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A new pentaploid of the genus *Arum* (Araceae)

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Abstract

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The pentaploid wild *Arum* (2n = 5× = 70) found in Southern Italy near San Michele, Bari, differs in some characteristics from the other *Arum* species known so far. It is most probably a hybrid between the tetraploid (2n = 56) *A. apulum* (Carano) Bedalov (*A. nigrum* Schott var. *apulum* Carano) and the hexaploid (2n = 84) *A. italicum* Miller.

Introduction

The present paper describes a natural pentaploid *Arum* found in South Italy near San Michele, in vicinity of Bari. The plants morphologically differ from the other known Arum species. The investigations show that the plants have 2n = 5× = 70 chromosomes and suggest that this pentaploid of *Arum* could be a hybrid derived from the tetraploid *A. apulum* (Carano) Bedalov (*A. nigrum* Schott var. *apulum* Carano) (2n = 4× = 56) and from the hexaploid *A. italicum* Miller (2n = 6× = 84). So far the only known pentaploids of the genus *Arum* were established by Lovis (1954–55) and by Beuret (1977).

Material and methods

The plants collected in Italy (near San Michele, Bari) and afterwards cultivated in the Botanical garden of the Faculty of Sciences of the University of Zagreb, have been investigated.

Mitotic chromosomes were studied in root tip cells. Roots were pretreated in saturated water solution of paradichlorbenzene for about three hours, fixed in aceto-alcohol (1 : 3) and stained in aceto-carmine.

Results

The investigated plants morphologically differ in certain features from all other *Arum* species known so far. Differences are particularly emphasized in the shape of the spadix and in the form of sterile and male flowers (Figs. 1, 2 and 3).

Travail dédié au professeur Claude Favarger, pour son 70^{e} anniversaire

The appendix of the spadix is white-yellow and slightly rough on its surface. It is 3–5 cm long, conical elongate markedly narrowed towards the apical part, broaden on the base and more or less gradually transforms in its stalk of which it is usually somewhat longer.

The upper sterile flowers are absolutely absent, rarely very weakly developed and arranged in one whorl (Fig. 3).

The male flowers are more or less reduced and arranged in one or two whorls. Very seldom they are arranged in more whorls and in this case the upper sterile flowers are also scarcely developed (Figs. 2 and 3).

The lower sterile flowers are also weakly developed and arranged in one or two whorls.

The part of the inflorescence with female flowers is normal, well developed, cylindrical, about 2 cm long and about 1 cm wide.

The spadix is never longer than a half of the spathe.

The spathe is usually about 30 cm long, eliptical-lanceolate. Externally it is slightly purple coloured. Its blade is about four to five time as long as its bottle part.

The leaves are uniformly green and triangular hastate, like in *Arum italicum* (Figs. 4 and 5).

The peduncle is not longer than one half of the petiole.

The tuber in the investigated plants has a kind of globular or somewhat flattened shape on which still exists last year old tuber (Figs. 6 and 7 b).

Cytological investigations have shown that the plants collected in South Italy are pentaploids with $2n = 5\times = 70$ chromosomes.

Discussion

According to literature (Bolkhovskikh et al. 1969, Löve et al. 1961, 1973, Prime 1961, Zahariyeva et al. 1969, Tarnavschi et al. 1970, Wcislo 1970, Beuret 1971, 1972, 1977, Lovka et al. 1971, Marchi 1971, Nilsson et al. 1971, Marchant 1972, Terpó 1971, 1973, Bedalov 1973 a, 1973 b, 1975 a, 1975 b, 1975 c, 1976, 1977, 1978, 1980, 1981, 1982, 1983, Kononov et al. 1974) the majority of *Arum* species are diploids with $2n = 28$ chromosomes (*A. pictum* L., *A. nigrum* Schott, *A. creticum* Boiss. et Heldr., *A. palaestinum* Boiss., *A. dioscoridis* Sibth. et Sm., *A. korolkowii* Regel, *A. hygrophilum* Boiss., *A. orientale* M. Bieb. and *A. alpinum* Schott et Kotschy), while few of them are polyploids with $2n = 56$ chromosomes (*A. maculatum* L., *A. apulum* (Carano) Bedalov, *A. albispathum* Stev.) and with $2n = 84$ chromosomes (*A. italicum* Miller).

Fig. 1. Inflorescence of pentaploid *Arum* from San Michele.

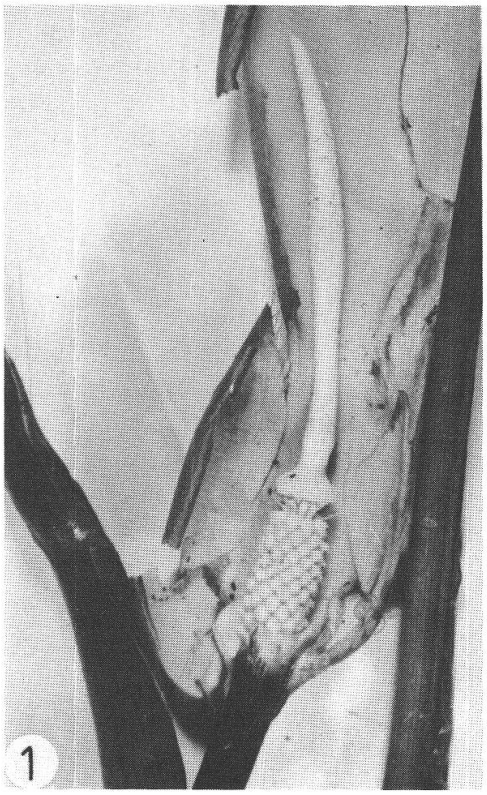
Fig. 2. The shape of the spadix.

Fig. 3. Detail of inflorescence.

Figs. 4 and 5. Uniformly green and triangular hastate leaves.

Fig. 6. Globular tuber.

Fig. 7. a) Globular tuber of *Arum apulum* – b) Oval and upright tuber from a cultivated specimen of the pentaploid *Arum* (culture in pot) – c) Cylindrical tuber of *A. italicum*.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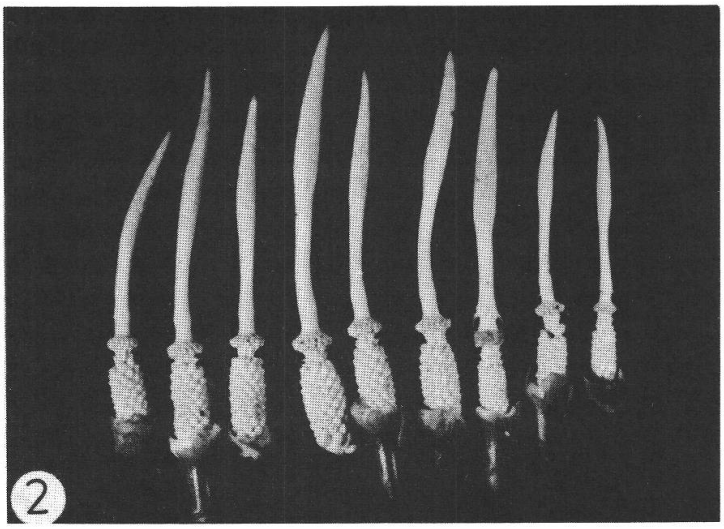
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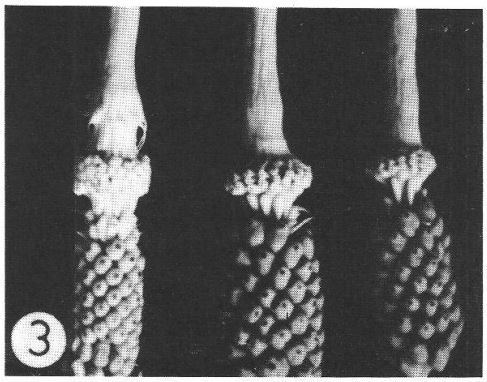
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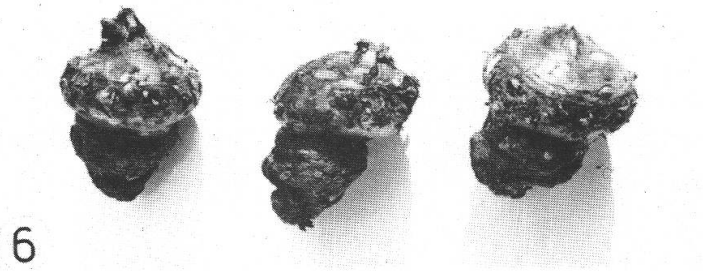
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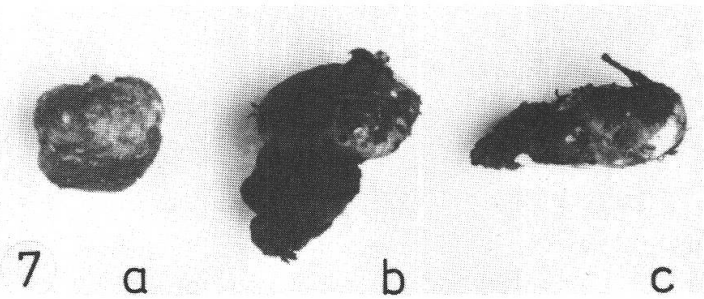
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a
b
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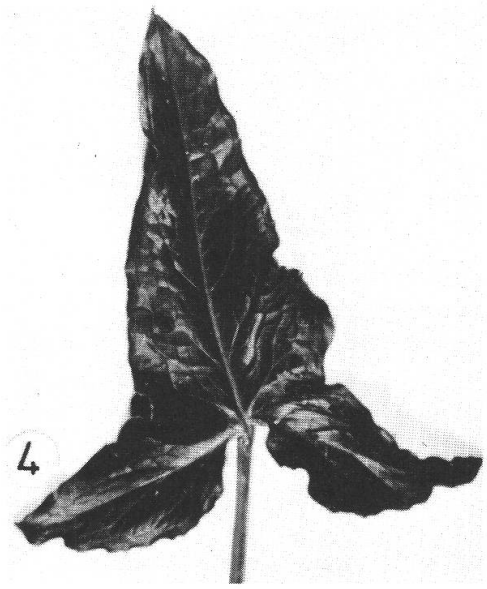
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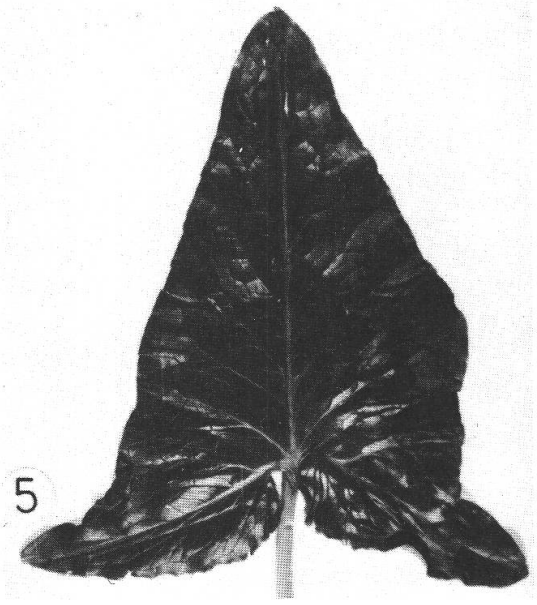
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The chromosome mumber 2n=70 has been established already earlier by Lovis (1954–55) for wild *Arum* specimens from Arundel, Sussex (England). The plant was described by him as a hybrid between *A. italicum* Mill. subsp. *neglectum* (Towns.) Prime (*A. neglectum* (Towns.) Ridley) (2n=84) and *A. maculatum* (2n=56). Another pentaploid *Arum* has been discovered by Beuret (1977) in the park Avocourt (Athis, near Paris) and considered by this author as a hybrid between *A. maculatum* L. (2n=56) and *A. italicum* Miller (2n=84). Morphologically this hybrid was very similar to the *italicum* parent.

The plant from South Italy investigated in the frame of this work is also hybrid, and according to some morphological characteristics, chromosome numbers and distribution of the other *Arum* species in this area, it could be a hybrid between *A. apulum* (2n=56) and *A. italicum* (2n=84). So, the globular shape of tuber, although it has a last year old part, could originate from the species *A. apulum* or could present an intermediate form between globular (*A. apulum*) and cylindrical (*A. italicum*) types (Fig. 7). Slightly purple coloured spathe could also be a characteristic originated from the species *A. apulum,* while triangular hastate leaves and peduncle not longer than one half of the leaf petiole are characteristics of the species *A. italicum.* Otherwise, in the surrounding of the locality where the *Arum* in question was collected, *A. apulum* and *A. italicum* are growing. After Fiori (1927), Zangheri (1976) and Pignatti (1982) the genus *Arum* in Italy is represented by species *A. italicum* (2n=84), *A. maculatum* (2n=56), *A. apulum* (2n=56), *A. pictum* (2n=28), *A. alpinum* (*A. cylindraceum* Gasp.) (2n=28) and *A.lucanum* Cavara and Grande.

According to Schott (1860) and Engler (1920) the only known *Arum* species with absent or scarcely developed upper sterile flowers is *A. creticum.* However the species *A. creticum,* which is endemic in the Aegean area, differs in some morphological features and has 2n=28 chromosomes (Marchant 1973).

The *Arum* hybrid found in South Italy represents a new type of the genus *Arum.* It is very interesting that this pentaploid *Arum* has a kind of globular type of tuber, because so far the only polyploid *Arum* with globular form of tuber was *A. apulum* (2n=56). Otherwise this shape of tuber is characteristic of diploid *Arum* species, while tetraploid species *A. maculatum* and hexaploid species *A. italicum* have cylindrically or ovally elongated and rhizomelike tubers (Bedalov 1975a, 1976, 1977, 1978).

Another wild *Arum* hybrid, a triploid one, having 2n=3×=42 chromosomes, which is hybrid between a diploid (2n=28) and a tetraploid (2n=56) plant was also described. It was recorded by Beuret (1971, 1977) for the vicinity of Bucarest (Rumania) and described by Kononov et al. (1974) for Crimea and Caucasus.

It is evident that wild *Arum* hybrids exist although not registered so often.

Otherwise, according to the experience of the author, artificial hybridisation between different Arum species is possible. It is possible to get seeds by artificial pollination. The difficulty lies in the fact that in *Arum* it is necessary to wait few years till from the seeds we get the plant mature enough to give flowers and fruits what is important for establishing morphological characteristics of the new plant.

In this paper mainly morphological characteristics and chromosome number of the pentaploid *Arum* from South Italy are given. Further morphological and phytogeographical investigations, as well as possibly artificial hybridisation will certainly throw considerable light on the problem of its progenitors origin.

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