FRIENDS OF THE GOULANDRIS MUSEUM

Many of the world's finest museums, particularly in the United States have the good fortune to be encouraged and helped in their endeavours by an outside association of public-spirited individuals supporting them with gifts of money, books, works of art, and services as guide lecturers and voluntary assistants and on occasion with well-informed advice and criticism. These associations are usually known as "Friends of the Museum". They bring together people who might otherwise be unaware of their common interests and they provide occasions for hearing lectures by experts. The Board of the Museum is accordingly grateful for the formation of the "Friends of the Goulandris Natural History Museum" in 1978 under the chairmanship of Mrs. Frosso Pilavaki. The "Friends" now number more than 1.000 members.

ACTIVITIES OF THE GEOLOGICAL DEPARTMENT

On the occasion of the Museum's 25 years of existence, this Department had organized two exhibitions.

The first exhibition was made in the end of 1989 and concerned the Dinosaurs. The British Museum (Natural History) loaned an Iguanodon skeleton; the second exhibition lasted from the end of 1989 to June 1990 and concerned the presence of Elephants in Greece and in particular the Dwarf Elephants of Tilos Island. While the first exhibition was made with the cooperation of the British Museum, the second had been organized by our Museum in cooperation with the Paleontological Museum of Athens University and the Vienna Museum of Natural History. The exhibition aimed to promote concern and public awareness about the extinction risk modern Elephants are facing due to poaching.

The Geological Department has recently received the donation of two geological libraries, one belonging to the geologist Mr. M. Nicolaou and the other to the late Professor of the National Faculty of Polytechnics, S. Katrakis. It also participates to the projects of the Museum, like the Project for Management and Protection of the Pindos mountain complex and the STRIDE Multimedia Project.

The genus Arum (Araceae) in Greece and Cyprus

PETER BOYCE

Abstract

Boyce, P. 1994. The genus *Arum (Araceae)* in Greece and Cyprus. *Ann. Musei Goulandris* 9: 27-38.

A synopsis of the 14 species of *Arum* known from Greece and Cyprus, with keys to all relevant infrageneric taxa. *A. purpureospathum* and *A. idaeum* are endemic to Crete. *A. cyrenaicum*, formerly considered endemic to Libya, also occurs on Crete.

Περίληψη

Boyce, P. 1994. Το γένος Arum (Araceae) στην Ελλάδα και στην Κύπρο. Ann. Musei Goulandris 9: 27-38.

Παρουσιάζεται μια συνοπτική αναφορά των 14 ειδών του γένους Arum, τα οποία έχουν καταγραφεί από την Ελλάδα και την Kύπρο και δίδονται κλείδες για την αναγνώριση των σχετικών taxa. Τα είδη A. purpureospathum και A. idaeum είναι ενδημικά της Kρήτης. Το είδος A. cyrenaicum, το οποίο μέχρι πρόσφατα είχε θεωρηθεί ενδημικό της Λ ιβύης, συναντάται επίσης και στην Kρήτη.

The generic name *Arum*, established in modern botany by Linnaeus in 1753 and 1754, with *A. maculatum* as lectotype, had its origin in Ancient Greece, the vernacular name Agov (aron) being used both by Theophrastus (c. 370 - 288 B.C.) and Dioscorides (1st century A.D.) for a species of *Arum*. Theophrastus, who lived most of his life in Attica, must have been well acquainted with *A. italicum*. Dioscorides, born in Asia Minor but evidently much travelled as an army doctor, may have known other species; the name *A. dioscoridis* commemorates him. An illustration in the Dioscoridean *Codex Vindobonensis* 98 recto (512 A.D.) is the earliest recognizable one of an *Arum* species and portrays *A. dioscoridis* with a

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purple spathe.

The genus *Arum* consists of 26 species of tuberous herbs occurring from the Azores to western China and from Sweden to Morocco (Boyce, 1989, 1993). Since the publication of a monograph of *Arum* (Boyce, 1993) a further two species, as yet underscribed, have been discovered in Turkey. The present publication raises *A. orientale* Bieb. subsp. *sintenisii* (Engler) P.C. Boyce to specific rank as *A. sintenisii*.

So far 14 species of Arum have been recorded from Greece and Cyprus, representing almost all of the infrageneric divisions proposed by Boyce (1989). Over half of the species are recorded from the Greek islands and Cyprus; six species are known to occur on the mainland.

All *Arum* species in Greece and Cyprus belong to subgen. *Arum* (see Boyce, 1989, 1993). The other subgenus, *Gymnomesium* (Schott) Engl. (Engler, 1879), is restricted to the Mediterranean west of Italy.

KEY TO THE SECTIONS AND SUBSECTIONS

1. Stem consisting of a horizontal rhizomatous tuber with lateral adventitious shoots forming offsets which later become independent; established plants forming extensive spreading colonies.....i. sect. Arum - Stem consisting of a vertically or horizontally orientated discoid tuber with peripheral adventitious shoots which sometimes form independent plants: established plants forming congested, compact colonies Spadix-appendix not so......4 3. Peduncle longer than the petioles; inflorescence \pm odourless; both staminodes and pistillodes with long, filiform, semirigid bristlesa. sūbsect, **Alpina** - Peduncle shorter than the petioles; inflorescence with foetid odour; pistillodes and staminodes with subulate to long, slender-filiform, flexuous bristles. b. subsect. Dioschroochiton Staminodes and pistillodes absent or poorly developed f. subsect. Cretica 5. Spadix-appendix short-stipitate, more than 5 mm in diameter, spathe-tube interior white or stained purple in the upper portion, very rarely entirely purple......6 - Spadix-appendix not stipitate, less than 4 mm in diameter,

spathe-tube interior wholly purple

d. subsect. **Hygrophila**6. Peduncle + equal to or exceeding the petioles: bristles of

6. Peduncle ± equal to or exceeding the petioles; bristles of staminodes and pistillodes filiform, flexuous; inflorescence odourless................................c. subsect. **Tenuifila**

Peduncle shorter than the petioles, occasionally ± absent;
 bristles of staminodes and pistillodes subulate, stiff;
 inflorescence with strong foetid odour.

e. subsect. Poeciloporphyrochiton

KEY TO SPECIES

Plants occuring as dense extensive colonies
Plants occuring as scattered individuals or small, discrete colonies3
2. Spadix-appendix \pm slender-clavate, 1/4-1/2 as long as spathe-limb
1. A. italicum
 Spadix-appendix massively to stoutly clavate-cylindric, subequal to more than 1/2 as long as spathe-limb
2. A. concinnatum
3.(1) Pistillodes and staminodes present4
 — Pistillodes and staminodes usually absent
4. Spathe-limb blotched and spotted with purple on inner surface;
inflorescence strongly foetid
 Spathe-limb not marked on inner surface; inflorescence foetid or not
5. Staminodes and pistillodes filiform; spathe-limb interior deep
purple
— Staminodes and pistillodes filiform; spathe-limb interior as
above or differently coloured6
6. Spathe-tube distinctly bicoloured on inner surface, purple
above, pale green to white below7
Spathe-tube not so9
7. Spadix-appendix stout-cylindric, subequal to spathe-
limb
9. A. elongatum
 Spadix-appendix slender-cylindric to cylindric-clavate,
up to 3/4 as long as spathe-limb8
8. Spathe-limb dark purple on inner surface, often
warm purple on milet duringer, Offer

paler towards the middle	•
9. (6) Inflorescence borne beneath leaves	
4. A. orientale subsp. orientale	
 Inflorescence borne at leaf level, sweet-smelling 	5
5. A. sintenisii	
10. Spathe-tube white or greenish white inside	,
sometimes flushed with pale purple above	,
and along the margin11	
— Spathe-tube deep purple inside12	
11. Spadix-appendix generally slender long-	
stipitate; cylindric to clavate	
3. A. alpinum	
 Spadix-appendix massive conic- 	-
cylindric, short-stipitate or stalkless	
10. A. rupicola	
12. Spathe-limb deep purple inside	
8. A. purpureospathum	
 Spathe-limb pale green with a 1-1.5 	
mm wide purple border	
11. A. hygrophilum	
13. (1) Spathe white, limb erect and	ĺ
cucullate at maturity; spadix-	
appendix deep purple	
13. A. idaeum	
 Spathe cream to yellow, limb 	
reflexing at maturity; spadix-	
appendix mid-yellow to dark	
yellow14. A. creticum	

ENUMERATION OF SPECIES

- i. Sect. **ARUM**. Stem a horizontal rhizomatous tuber with lateral adventitious shoots forming offsets which later become independent; established plants forming extensive spreading colonies.
- 1. **Arum italicum** *Miller*, Gard. Dict. 8th ed., art. Arum, no. 2 (1768); Schott, Syn. Aroid. 10 (1856) & Prodr. Syst. Aroid. 82 (1860); Engler in A. & C. DC. Monog.

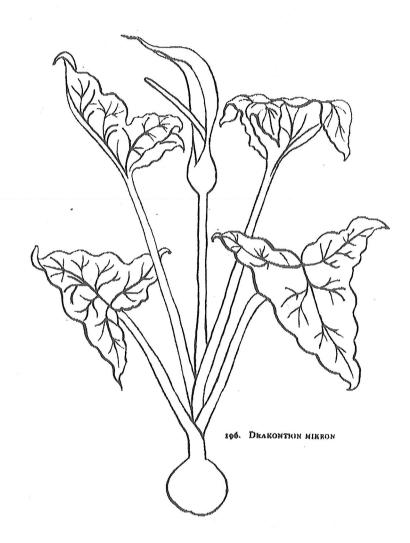


Fig. 1 *Arum dioscoridis* Fraas. Outline drawing based on *Codex Vindobonensis* (from R.T. Gunther, *The Greek Herbal of Dioscorides* 207; 1934). Original has dark purple spathe.

Phanerog. 2: 591 (1879); Hruby in Bull. Soc. Bot. Genève 4: 128 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 82 (1920); Mayo & Meikle in Meikle, Fl. Cyprus. 2: 1667 (1985); P. C. Boyce, The Genus *Arum*, 69 (1993).

Distribution: Greece: Mainland: Macedonia (Makedhonia) Peloponnese (Peloponnisos), Thessaly (Thessalia), Thasos, Thrace (Thraki). Islands: Corfu (Kerkira), Cyprus (Kypros): Troodos.

Of the four subspecies recognized for *A. italicum* in the recent revision (Boyce, 1993), only the typical subspecies is represented in Greece and Cyprus. The striking silver-grey venation usually associated with *A. italicum* subsp. *italicum* is rarely encountered in eastern Mediterranean populations.

Confusion between *A. italicum* and *A. concinnatum* Schott is possible, although the latter is readily distinguished by its more massive spadix-appendix.

2. **Arum concinnatum** *Schott*, Icones Aroid., t. 39 & 40 (1859) & Prodr. Syst. Aroid., 84 (1860); Turland, Chilton & Press, Flora of the Cretan area, 158, map. 1366 (1993); P.C. Boyce, The Genus *Arum* 79 (1993).

Distribution: Greece: Mainland: southern Peloponnese (Peloponnisos). Islands: Chios (Khios), Crete (Kriti), Karpathos, Cos (Kos), Lesbos (Lesvos), Naxos, Rhodos (Rhodes), Samos, Simi, Cyprus (Kypros): Lapithos.

Note. Almost certainly on all of the eastern Aegean islands south of Lesvos.

Arum concinnatum has been much confused with A. byzantinum Blume (Blume, 1836), a species restricted to northwestern Turkey. Recent guide books (e.g. Polunin, 1980) have misnamed A. concinnatum as A. byzantinum. Arum byzantinum is a much smaller plant, with darker coloured spathes, a shorter, thinner spadix-appendix and narrower laeves lacking the cloudy, silver-grey markings typical of A. concinnatum.

Arum concinnatum is variable in spathe-limb coloration. On Crete forms ranging from very pale greenish white to plum-purple occur as mixed populations. Some of the forms have been recognized as distinct species (e.g. A. wettsteinii Hruby (1912)). In southwestern Crete A. concinnatum hybridizes with A. cyrenaicum producing plants intermediate between the parents.

- ii. Sect. **DIOSCORIDEA** (*Engler*) *P.C. Boyce*. Stem a vertically or horizontally orientated discoid tuber with peripheral adventitious shoots which sometimes form independent plants; established plants forming congested, compact colonies.
- a. Subsect. **ALPINA** *P.C. Boyce.* Spadix-appendix clavate, long-stipitate. Peduncle longer than petiole. Bristles of staminodes long, filiform, semi-rigid. Inflorescence \pm odourless.
- 3. Arum alpinum Schott & Kotschy in Bot. Zeitung. 9: 285 (1851); Schott, Syn.

Aroid., 12 (1856) & Prodr. Syst. Aroid., 91 (1860); Turland, Chilton & Press, Flora of the Cretan area, 158, map 1365 (1993); P.C. Boyce, The Genus *Arum*, 85 (1993). Distribution: Greece: Mainland: Attica (Attiki), Ipiros, Macedonia (Makedhonia), Sterea Ellas. Islands: Crete (Kriti).

Long confused with *A. maculatum* L. (Linnaeus, 1753), *A. alpinum* is characterized by carrying its generally odourless inflorescence borne above the leaves. *Arum maculatum* has yet to be recorded from Greece or Cyprus; records from Crete are referable to *A. alpinum* or *A. idaeum* (see Greuter, 1984).

Arum alpinum is widespread, occuring from Portugal to southern Sweden and then east to northwestern Turkey. Given this extensive range the species is remarkably uniform in appearance. Isolated populations show some variation (e. g. spadix-appendix shape and inflorescence size) but the species is always easily recognizable.

b. Subsect. **DISCHROOCHITON** *Schott*. Spadix-appendix long-stipitate, usually stout. Peduncle shorter than the petiole. Pistillodes and staminodes very well developed, with long, filiform, flexuous bristles; Inflorescence smelling foetid.

Arum orientale *Bieb.*, Fl. Taur. - Cauc. 2: 407 (1808); Schott, Syn. Aroid., 15 (1856) & Prodr. Syst. Aroid., 88 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 586 (1879); Hruby in Bull. Soc. Bot. Genève 4: 140 (1912); Engler in Engler, Das Pflanzenr. 73 (IV. 23F): 78 (1920); Mayo & Meikle in Meikle, Fl. Cyprus 2 1667 (1985); P.C. Boyce, The Genus *Arum*, 90 (1993).

Distribution: Greece: Mainland: Macedonia (Makedhonia).

Boyce (1993) recognized three subspecies for *A. orientale*. In Greece it is represented by the typical subspecies, which is widespread in eastern central Europe and the Balkans, extending through northern Turkey into the Caucasus and Crimea. Subsp. *longispathum* (Reichb.) Engler (Engler, 1920) is restricted to Montenegro while subsp. *sintenisii*, endemic to Cyprus, is raised to specific rank level elsewhere in this paper.

There are few collections of *A. orientale* known from Greece, all collected from the northern mainland.

5. Arum sintenisii (Engler) P.C. Boyce, stat. nov. A. orientale Bieb. subsp. elongatum (Steven) Engler var. sintenisii Engler, Das Pflanzenr. 73 (IV. 23F): 80 (1920). Type: Cyprus (Kypros), auf Triften bei Kythraea (Kythrea), 6 May 1880, Sintenis & Rigo 130 (holotype K!). A. orientale Bieb. subsp. sintenisii (Engler) P.C. Boyce, The Genus Arum: 96 (1993).

Distribution: Cyprus (Kypros): Kythrea.

Boyce (1993) regarded this taxon as a subspecies of *A. orientale*. Since then, study of further material and access to living plants have convinced me that it is a distinct

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species. Arum sintenisii has a different mode of inflorescence presentation and a sweet, not foetid odour when in flower. Arum sintenisii is restricted to the vicinity of Kythrea in Cyprus where is occurs as extensive stands.

6. Arum nigrum Schott in Oesterr. Bot. Wochenbl. 27 (7): 213 (1857) & Icones Aroid., t. 37, 38 (1859). & Prodr. Syst. Aroid., 81 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 586-7 (1879); Hruby in Bull. Soc. Bot. Genève 4: 137 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 74-5 (1920); P.C. Boyce. The Genus Arum 106, (1993).

Distribution: Greece: Mainland: Attica (Attiki) (doubtful), Evvoia (doubtful), south Macedonia (Makedhonia), Islands: Jura, Skiros.

Long thought to be restricted to Montenegro, A. nigrum is now known to be present but rare in Greece. The deep purple spathe-limb and black-purple to pewtercoloured spadix-appendix, combined with an exceptionally strong dung-like odour. make it easily recognizable. Unlocalized records of A. nigrum from southern mainland Greece reported by Halàcsy (1904) have yet to be confirmed. Reports of A. nigrum on Samothraki (Akerovd & Preston, 1987) are referable to A. elongatum subsp. elongatum.

7. Arum cyrenaicum Hruby in Bull. Soc. Bot. Genève 4: 159 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 81 (1920); El Gadi in Fl. Libya, 41: 236 (1977): Turland, Chilton & Press, Flora of the Cretan area, 159, map 1368 (1993); P.C. Boyce, The Genus Arum, 110 (1993).

Distribution: Greece: Islands: southwestern Crete (Kriti).

One of the most recent additions to the Greek flora, A. cyrenaicum was long thought to be endemic to Libya, occurring between Tripoli and Benghazi. It has recently been discovered on Crete, but so far only three small populations have been found, each consisting of a few individuals. It is interesting to note that at one of the sites hybrids between A. cyrenaicum and A. concinnatum have been found.

8. Arum purpureospathum P.C. Boyce in Aroideana 10: 8 (1987); Turland in Bull. Alpine Gard. Soc. 57: 112-117 (1989); Turland, Chilton & Press, Flora of the Cretan area, 159, map 1370 (1993); P.C. Boyce, The Genus Arum, 113 (1993). Distribution: Greece: Islands: southwestern Crete (Kriti).

Arum purpureospathum is one of the two Arum species endemic to Crete. It is restricted to a few sites in southwest of the island. The large, glistening, deep purple spathes are distinctive. Arum purpureospathum is protected by law in Greece.

9. Arum elongatum Steven in Bull. Bot. Soc. Mosc. 32,2: 67 (1857); Schott, Prodr. Syst. Aroid., 100 (1860); Hruby in Bull. Soc. Bot. Genève 4: 140 (1912); P.C. Boyce, The Genus Arum, 123 (1993).

Distribution: Greece: Mainland: Macedonia (Makedhonia). Islands: Samothraki. Arum elongatum occurs as the typical subspecies in northern Greece. Boyce (1993) maintained a second subspecies, subsp. alpinariae Mill & Alpinar (Mill & Alpinar, 1988), from Turkey. Arum elongatum is rare in Greece, represented by only a few collections. It is a striking species with relatively large, deep purple spathes, a long, rather stout spadix-appendix producing a powerful odour of horse dung. Records of A. nigrum on Samothraki (Akeroyd & Preston, 1987) are referable to A. elongatum subsp. elongatum.

- c. Subsection **TENUIFILA** (Engler) P.C. Boyce (1989). Peduncle longer than petiole. Spadix-appendix shortly stipitate or sessile, slender to stout, occasionally massive. Staminodes and pistillodes moderately well-developed, bristles filiform. rather short. Inflorescence odourless.
- 10. Arum rupicola Boiss., Diagn. 1,13: 7 (1853); Schott, Syn. Aroid. 14 (1856) & Prodr. Syst. Aroid., 96 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 588 (1879); P.C. Boyce, The Genus Arum, 129 (1993).

Distribution: Greece: Islands: Lesbos (Lesvos). Cyprus (Kypros): Troodos. Tripylos.

Arum rupicola is essentially an Asian species, occurring only on Cyprus and the island of Lesbos. Two varieties are recognized by Boyce (1993). The Greek and Cypriot plant, with a purple to dull brown spathe-limb and similarly coloured spadixappendix, corresponds to the typical variety. Var. virescens (Stapf) P.C. Boyce (Boyce, 1993), has a greenish white spathe, pale lilac to grey spadix-appendix and is exclusively Asian.

- d. Subsect. HYGROPHILA P.C. Boyce. Peduncle equal to or longer than the petiole. Spadix-appendix sessile, less than 4 mm diam. Staminodes and pistillodes with long, filiform, flexuous bristles. Spathe-tube interior wholly purple. Inflorescence odourless.
- 11. **Arum hygrophilum** *Boiss.*, Diagn. 1,13: 8 (1853); Schott, Syn. Aroid., 13 (1856) & Prodr. Syst. Aroid., 98 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 589 (1879); Hruby in Bull. Soc. Bot. Genève 4: 157 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 77 (1920); Mayo & Meikle in Meikle, Fl. Cyprus, 2: 1665 (1985); P.C. Boyce, The Genus Arum, 147 (1993).

Distribution: Cyprus (Kypros): Kythrea, Kazaphani, Tala.

A distinctive plant with pale green spathes having a striking purple band along the margin of the spathe limb, A. hygrophilum has a disjunct distribution. First described from the Syrian - Lebanese border, the species also occurs on Cyprus and in northern

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Morocco.

e. Subsect. **POECILOPORPHYROCHITON** *Schott.* Peduncle much shorter than the petiole, sometimes apparently absent. Spadix-appendix shortly stipitate, cylindric to fusiform-cylindric or rather slender-cylindric, moderately stout. Staminodes and pistillodes well developed, bristles subulate, stiff, short to long. Inflorescence with foetid odour.

12. **Arum dioscoridis** *Smith* in Sibthorp & Smith, Fl. Graec. Prodr. 2: 245 (1816); Schott, Syn. Aroid., 9 (1856) & Prodr. Syst. Aroid., 78 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 583 (1879); Hruby in Bull. Bot. Soc. Genève 4: 153 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 72 (1920), Mayo & Meikle in Meikle, Fl. Cyprus, 2: 1665 (1985); Boyce, The Genus *Arum*, 151 (1993).

Distribution: Greece: Islands: Chios (Khios), Rhodes (Rhodos). Cyprus (Kypros): Cap Greco, Kyrenioa, Kythrea, Limassol, Nicosia, Sotia.

Four varieties of *A. dioscoridis* are recognized by Boyce (1993). Of these var. *dioscoridis* and var. *cyprium* (Schott) Engl. (Engler, 1920) are present on Rhodes, Chios and Cyprus. The varieties are distinguished by coloration of the interior of the spathe limb. Var. *dioscoridis* has spathes with large deep purple confluent blotches and spots overlaid with slightly paler purple staining to within a few centimetres of the spathe tip. Var. *cyprium* has pale green spathes with smaller, more-or-less discrete blotches and lacking any purple staining. When flowering both varieties usually produce a powerful smell of pig-dung.

f. Subsect. **CRETICA** (*Engler*) *P.C. Boyce*. Peduncle longer, or much shorter than petiole. Spadix-appendix sessile to obscurely stipitate, cylindric, laterally compressed, moderately stout. Staminodes and pistillodes absent, very rarely staminodes and pistillodes present in *A. creticum*. Inflorescence sweetly scented, more rarely odourless.

13. **Arum idaeum** *Coust. & Gandoger* in Bull. Soc. Bot. France 63: 11 (1917); Turland, Chilton & Press, Flora of the Cretan area, 159, map 1369 (1993); P.C. Boyce, The Genus *Arum*, 162 (1993).

Distribution: Greece: Islands: Crete (Kriti).

Restricted to mountainous regions of Crete, *A. idaeum* has long been confused with *A. creticum*, usually being referred to as the high altitude form of that species. *Arum idaeum* typically has white spathes and a deep purple spadix appendix. However, the spadix appendix can vary, with forms displaying various degrees of yellow, ranging from a few patches to almost entirely yellow. Other interesting variation is found in the smell of the inflorescence. Most plants in cultivation in

Europe have an odourless inflorescence but many plants investigated in the field produced a faint but readily discernible smell of violets and hyacinth.

14. **Arum creticum** *Boiss. & Heldr.* in Boiss., Diagn. 1,13: 9 (1853); Schott, Syn. Aroid., 11 (1856) & Prodr. Syst. Aroid., 94 (1860); Engler in A. & C. DC., Monog. Phanerog., 2: 590 (1879); Hruby in Bull. Soc. Bot. Genève 4: 151 (1912); Engler in Engler, Das Pflanzenr., 73 (IV. 23F): 69 (1920); Turland, Chilton & Press, Flora of the Cretan area, 159, map 1367 (1993); P.C. Boyce, The Genus *Arum*, 165 (1993).

Distribution: Greece: Islands: Karpathos, Kasos, Crete (Kriti).

A very striking species with large cream to lemon-yellow inflorescence borne well clear of the leaves. Widespread on Crete and occuring eastwards on Kasos, Karpathos and in southwestern Turkey, *A. creticum* is perhaps the most readily identifiable and certainly the best known of the Greek arums. The strong smell produced by the open inflorescence is usually described as sweet and freesia-like, but can vary from this to an highly unpleasent naptha-like odour.

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