
TWO NEW SPECIES AND A NEW COMBINATION IN AUSTRALIAN *TYPHONIUM* (ARACEAE TRIBE *AREAE*)

A. HAY*

Typhonium praetermissum and *T. taylori* (Araceae) are described as species new to science from the Northern Territory, Australia. The first is intermediate in character between *Typhonium* Schott and *Lazarum* A. Hay. Consequently, *Lazarum* is reduced to the synonymy of *Typhonium* and the new combination *Typhonium mirabile* is made. The new species are illustrated.

Keywords. Aroid geophytes, Northern Territory, *Lazarum*.

INTRODUCTION

Araceae tribe *Areae*, widely distributed in the eastern hemisphere, was considered to be represented in Australia by two closely allied genera, monotypic *Lazarum* A. Hay and polytypic *Typhonium* Schott (Hay, 1992, 1993). Hay & Taylor (1996) reported that recent collecting in the vicinity of Darwin, Northern Territory had resulted in the discovery of several putatively new taxa in Araceae tribe *Areae*, of which two or three were known only sterile or in fruit and so could not be ascribed with certainty to one or other of these genera. Living plants of one of the putatively new taxa have subsequently flowered in cultivation at the Darwin Botanic Garden. They represent a new species conforming to the concept of *Lazarum*. A second undescribed species is represented by plants that have flowered at both Darwin Botanic Garden and the Royal Botanic Gardens Sydney. In it, the basis for distinction of *Lazarum* from *Typhonium* breaks down.

Hay (1992) distinguished *Lazarum* from *Typhonium* by their differing spathe bases. In *Lazarum* the basal portion of the spathe is tubular and divided by an annular septum into two chambers. The lower includes the portion of the spadix bearing pistils and sterile organs, while the upper includes the male zone of the spadix. The base (defined in this instance by the point of union of the spathe margins) of the spathe limb is at a level distal to the male zone. In *Typhonium* the spathe base forms a single chamber, is generally convolute (rarely tubular) and includes only the pistils and sterile organs. It is differentiated from the limb by a constriction situated at a level proximal to the male zone, which is thus exposed.

A combination of differential characters, each found in other genera of the *Areae*, was used to distinguish *Lazarum* further, and in particular from *Sauromatum* Schott

* Royal Botanic Gardens, Mrs Macquaries Road, Sydney 2000, Australia.

which it resembles strongly in architecture and in the tubular spathe base. These included vermiform (vs. clavate) sterile organs, uniovulate (vs. 2–4-ovulate) ovary, a single whorl (vs. spirals) of pistils and simple entire (vs. pedate) leaves. In a tribe of Araceae in which currently accepted generic limits are particularly narrow, it was at the time appropriate to erect a new genus for a species of *Areae* with such distinct inflorescence structure. However, *Lazarum* can no longer be maintained separate from *Typhonium*. Potential synonymy of *Lazarum* with *Sauromatum* is not discussed, as that genus too is due to be reduced to the synonymy of *Typhonium* (Hettterscheid & Boyce, pers. comm.), though this relationship may eventually need to be considered at infrageneric level.

One of the new species, *T. praetermissum*, has the spathe organized into a lower tubular portion including the pistils and sterile organs only, separated from the limb by a constriction which, internally, is thickened into an annular septum through which the naked zone of the spadix passes and into which the spathe limb margins run and unite. The spadix bears the male zone in a position relative to the spathe limb typical for *Typhonium*. Thus here the septum corresponds with the differentiation of the single-chambered spathe base from the limb, whereas in *Lazarum* the differentiation of spathe base from limb is at a level above the male zone of the spadix, while the septum divides the spathe base itself into two chambers. While the septum is in different positions relative to the base of the spathe limb in *Lazarum* and *T. praetermissum*, it is in the same position relative to the zones of the spadix. With respect to the diagnostic character used to distinguish *Lazarum* from *Typhonium* and other members of the *Areae*, this new species is intermediate. Moreover, supporting differential character states recombine in the new species to further blur the distinction of *Lazarum* from *Typhonium* (and *Sauromatum*). The pistils are in spirals (not a whorl; cf. *Typhonium* and *Sauromatum*) and intermediate in orientation between the acroscopic pistils of *Lazarum* and the (generally, but not universally) plagioscopic pistils of *Typhonium* and *Sauromatum*. The sterile organs are clavate (not vermiform; cf. *Sauromatum* and some *Typhonium*), the appendix is basally thickened and truncate at the insertion (not cylindrical; cf. *Typhonium*). Architecturally this new species is similar to *Lazarum*, a few *Typhonium* species and *Sauromatum*, corresponding to stem type B in Murata's (1990) scheme of shoot diversity in *Typhonium*.

With the recognition of a character combination intermediate between *Lazarum* and some species of *Typhonium*, and the reduction of *Lazarum* and, imminently, *Sauromatum* to the synonymy of *Typhonium*, the need arises to review the infrageneric classification of *Typhonium*. Some progress toward an infrageneric classification has been made by Sriboonma et al. (1993, 1994) using cladistic analysis of chloroplast DNA and morphological features respectively. However, Australian species, which now number 16 plus further incompletely known entities and account for almost half the genus, were under-represented in the former study, and in the latter, relationships with the most immediately allied genera – *Theriphonum* Schott, *Sauromatum* and *Lazarum* – were not considered. The largest proposed section (Sriboonma et al., 1994), sect. *Typhonium*, with 28 Asian and Australian species, remains mainly unre-

solved. Furthermore, certain species groupings were proposed with startling but undiscussed geographical disjunctions (e.g. a grouping, within the otherwise unresolved sect. *Typhonium*, of eastern Australian *T. brownii* Schott, *T. eliosurum* (Benth.) O.D. Evans and *T. weipanum* A. Hay with Chinese (Hunan) *T. hunanense* H. Li & Z.Q. Liu, and sect. *Gigantea* in which are grouped only Australian *T. liliifolium* F. Muell. ex Schott and Chinese *T. giganteum* Engl.), all of which suggests that refinement of the classification may be possible. Nevertheless, it must be said that relationships within *Typhonium* are not at all readily apparent morphologically and a more detailed macromolecular analysis may prove useful in addition to further morphological studies. I shall therefore refrain from formally recognizing *Lazarum* at infrageneric level, though it may become desirable to do so at a later date.

An amended key to *Typhonium* in Australia will appear in the forthcoming treatment of Araceae for the *Flora of Australia* (Hay, in prep.).

1. *Typhonium praetermissum* A. Hay, sp. nov. Fig. 1.

Typhonium johnsonianum A. Hay & S. Taylor affinis sed inflorescentia sine foliis primum crescenti, spatha inferiore tubulari ad constrictionem intus septata, organis neutris clavatis supra pistilla dispositis differt. Typus: Cult. Hort. Reg. Bot. Sydney, Accession No. 952501, Hay s.n., 16 x 1996 (fl.) (holo. NSW, spirit), originally collected from Australia, Northern Territory, Palmerston escarpment, cnr of Temple Terrace and Stuart Highway, 14 xii 1995, Hay 11048 (no voucher).

Deciduous geophyte. *Corm* pale brown, compressed subglobose, c.2.5cm diam. *Leaves* (1–)2–3 together; petiole c.5.5cm long, sheathing and subterranean in the lower 4.5cm; free portion of petiole deeply channelled, c.1mm diam., more or less appressed to soil surface; blade held more or less flat to ground, glaucous blue-green, somewhat coriaceous, (elliptic to) ovate to very broadly ovate with the base somewhat cordate, to pedatifid with 5 sessile segments, with the posteriormost pair often overlapping (but see note below), to c.4.5cm long, c.3cm wide (when simple) to c.5.5cm wide (when pedatifid); blade tip, or tip of anterior lobe, acute to obtuse and minutely apiculate, the margin crispate or not; midrib or anterior costa prominent abaxially, impressed adaxially; primary lateral veins 2–3 on each side of midrib or anterior costa, diverging at c.20–45°. *Inflorescence* appearing beside (not among) and before the leaves, foul-smelling before and after opening, by anthesis accompanied (not subtended) by the reduced blade of the last cataphyll subtending the unexpanded foliage leaves; peduncle subterranean, length depending on depth of corm in soil, c.2.5mm diam., subtended by c.2 lanceolate cataphylls, the last exceeding the soil surface by a few millimetres. *Spathe* below the limb dirty white speckled brick-red, subterranean, tubular, compressed subglobose, c.1cm long × 1.2cm wide, separated at ground surface level from the limb by a deep and abrupt constriction where also the spathe inwardly thickened into an annular septum tightly embracing the naked portion of the spadix; interior of spathe tube at the apex with a small flap representing the insertion of the inner spathe margin; spathe limb c.4cm

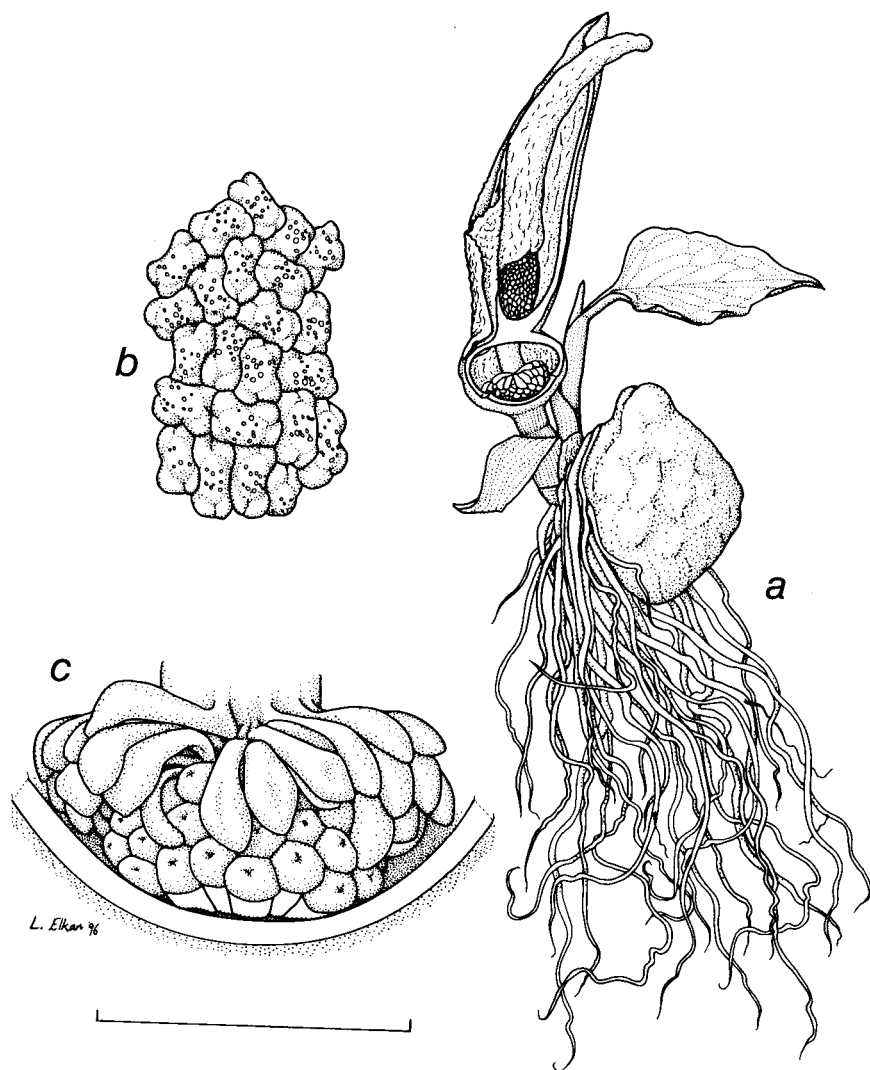


FIG. 1. *Typhonium praetermissum* (Hay s.n.): a, habit, with part of spathe removed; b, part of male zone; c, base of spadix with pistils and neuter organs. Scale bar: a, 4cm; b, 4mm; c, 6mm.

long \times 3cm wide at widest, lanceolate, canoe-shaped, distally slightly reflexed, very dark purple to black and smooth adaxially, dull grey-brown and rugose abaxially, the margins crispate, the outer margin inserted on the shoulder of the spathe tube. *Spadix* slightly exceeding the spathe, sessile; female zone c.3mm long, c.6mm wide; pistils c.1.5mm long, close-packed, pale greenish ivory, the lowermost more or less plagioscopic, the upper becoming acroscopic; stigma c.1mm across, button-like, sessile; sterile organs c.3mm long, crowded in a zone adjunct to the female zone, clavate,

down-turned, pale brick-red; male zone separated from the sterile organs by a naked deep purple interstice c.9mm long \times 3mm diam. passing through the orifice of spathe septum; male zone 9mm long \times 5mm diam., the base close up against the distal side of the spathe septum; anthers sessile, c.0.7mm wide, numerous, closely appressed, brick-red except for the slightly protruding ivory tip of the connective; appendix c.3.5cm long, sessile, obliquely inserted, basally truncate, blackish purple, rugose, narrowly conic, distally slightly reflexed and tapering to a narrow blunt point. *Infructescence* beside (not among) the leaves, the withered subtending cataphylls enclosing both the peduncle and vegetative growth; fruiting peduncle c.4mm diam.; fruits at ground level, not enclosed by lower spathe, arranged in a hemispherical cluster c.1.5cm diam., ovoid to tetrahedral, longitudinally ridged, somewhat rugose in the upper part. *Seed* solitary, more or less onion-shaped, orange-brown, orthotropic, albuminous, strophiolate, longitudinally ridged, c.3mm long.

Distribution and habitat. Known with certainty only from the source locality of the type specimen, near Darwin.

Grows in gravelly shallow lateritic soil, generally in unshaded situations in open eucalypt woodland at low altitude.

Note. In external appearance the inflorescence of *T. praetermissum* is very similar to that of *T. johnsonianum* from which it differs in the clavate neuter organs distributed only above the pistils, the tubular spathe base with a septum at the constriction and in having the inflorescence developing before the leaves. The leaves are also extremely similar to those of *T. johnsonianum*, though that species is not recorded as having pedate/pedatifid variants. At the time of collection of *T. praetermissum*, no pedatifid-leaved individuals were noted in the population. However, since then numerous individuals in the same locality have been found with pedatifid leaves. S. Taylor (pers. comm.), who originally found the plant, is of the view that the simple-leaved and pedatifid-leaved individuals are part of the same population, and hence I have included this feature in the description. However, it should be noted that as yet no pedatifid-leaved individual has been observed flowering and so ascription of this feature to *T. praetermissum* should be regarded as provisional.

The population from which the type plant was collected is under intense threat from building development. S. Taylor further notes that a simple, hastate or pedatifid-leaved population, probably of this species, exists at Karama, a suburb of Darwin, and a second pedatifid but long-petioled entity in *Typhonium* at Howard Springs Hunting Reserve near Darwin. Both are as yet incompletely known.

The specific epithet, meaning overlooked, alludes to the fact that this very cryptic species was only recently discovered, virtually on the doorstep of the Darwin Herbarium (DNA).

Other specimens seen. Australia, Northern Territory, Palmerston Escarpment, cnr Temple Tree and Palmerston Hwy, 14 xii 1995 (fr.), *Egan, Taylor & Hay* 5262 (DNA); Cult. Darwin Botanic Gardens Acc. No. 960131 (originally collected from the type locality as *Taylor* 345), 25 xi 1996 (fl.), *Tumbilis* s.n. (DNA).

2. *Typhonium mirabile* (A. Hay) A. Hay, *comb. nov.*

Syn.: *Lazarum mirabile* A. Hay in Bot. J. Linn. Soc. 109: 430 (1992) & *Telopea* 6: 566 (1996). Type: Australia, Northern Territory, Nr. Darwin, cult. Berrimah Research Farm ex Hanguana Jungle, Melville Island, 24 x 1984 (fl.), *J. Gallen* 3 (holo. DNA!, spirit).

3. *Typhonium taylori* A. Hay, *sp. nov.* Fig. 2.

Typhonium mirabile (A. Hay) A. Hay simulans sed inflorescentia tenuiore, appendice et spathae lamina longissimis, organis neutris in interstitio usque ad inflorescentiam masculam laxe dispositis divergens. Typus: Cultivated Darwin Botanic Gardens Acc. No. 960129, 25 xi 1996 (fl.), *Tumbilis* s.n. (holo. DNA; iso. NSW – both spirit material only; photo K, L), from material originally collected as *S.M. Taylor* 344 from Northern Territory, Howard River Flood Plain.

Minute deciduous geophyte. *Corm* c.1cm diam., subglobose (teste S.M. Taylor). *Leaves* c.4 together; petiole c.1cm long above ground, presumably sheathing in the underground portion; leaf blade (known from photographs only) subdeltoid to elliptic to narrowly lanceolate, entire, c.15 × 9mm to 4.5cm × 6mm. *Inflorescence* solitary, accompanied by a leaf (further leaves apparently produced later); peduncle 2mm diam., entirely subterranean. *Spathe* c.6.5cm long, lower 1.5cm tubular and subterranean, the tubular part bluntly spindle-shaped, 5mm wide at the middle, divided into two chambers by an annular septum c.2/3 of the way from the base; interior of lower chamber minutely hairy; interior of upper chamber smooth; apex of spathe

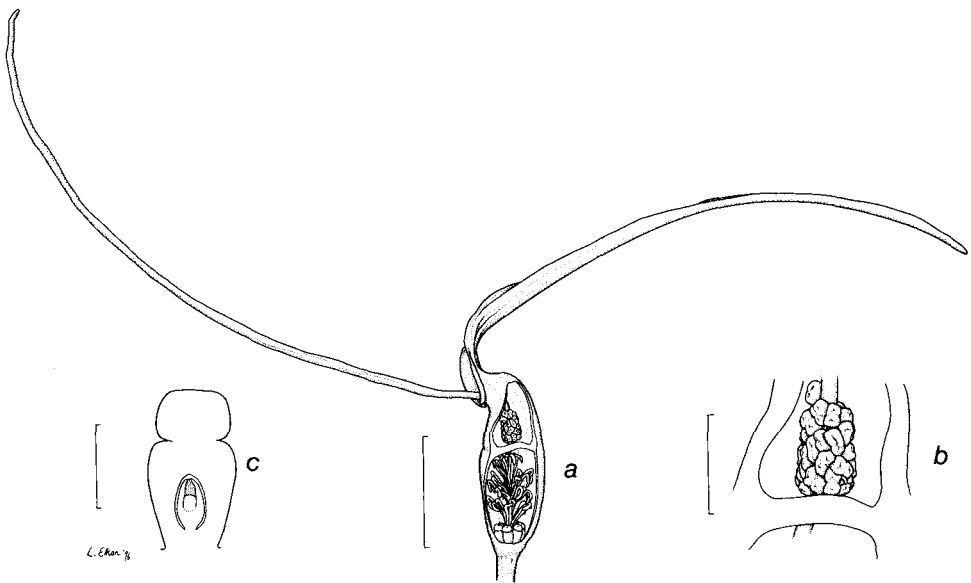


FIG. 2. *Typhonium taylori* (*Tumbilis* s.n.): a, inflorescence with part of spathe removed; b, part of male zone; c, pistil in longitudinal section. Scale bars: a, 10mm; b, 3mm; c, 1mm.

tube abruptly curved over so that opening is horizontal; spathe limb 5cm long, very narrowly lanceolate, in the lower c.3mm somewhat flared around opening of spathe tube and c.4mm wide, then strongly reflexed and tapering to c.1.5mm wide. *Spadix* sessile, 7.5cm long; female zone a single whorl of acroscopic pistils; ovary cylindric, c.1.5mm tall, c.0.7mm thick, unilocular with one basal orthotropous ovule; stigma subsessile, separated from the ovary by a very short constriction, shortly cylindric, about as thick as the ovary; sterile interstice c.7mm long, in the lower spathe chamber bearing filiform neuter organs c.4–5mm long, these suberect, in the distal 2mm fully outwardly reflexed and mostly appressed against the wall of the spathe chamber, the distal c.1mm of the interstice naked, passing through the hole in the spathe septum; male zone c.3.5mm long, the base level with the distal side of the spathe septum, c.1.5mm thick, with about 25 sessile anthers; appendix filiform, exceeding the spathe by about 1cm, c.1mm diam. at base, very gradually tapering, at base deflected more or less horizontally to project forward from spathe tube mouth. *Infructescence* unknown.

Distribution and habitat. Known only from the source locality of the type collection at Howard River Flood Plain near Darwin on west side of Howard River. Vegetatively similar sterile plants are reported from the east side of Howard River, in similar habitat, and from Whitewood Jungle on a tributary on the west side of Howard River (S.M. Taylor, pers. comm.).

Seasonally saturated sandy soil in nutrient poor grass/sedgeland with occasional *Melaleuca viridiflora*.

Note. Both this species and *T. mirabile* are each known only from a single flowering collection. Evidently the two plants are closely related. Notwithstanding, they differ significantly in dimensions, proportions and in several qualitative features which together make specific delimitation justifiable. Qualitative differentiating features include the sterile interstice bearing neuter organs throughout in *T. taylori* and clustered at the base in *T. mirabile*, the spathe limb sharply reflexed in *T. taylori* and erect in *T. mirabile*, the top of the spathe tube suberect in *T. mirabile* and sharply turned to face horizontally in *T. taylori*, the appendix projected forward from the mouth of the spathe tube in *T. taylori* and ascending in *T. mirabile*. Colours have not been directly observed by me in either species. However, it appears from photographs of *T. taylori* taken in the Darwin Botanic Garden that the spathe limb is purplish brown adaxially and greyish, speckled purple-brown abaxially and that the appendix is greenish yellow except for a white basal portion. In *T. mirabile*, notes accompanying the holotype recorded that the same parts were 'mottled grey green' and 'smokey grey, greenish towards the base' respectively (Hay, 1992). In *T. mirabile* the inflorescence develops before the leaves while in *T. taylori* the inflorescence is accompanied by one leaf, with further leaves apparently developing later (vegetative material originally collected from the wild had about four leaves per plant). Material adequate for describing the shoot architecture of the latter species is not available.

T. taylori is named for Steve Taylor who collected the plants from which the type

specimens were prepared and who has added much to knowledge of this genus in the Northern Territory.

ACKNOWLEDGEMENTS

I am indebted to Steve Taylor (DNA) for bringing the plants described here to my attention and for providing further information pertaining to them, to Lydia Tumbilis (Darwin Botanic Garden) for cultivating, photographing and preserving inflorescences from the material cited here, to Ian McLellan and nursery staff of the Royal Botanic Gardens Sydney for cultivating other material cited here, to Lesley Elkan for the botanical drawings and to Peter Boyce (K) and Drs Wilbert Hettterscheid (L) who kindly read and commented on the manuscript.

REFERENCES

- HAY, A. (1992). A new Australian genus of Araceae, with notes on generic limits and biogeography of the Areae. *Bot. J. Linn. Soc.* 109: 427–434.
- HAY, A. (1993). The genus *Typhonium* (Araceae-Araeae) in Australasia. *Blumea* 37: 345–376.
- HAY, A. & TAYLOR, S. J. (1996). A new species of *Typhonium* Schott (Araceae-Araeae) from the Northern Territory, with notes on the conservation status of two Araeae endemic to the Tiwi Islands. *Telopea* 6: 563–567.
- MURATA, J. (1990). Diversity of shoot morphology in *Typhonium* (Araceae). *Amer. J. Bot.* 77: 1475–1481.
- SRIBOONMA, D., HASEBE, M., MURAKAMI, N., MURATA, J. & IWATSUKI, K. (1993). Phylogeny of *Typhonium* (Araceae) inferred from restriction fragment analysis of chloroplast DNA. *J. Plant Res.* 106: 11–14.
- SRIBOONMA, D., MURATA, J. & IWATSUKI, K. (1994). A revision of *Typhonium* (Araceae). *J. Fac. Sci. Univ. Tokyo, Sect. III*, 15: 255–313.

Received 7 January 1997; accepted with minor revision 12 May 1997