 1547* (K); Singapore, Tanglin, 1903, *Ridley s.n.* (K); Sabah, Tenom District, near Rayoh Hill, *Amparia 41466* (K, L).

INDONESIA. Java, 'Titikusan,' *Blume s.n.* (L, several sheets, types of *Arum diversifolium* Blume); 'Tingielin mintek,' *Herb. jav. Burman* (L, 898, 90 ... 279, type of *T. divaricatum* var. *robustum* Blume); Java, weed in Bogor Bot. Gard., 25 Apr 1961, *Nicolson 960* (US); Sumatra, Sibolangit, 20 Nov 1917, *Lörzing 5418* (L, ster.); Borneo, Bangarmassing, 1857–8, *Motley 88* (K, type of *T. motleyanum* Schott); Halmahera, 3 Oct 1937, *Nedi 268* (L, ster.); Amboina, 4 Apr 1948, *Mrs. E. A. de Wiljes-Hissink 5* (GH); Banda, 'Toja oetang,' [1832], [*Peitsch?*] *s.n.* (L, cited as *T. divaricatum* by Blume, p. 130, 1837, as 'Toja Utang' from Banda).

PHILIPPINES. Manila, 18 Apr 1938, *Fenix 147* (GH); Manila Gardens, 24 May 1945, *Quisumbing, PNH 2070* (GH).

PAPUA-NEW GUINEA. Lae Bot. Gard., said to be wild nearby, 12 Nov 1961, *Nicolson 1399* (L, US); 1557 (K, L, US).

TANGANYIKA. Zanzibar, Jun 1899, *J. F. Last s.n.* (K), surely introduced!

BRAZIL. Bahia, 23 May 1918, *Curran 324* (GH), surely introduced!

#### 4. *Typhonium blumei* Nicolson & Sivadasan, *sp. nov.* — Figs. 4 (spadix), 8 (map).

[*Arum ceylanicum humile latifolium, pistillo purpureo* P. Miller, Fig. Pl. Gard. Dict. (1760) 35, t. 52, f. 2.]

*Arum trilobatum* var.  $\beta$  *auriculatum* Sims, Bot. Mag. 49 (1822) t. 2324. — Type: Bot. Mag. 49 (1822) t. 2324.

*Arum trilobatum* auct. non L.: Thunb., Fl. Japon. (1784) 234; Curtis, Bot. Mag. 10 (1796) t. 339; Lodd. Bot. Cab. 6 (1821) t. 516.

*Arum divaricatum* auct. non L.: Roxb., Hort. Bengal. (1814) 65, Fl. Ind. 3 (1832) 503; Wight, Icon. 3 (1844) 6, t. 790; Bentham, Fl. Hongk. (1861) 342.

*Typhonium divaricatum* auct. non Bl., nom. illegit.: Bl., Rumphia 1 (1837) t. 36A; Schott, Aroid (1855) 12, t. 18; Hook. f., Fl. Brit. India 6 (1893) 510; Engler, Pflanzenr. IV.23F (Heft 73) (1920) 115; Gagnep. in Lecomte, Fl. Gen. I.-C. 6 (1942) 1180; Ohwi, Fl. Japan (1965) 262; Liu, Fl. Taiwan 5 (1978) 815, t. 1530; Li in Wu & Li, Fl. Reipubl. Pop. Sinic. 13(2) (1979) 111.

*Typhonium trilobatum* auct. non (L.) Schott: Jonker-Verhoef & Jonker, Acta Bot. Neerl. 8 (1959) 149; id., Fl. Surin. 1(2) (1968) 380.

Foliis sagittato-cordatis aut trilobatis; spatha superne lanceolato-oblonga, spadicem subulatem aequans; organii rudimentariis setiformibus, erectis. — T y p u s : Buerger & Siebold s.n. (L, sheet 898,90 ... 290) Japan; i s o t y p u s : idem (L, 898,90 ... 289).

Corm subglobose, to 2 cm diameter. *Petioles* thin, to 20 cm, sheathing below. Blade variable, usually sagittate but cordate to trilobate, 5–15×3.5–9 cm. *Peduncle* to 4 cm. *Spathes* 15–20 cm, lower portion ca. 1.5–3 cm, greenish outside and purplish inside; blade 12–18×4–5 cm, spreading and withering, dark purple, abruptly tapering from below the middle, apex usually twisted. *Spadix* subequaling spathe, pistillate portion to 1 cm, sterile portion ca. 1 cm and covered with densely congested, subacute and suberect rudiments next to pistillate flowers, naked interstice to 2 cm long, male portion to 1 cm, appendix to 13 cm, subsessile but often unequally somewhat swollen at base, often somewhat roughish with age, dark purple. *Berries* few-seeded.

**D i s t r i b u t i o n :** E. and S. E. Asia. Introduced into Luzon, Guam, Carolines (Koror), Africa (Comores, Madagascar, Mauritius, S. Africa, Ghana) and neotropics (Cuba, Martinique, Suriname).

**N o t e s :** This species was, hitherto, most commonly called *T. divaricatum*. This binomial was most commonly attributed to '(L.) Decaisne' but is correctly to be attributed to Blume. Decaisne (1834) stated at the end of his treatment of Timorese aroids (translated from French), 'The synonyms of these Aroids, as well as the communication of these two species of *Typhonium* [*T. divaricatum* and *T. cuspidatum*], have been given to me by Mr. Blume.' The reason why the parenthetical citation of Linnaeus must be dropped is because Blume explicitly excluded the type of *Arum divaricatum* Linnaeus when he specified 'excl. syn. Hort. Malab.' The Linnaean type of *Arum divaricatum*, cited as '*Nelenschena major* Rheed. Mal. 1, p. 39, t. 20,' was placed in synonymy of *T. cuspidatum*. Thus, *T. divaricatum* Blume (in Decaisne, 1834) actually is a new species, not a new combination.

Unfortunately for this familiar name, Blume also cited an earlier valid name in synonymy of *T. divaricatum*, *Arum diversifolium* Blume (1823) and its epithet was available at that time for use in *Typhonium* (it became unavailable upon publication of *T. diversifolium* Wall. ex Schott, 1855). Under Art. 63, *T. divaricatum* is illegitimate and, under Art. 7.11, *T. divaricatum* must be typified on the type of *Arum diversifolium* Blume, a Javanese element identifiable with *T. roxburghii*. This leaves what has generally been called *T. divaricatum* (of eastern Asia) without any applicable name at the rank of species.

Blume's concept of this species was confused. This is perceptible in the 1834 publication where he cites elements identifiable as *T. blumei*, such as '*Arum trilobatum* (aut Linn.) Thbg., Fl. Jap. p. 234; Bot. Mag. n. 339 et 2324,' and elements identifiable as *T.*

*roxburghii*, such as 'Arum diversifolium Blum., Cat. Hort. Buit. p. 102; *Arisarum amboinicum* Rumph. 5. t. 110 [ut 100]. fig. 2' and even 'A. Zippelio, in insul. Timor.' The reason for Blume's confusion becomes obvious in his 1837 publication (Rumphia 1: 131) when he characterized the sterile flowers as 'primum arrecta, deinde recurva,' i.e., at first erect (*T. blumei*), then decurved (*T. roxburghii*). It is not surprising that Blume regarded Chinese/Japanese elements (*T. blumei*) and Indonesian elements (*T. roxburghii*) as conspecific. He regarded the technical character by which these species are now separated as merely stages in development (aging).

It is also apparent from study of specimens annotated by Blume (L) that materials were mixed in mounting. For example, there are two detached inflorescences of *T. roxburghii* mounted on a sheet of *T. flagelliforme* labeled as collected by Zippel from Timor. These two inflorescences are probably what Blume was citing under *T. divaricatum* as the Zippelius collection from Timor. Another mixed collection has a detached inflorescence of *T. blumei* mounted on a sheet of *T. roxburghii* labeled as collected by Blume from Java. Comparison of this inflorescence with Blume's illustration of *T. divaricatum* (Rumphia 1 (1837) t. 36A) strongly suggests that this inflorescence is the basis of Blume's illustration. It is exceedingly improbable that this inflorescence (*T. blumei*) was actually collected in Java. It is far more likely that this inflorescence was taken from the Buerger & Siebold collections (Japan) in Blume's hands and, after being softened and dissected for preparation of the illustration, was misplaced on Blume's Javanese collection of *T. roxburghii*.

Blume's later (1837) illustration undoubtedly was the major factor in the widespread application of his binomial to what we are obliged to treat as a new species. It is appropriate to honor Blume by naming the species he illustrated for him. We have selected the type from material cited by Blume which is very likely the basis of his published illustration. In passing we must point out that the holotype is misannotated as 'Aus China.' This surely is an error, not only because the original label bears the Japanese vernacular names, To-hange and Hange, in Kanji, but because the duplicate (isotype) is labeled 'Japan.' The type locality is undoubtedly Kyushu island, probably the vicinity of Nagasaki.

It is extremely doubtful that this species is native in India (or Sri Lanka). Some reports of this species as native in India, such as reports of *T. divaricatum* by Hooker (Fl. Br. Ind. 6 (1893) 510) and Fischer (in Gamble, Fl. Madras 3 (1931) 1577 (1100)), are based on a misidentification of a *Wight* specimen from Mootalur (Tamil Nadu). The critical specimen (EIC 8930), kindly loaned to us by Kew, actually is *Theriophonum minutum* (Willdenow) Baillon. All other records of *T. blumei* (called *T. divaricatum*) in India and Sri Lanka appear to involve a misidentification of *T. roxburghii* or rest on cultivated specimens which are known to be introduced (as with *Roxburgh*) or can be presumed so.

#### Representative specimens:

THAILAND. Kanburi Prov., Kao Tawng, 21 Aug 1930, *Kerr 19628* (K).

CHINA. Chekiang Prov., 16 Aug 1920, *Hu 61* (K); Kiangsu Prov., 1921, *Hu 994* (K); Hong Kong, no date, *Champion 289* (K); Kwangtung Prov., Hainan, 7 Apr 1932, *Liang 61523* (K, NY, US); Szechuan Prov., Mt. Omei, 4 Oct. 1938, *Chow 8555* (AA); Kiating [Loshan], 22 May 1942, *Tai 1290* (AA).

JAPAN. 'Aus China' but probably Kyushu, Nagasaki, ca. 1826, *Buerger & Siebold s.n.* (L) [type of *T. blumei*].

OKINAWA. Chinen, 18 Jul 1951, *Walker 6895* (L, US).

PHILIPPINES. Luzon, Manila, 1879, *Rothdauscher s.n.* (M); Jard. Bot. Manila, 15 Feb 1891, *Loher 2427* (K).

MARIANA ISLANDS. Guam, behind Govt. House, Aug 1906, *Safford 1183* (US).

CAROLINE ISLANDS. Palau Islands, Koror Island, 8 May 1958, *Owen 22* (US, Herb. Fosberg).

?INDONESIA. ?Java, *Leschenault s.n.*, with attached drawing from Noronha (*L, 989,90 ... 283*); ?Buitenzorg, *Blume s.n.*, detached spadix on sheet of *T. roxburghii*, probably from different collection and location (*L, 898,90 ... 308*).

COMORES. Mayotte Island, im Wald, [introduced], 25 Feb 1969, *Bogner 284* (K, M).

MALAGASY REPUBLIC. Cult. [introduced] in Majunga, Feb 1969, *Bogner s.n.* (US).

MAURITIUS. Ile de France [introduced], *Commerson s.n.* (*L, 908,337 ... 442*).

GHANA. Kade, 16 Apr 1977, *Hall & Lock 46551* (M).

SOUTH AFRICA. Durban Bot. Gard. [introduced], Feb 1893, *Wood 4711* (K).

CUBA. Matanzas, jard. [introduced], no date, *Garcia 11626* (US).

MARTINIQUE. Jard. Tivoli, spontané [introduced], 1 Feb 1939, *Stehle 5184* (US).

SURINAME. Paramaibo, weed along streets, app. introduced, Dec 1955, *Jonker 94* (U).

#### ADDENDUM

After submission of this paper the first author realized that our report of *T. blumei* in S. E. Asia (Kanburi, S. W. Thailand) was based on a misidentification of *Kerr 19628* (K). The specimen is identifiable with what Gagnepain (in Lecomte, Fl. Gen. Indoch. 6 (1942) 1181) called *T. divaricatum* var. *minutum*. This taxon has erect sterile flowers, like *T. blumei*, but they are broadly clavate-deltoid-thickened at the apex on the syntype, *Kerr 21422* (K), unlike *T. blumei*, probably representing a distinct species.

Readers should note that the distribution map of *T. blumei* (fig. 8) is incorrect and the species, as yet, is only known as native in China and Japan. The reports in the Fl. Gen. Indoch. 6 (1942): 1180 of *T. blumei* (called *T. divaricatum*) in Laos and Saigon (based on Thorel specimens at P) have not been confirmed but are suspected of being '*T. divaricatum* var. *minutum*.' as is *Kerr 19628* from Kanburi, Thailand.