Arum—A Decade of Change

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ABSTRACT

When published in 1993 *The Genus Arum* (Boyce, 1993) presented for the first time in 70 years, and ever in English, a tool to identify with some degree of confidence all of the 25 *Arum* species and their subordinate taxa then recognized. Inevitably since publication there have been changes in species delimitation as well as new discoveries, such that the species tally for *Arum* now stands at 28. Changes of note since 1993 include the recognition of two species treated then at subspecific rank within *A. orientale* Bieb. [*A. longispathum* Reich. & *A. sintenisii* (Engl.) P. C. Boyce] while a further species [*A. alpinariae* (K. Alpinar & R. R. Mill) P. C. Boyce], treated then as a subspecies of *A. elongatum* Steven, is formally raised to the level of species in this paper. Additional study has resolved a number of issues including application of names for the species hitherto called *A. alpinum* Schott & Kotschy and the status of subordinal taxa in *A. italicum* Miller. These are all detailed below together with sundry other observations.

While much work remains to be done on *Arum* it seems a worthwhile exercise to present an overview of these changes wrought in the past decade and to cast some pointers for work that still remains to be tackled.

KEY WORDS

Arum alpinariae, Arum alpinum, Arum apulum, Arum besserianum, Arum cylindraceum, Arum dioscoridis, Arum dioscoridis var. *cyprium, Arum dioscoridis* var. *syriacum, Arum dioscoridis* var. *philistaeum, Arum elongatum, Arum elongatum* ssp. *alpinariae, Arum hygrophilum, Arum italicum, Arum italicum* f. *majoricense, Arum italicum ssp. albispathum, Arum italicum ssp. canariense, Arum italicum* ssp. *majoricense, Arum italicum* ssp. *neglectum, Arum longispathum, Arum lucanum, Arum maculatum, Arum nigrum, Arum orientale, Arum pictum, Arum pictum* ssp. *sagittifolium, Arum rupicola, Arum sintenisii,* Croatia, Cyprus, polymorphic species, Turkey

TAXONOMIC UPDATES

Arum longispathum

Resurrection of *A. longispathum* at species rank is supported following observations made of living material from Croatia to which I did not have access before publication of *The Genus Arum*. It is now clear that *A. longispathum* is distinct from *A. orientale,* indeed from any other *Arum,* by the inflorescence carried on a long peduncle clear of the foliage in the manner of *A. rupicola* Boiss., but strongly odorous of cattle dung. Discounting the long peduncle, the general aspect of the inflorescence is that of *A. elongatum,* with which *A. longispathum* shares a penetrating smell at anthesis but differs by the spathe being pale purple with a still paler central portion and the spadix appendix dull lilac; the entire spathe and spadix of *A. elongatum* is deep purple. Sterile flowers of *A. longispathum* are filiform and not thickened as in *A. elongatum*. The information (Boyce, 1993) concerning the restricted natural range (endemic to Croatia) of *A. longispathum* remains valid.

Arum sintenisii and Cypriot *Arum*

The change of status of this Cypriot endemic was published in the *Annales of the Goulandris Museum* (1994 publ. 1995).

However, this is not a well-known journal and so it seems worth repeating here the salient points. *Arum sintenisii* differs from *A. orientale* by the long-peduncled inflorescences carried at or slightly above the level of the leaves and the spadix appendix producing a strong fruity smell at anthesis (inflorescence carried below the foliage and smelling of cattle dung/urine in *A. orientale*). In general aspect *A. sintenisii* rather closely resembles *A. hygrophilum* Boiss., especially as herbarium material, although it differs in the spathe colour and spadix odour (*A. hygrophilum* has the spathe pale green with a very narrow purple margin and a spadix that is odourless at all times). It has further become apparent that all the vouchered records of *A. hygrophilum* from Cyprus are attributable to *A. sintenisii* and that *Arum hygrophilum* appears to be absent from Cyprus.

A plant of Cypriot origin that I erroneously reported as a putative hybrid between *A. orientale* and *A. hygrophilum* on pages 179/80 of *The Genus Arum* is also referable to *A. sintenisii*.

As an outcome of these changes, three *Arum* species are currently recorded for Cyprus:

A. dioscoridis var. *cyprium* (Schott) Engl. (see note below under discussion of *A. dioscoridis* Sm.)
A. rupicola Boiss.
A. sintenisii (Engl.) P. C. Boyce

Arum besserianum

Arum besserianum Schott, treated as insufficiently known in 1993, is, based on study of plants now in cultivation, quite distinct from and indeed probably not particular closely related to *A. orientale*. The spathe is deeper coloured and the tuber globose and compressed, rather in the manner of a begonia tuber, while the sterile flowers are more densely arranged.

At least one nursery offering *A. orientale* and *A. besserianum* states that they may be separated by tuber shape, which is true, but implies that the tuber of *A. orientale* is elongated. This is not strictly so in the sense of tuber elongation in, e.g. *A. maculatum* L. and its kin, in which the tubers are rhizome-like with the tuber growing laterally through the soil. The tubers of *A. orientale* are better described as being obliquely or asymmetrically globular in such that the new tuber does not form directly over the old tuber, as is the case with *A. besserianum,* but rather slightly offset to one side so that observing tubers of several years growth a *somewhat* elongated tuber does result, but not in the manner in which such rhizome-like tubers occur in *A. maculatum,* etc, where new growth is produced laterally to the tuber axis and a long, sausage-like tuber results.

The synonymy cited for *A. besserianum* (Boyce, 1993) is still valid.

Arum alpinariae

Treated as a subspecies of *A. elongatum* (Boyce, 1993), *A. alpinariae* (K. Alpinar & R. R. Mill) P. C. Boyce is distinct from it by the much shorter and considerably less massive spadix appendix and most readily distinguished by the startling rich crimson spathe interior, quite different to the sombre purple spathe of *A. elongatum* and, indeed, unmatched by any other *Arum* species. These striking characteristics, together with the so far endemic habitat strongly support its recognition as a distinct species.

The formal publication of its new status is presented below:

Arum alpinariae (K. Alpinar & R. R. Mill) P. C. Boyce, **stat. nov.**

Basionym: *Arum elongatum* ssp. *alpinariae* K. Alpinar & R. R. Mill in Fl. Turkey & E. Aegean Is., 10: 236, 219 (1988).

Type: TURKEY: Sebsen to Bolu, Bolu Yolu, Ağu Dağı, Kesik yaylasi, among *Juniperus,* 1,600 m, 6 June 1983, *K. Alpinar* ISTE 50605 (holotype ISTE!; isotype E!; K photograph!).

Arum cylindraceum

Perhaps the most unfortunate outcome of these new studies is to note that *A. alpinum*

must now be called *A. cylindraceum* Gasp., a name treated as doubtful in 1993 but, following recollection of material from the type locality, shown to be unequivocally identical with the later *A. alpinum*.

Additionally, new collections of herbarium and living specimens of *A. lucanum* Cavara & Grande have demonstrated without a shadow of doubt that it too is referable to the prioritised *A. cylindraceum*.

Given that *A. alpinum* has been so-long obfuscated by *A. maculatum* and further burdened by a plethora of trivial taxonomic epithets, I feel it worthwhile presenting the new name for this species with its complete synonymy but without the long type and publication citations, for which see Boyce (1993).

Arum cylindraceum Gasp. *A. maculatum* var. *cylindraceum* (Gasp.) Engl. *A. alpinum* Schott & Kotschy. *A. maculatum* var. *alpinum* (Schott & Kotschy) Engl. *A. maculatum* ssp. *alpinum* (Schott & Kotschy) Richter. *A. maculatum* var. *angustatum* subvar. *alpinum* (Schott & Kotschy) Engl. *A. orientale* ssp. *alpinum* (Schott & Kotschy) H.Riedl.

A. alpinum var. *pannonicum* Terpó,

A. alpinum var. *pannonicum* fm *javorkae* Terpó.

A. danicum (Prime) O.N. Dubovik *A. gracile* Unverr. *A. maculatum* var. *angustatum* subvar. *gracile* (Unverr.) Engl. *A. alpinum* ssp. *gracile* (Unverr.) Terpó

A. intermedium Schur ex Schott. *A. alpinum* var. *intermedium* (Schur ex Schott) Terpó

A. italicum var. *lanceolatum* Boiss. & Heldr. ex Engl.

A. lucanum Cavara & Grande. *A. orientale* ssp. *lucanum* (Cavara & Grande) Prime

A. majoricum ssp. *lucanum* ('Bonafé') A. M. Romo

A. maculatum var. *angustatum* Engl. *A. maculatum* ssp. *angustatum* (Engl.) Richter

A. maculatum var. *attenuatum* Engl.

A. maculatum ssp. *danicum* Prime. *A. alpinum* ssp. *danicum* (Prime) Terpó. *A. orientale* ssp. *danicum* (Prime) Prime

A. transsilvanicum Cztez

Arum pictum

Arum pictum L. f. is a distinctive autumn flowering species occurring in the Balearic islands, Corsica, Sardinia and mainland western Italy. Although unquestionably all belonging to one species, the populations in the Balearics tend to have rounded leaves with rather weakly defined rounded basal lobes whereas populations from Corsica, Sardinia and mainland Italy have leaves almost triangular in outline with quite well formed basal lobes. Given this, the publication of a purportedly Majorcan endemic, *Arum pictum* ssp. *sagittifolium* J. A. Rosselló & L. Sáez (*Acta Bot. Barcin.*, 44: 170 (1997)) is intriguing in that the specimen that forms the type has leaves with much more the appearance of *A. pictum* from the easterly part of its range.

A New Approach with Polymorphic Species

I was inconsistent with my treatment of polymorphic species such that while I treated some, such as *A. maculatum* as a single highly variable entity, others, e.g. *A. italicum* and *A. dioscoridis* I attempted to split into discrete subordinate taxa. The unfortunate result of this latter course of action was to leave behind a mass of plants unplaceable within any taxon without resorting to finer and finer degrees of differentiation. These ultra-narrowly defined taxa, while arguably useful to the horticulturist, are of little taxonomic value and I have come to the conclusion that these highly variable species are best treated as single entities, as in the manner with which I dealt with *A. maculatum* and that *A. italicum* should be treated as a highly variable species.

Arum italicum

Since publication of *The Genus Arum* (Boyce, 1993) I have examined in habitat a

great number of plants of two of the three western European subspecies of *A. italicum, viz.* ssp. *italicum* and ssp. *neglectum* (F. Towns.) Prime, with the result that I have come to the conclusion that the two are not after all separable and fall under the one name, *A. italicum* ssp. *italicum*. Despite this, I note with some distress that further subdivisional tinkering with this remarkably variable species continues apace (e.g. *A. italicum* f. *majoricense* (L. Chodat) M. Mus, J. J. Pericás & J. A. Rosselló & *A. italicum* ssp. *majoricense* (L. Chodat) O. de Bolòs, R. M. Masalles & J. Vigo.

The most easily observable character I used to distinguish between ssp. *italicum* and ssp. *neglectum* was that of leaf shape, in particular the relationship between the basal and middle lobes of the leaf particularly for the first flush of leaves to emerge at the onset of growth. In 'typical' ssp. *italicum* the basal lobes are long and narrow and diverge sharply giving rise to the familiar leaf shape of the forms of *A. italicum* most often favoured in gardens whereas the leaves of 'typical' ssp. *neglectum* have shorter, broader lobes that partially overlap and diverge only slightly or not at all. Observation of large populations of *A. italicum sensu lato* in western France and southern Spain has showed that these leaf forms are simply elements within a considerable pool of variation and that where there are enough plants over a large enough area intermediates in leaf shape are abundant.

Another character I utilized in separating the subspecies, albeit primarily with regard to cultivated plants, is that of leaf markings. In gardens typical ssp. *italicum* is probably best recognized and certainly most favoured by gardeners in the form with strikingly silver-grey main and secondary veins. As pointed out in *The Genus Arum,* this leaf marking form is by no means the norm in wild populations, where unmarked or only scantily silver-veined leaves are far more abundant while forms with plain green or variegated leaves with purple-black spotting are also common as are plants with leaves discretely spotted silver-grey. Nonetheless, I did state that ssp. *neglectum* never displayed such variegation and used this as one of the potentially useful characters to aid identification. This is erroneous. Plants with typical ssp. *neglectum* leaf shape displaying silver-grey veining are not at all uncommon. Interestingly some nursery catalogues state that ssp. *neglectum* differs from ssp. *italicum* in having the leaf variegation not associated with the veins. This is not so. A large wild population of *A. italicum* will display a bewildering range of leaf markings associated with the ssp. *neglectum* leaf shape, with leaf markings ranging from silver-grey vein-associated variegation to clouded variegation not associated with veining while the ssp. *italicum* leaf shape also frequently displays non-venation-associated variegation.

The floral characters I used, mainly dealing with the relative abundance of the sterile flowers above and below the zone of fertile stamens are also part of a variation cline and in the intervening years it has come forcibly to my attention that the abundance of these sterile flowers in directly linked to plant vigour in this and all other *Arum* and is not to be seen as a reliable character upon which significant taxonomic decisions are made when distinguishing between elements *within* the same species. However, the form and arrangement of these sterile structures remains a powerful tool for separating *between* different species.

The feature of inflorescence colours in ssp. *neglectum* being more sombre than in ssp. *italicum* is stable only for the U.K. populations where the dull ochre or purplish ochre spadix appendix and purple-flushed spathe limb are diagnostic. On continental Europe the colours are variable, with the sombre colours 'typical' of ssp. *neglectum* not infrequently occurring in inflorescences of typical ssp. *italicum* and *vice versa*. In particular, the purple staining on the inside of the convolute part of lower spathe seems to be much more inconsistent than I once thought. Evidence I had to hand when working on *A. italicum* for the book supported that the lower spathe of 'typical' ssp. *italicum* seldom if

ever displayed such purple staining whereas that of 'typical' ssp. *neglectum* invariably has staining to a degree and frequently quite markedly so. Now that I have had the opportunity to examine spathes from hundreds of different individuals over a wide range of habitat it is apparent that the spathe staining is unreliable in defining taxa *within* a species, although again it remains a useful tool at the species to species level with, e.g. *A. nigrum* Schott, *A. apulum* (Carano) P. C. Boyce and *A. orientale,* etc., readily separable using this character.

I cited a geographical basis for the separation, with ssp. *neglectum* accounting for the northerly part of the range of *A. italicum* and ssp. *italicum* the southerly part. Curiously this is still a reasonably accurate statement, although the remarkably unvarying nature of ssp. *neglectum* north of the Loire Valley is odd given the chaotic introgression south of the Loire Valley. One explanation might be that the southern range of ssp. *neglectum* is blurred by massive hybridization with ssp. *italicum*. If that were so, then one would expect ssp. *italicum* in its strict sense to become the dominant plant further south where it is far removed from the supposed northerly subspecies. This is not the case; the range of variation remains the same as far south as the Costas (coastal towns associated with bathing beaches) of Spain and into North Africa. Given the unvarying appearance of plants from the northerly populations it seems likely that at least the wild UK populations of ssp. *neglectum* are for the greater part clonal or closely inbred such that variation is minimal; sites at Arundel in West Sussex and on the Isles of Scilly (where *A. maculatum* is absent) are typical of such possible near-clonal populations. Although this needs to be investigated using molecular techniques if it is to be regarded as more than just supposition the conformity of these northerly populations is striking.

In conclusion for the moment *A. italicum* ssp. *italicum* will remain as the name for the western continental European and UK plants because as yet I have still to amass enough information to deal with *A. italicum* ssp. *canariense* (Webb. & Berth.) P. C. Boyce in a similar critical manner; there is also the problem of what to do with *A. italicum* ssp. *albispathum* (Steven ex Ledeb.) Prime, which I admit to knowing only through cultivated specimens, never having seen it in habitat. I *suspect* the most logical step will be resurrecting it as a species, but, for moment, I'm maintaining the unsatisfactory status quo.

Arum dioscoridis

Retaining or dispensing with taxonomic subordinates within *A. dioscoridis* is more complex than with *A. italicum* not least due to the importance that the spathe markings have in deciding which individuals are horticulturally desirable; thus the morphological markers that are provided by the recognition of formal taxonomic entities are horticulturally important.

The problem, however, is that the formal varietal taxa I recognized in 1993—var. *dioscoridis,* var. *cyprium* (Schott) Engl., var. *syriacum* (Blume) Engl. and var. *philistaeum* (Kotschy & Schott) Boiss., are still far from universally applied in horticultural circles. The greatest confusion is associated with var. *dioscoridis,* a variety quite clear-cut in habitat by the confluent purple-black spotting overlaid with varying degrees of purple staining and the upper part of the spathe, usually, but certainly not invariably bereft of any purple spots or stains. Such forms without any upper spathe markings are not infrequently sold under the varietal epithet *luschanii* R.R. Mill despite the fact that such plants ***absolutely match*** the illustration that forms the type of *A. dioscoridis* and is thus ***also the type of the typical variety,*** var. *dioscoridis*. The forms of var. *dioscoridis* in which the upper limb is variously purple stained have no formal epithet; if all the varieties I recognized in 1993 are to be meaningful and retained in horticultural usage then an epithet for these plants is required!

You may gather from the last sentence that I am in favour of merging at least

some of the varieties I formerly recognized. The introgression between var. *cyprium* (typically pale green spathe with discrete large purple spots and no staining) in one direction into var. *dioscoridis* (confluent spots and staining) and into var. *syriacum* (small, scattered spots, no staining, sometimes entirely pale green) is so complete that, at least in botanical terms these varieties have no real value.

The one exception to this merging of minor taxa might be var. *philistaeum,* described from Gaza, a plant still very poorly understood and, despite at least one nursery offering plants under this name, not presently in cultivation. The possibility that this plant may turn out to be a hybrid between *A. palaestinum* Boiss and *A. dioscoridis* should not be discounted.

CONCLUSIONS

The species list with distributions now comprises:

1. *Arum maculatum* L. Throughout northwest and central Europe as far north as northern Germany and as far south as the eastern Balkans.
2. *Arum byzantinum* Blume. Eastern central Balkans, extreme western Turkey.
3. *Arum italicum* Miller. Throughout Europe as far north as the southernmost UK and as far south as western North Africa, east to the western Balkans (typical subspecies). Two additional subspecies are still recognized: ssp. *canariensis* (Webb. & Berth.) P. C. Boyce (Canary Isles); ssp. *albispathum* (Steven ex Ledeb.) Prime (northeast Turkey, southwestern Commonwealth of Independent States (former USSR).
4. *Arum concinnatum* Schott. Southernmost Greek mainland, southeast Aegean islands, southwest Turkey.
5. *Arum cylindraceum* Gasp. Throughout Europe and west Asia, from Denmark to northeast Turkey and as far south as Sicily.
6. *Arum orientale* Bieb. Central & eastern Europe, northeastern Turkey, southwestern CIS, northwestern Iran.
7. *Arum besserianum* Schott. Northeastern eastern Europe into southwestern CIS.
8. *Arum longispathum* Reich. Croatia.
9. *Arum sintenisii* (Engl.) P. C. Boyce. Cyprus.
10. *Arum gratum* Schott. Northeast Turkey.
11. *Arum apulum* (Carano) P. C. Boyce. Central Italy.
12. *Arum nigrum* Schott. Western Balkans.
13. *Arum cyrenaicum* Hruby. Libya, Crete.
14. *Arum purpureospathum* P. C. Boyce. Crete.
15. *Arum balansanum* R. R. Mill. Central west Turkey.
16. *Arum hainesii* Agnew & Hadač ex H. Riedl. Northeast Iraq.
17. *Arum elongatum* Steven. Northeastern Turkey, southwestern CIS.
18. *Arum alpinariae* (K. Alpinar & R. R. Mill) P. C. Boyce. Central west Turkey.
19. *Arum rupicola* Boiss. East Aegean islands, Turkey, western Middle East.
20. *Arum jacquemontii* Blume. Southern Central Asia, Nepal, as far east as far western China.
21. *Arum korolkowii* Regel. Northern Asian CIS.
22. *Arum euxinum* R.R. Mill. Northeast Turkey.
23. *Arum hygrophilum* Boiss. Western Middle East, northeast Morocco.
24. *Arum dioscoridis* Sm. Southern Turkey, eastern-most Mediterranean islands, western Middle East.
25. *Arum palaestinum* Boiss. Western Middle East
26. *Arum idaeum* Coust. & Gandoger. Crete.
27. *Arum creticum* Boiss. & Heldr. Southeast Aegean islands, southwest Turkey.
28. *Arum pictum* L. f. Corsica, Sardinia, western central Italy.

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