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# Cytotaxonomical notes on *Allium savii* Parl. (Alliaceae), a misappreciated Tyrrhenian element

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## RÉSUMÉ

BRULLO, S., P. PAVONE, C. SALMERI & A. SCRUGLI (1994). Notes cytotaxonomique sur *Allium savii* Parl. (Liliaceae), un inapprécié élément tyrrhénien. *Candollea* 49: 271-279. En anglais, résumés français et anglais.

*Allium savii* est une espèce de distribution typiquement tyrrhénienne non reconnue par les flores méditerranéennes. Il s'agit d'une espèce très différenciée par sa morphologie et sa caryologie des autres taxa de *Allium* sect. *Codonoprasum*. Elle est localisés dans les marécages côtiers ou plus rarement de l'intérieur, où elle fleurit en automne. Ses affinités avec les espèces du complexe de *A. paniculatum* sont examinées.

## ABSTRACT

BRULLO, S., P. PAVONE, C. SALMERI & A. SCRUGLI (1994). Cytotaxonomical notes on *Allium savii* Parl. (Liliaceae), a misappreciated Tyrrhenian element. *Candollea* 49: 271-279. In English, French and English abstracts.

*Allium savii* is a species with a typically Tyrrhenian distribution, not recognized by most Mediterranean floras. It is a species well differentiated for its morphology and karyology from the other taxa of *Allium* sect. *Codonoprasum*. It is localized in the coastal or, more rarely, inland marshes, where it flowers in autumn. Its relationships with the species of *A. paniculatum* group are examined.

**KEY-WORDS:** Cytotaxonomy — Flora — Tyrrhenian area — *Allium* — *Codonoprasum*.

## Introduction

In this paper a quite critical and misappreciated species of the genus *Allium* occurring in the Mediterranean area is examined. It belongs to the cycle of *A. paniculatum* L. but it differs substantially from the other taxa of this group in its ecology and flowering period. In fact, it occurs often on salt soil, mainly in the coastal marshes or more rarely in the inland places, where it flowers normally in autumn (September-November). It was described for the first time by PARLATORE (1852) as *Allium savii*, on a specimen coming from the sandy shore near Pisa (Italy), collected by P. Savi (FI!). Afterwards, only CESATI & al. (1868-1886) mentioned this taxon as a variety of *A. pallens* L., while no other author of Italian floras treated it. Besides, this species was quoted as a synonym of *A. paniculatum* L. by FIORI & PAOLETTI (1896) or of *A. fuscum* by NYMAN (1882). Successively, Debeaux (cf. MAGNIER, 1882-1897) described another *Allium* very similar to the previous one as *A. paniculatum* var. *salinum*, which occurred in the coastal marshes from Corsica. The latter, characterized by an autumnal flowering period too, is considered as a Corsican endemic (cf.

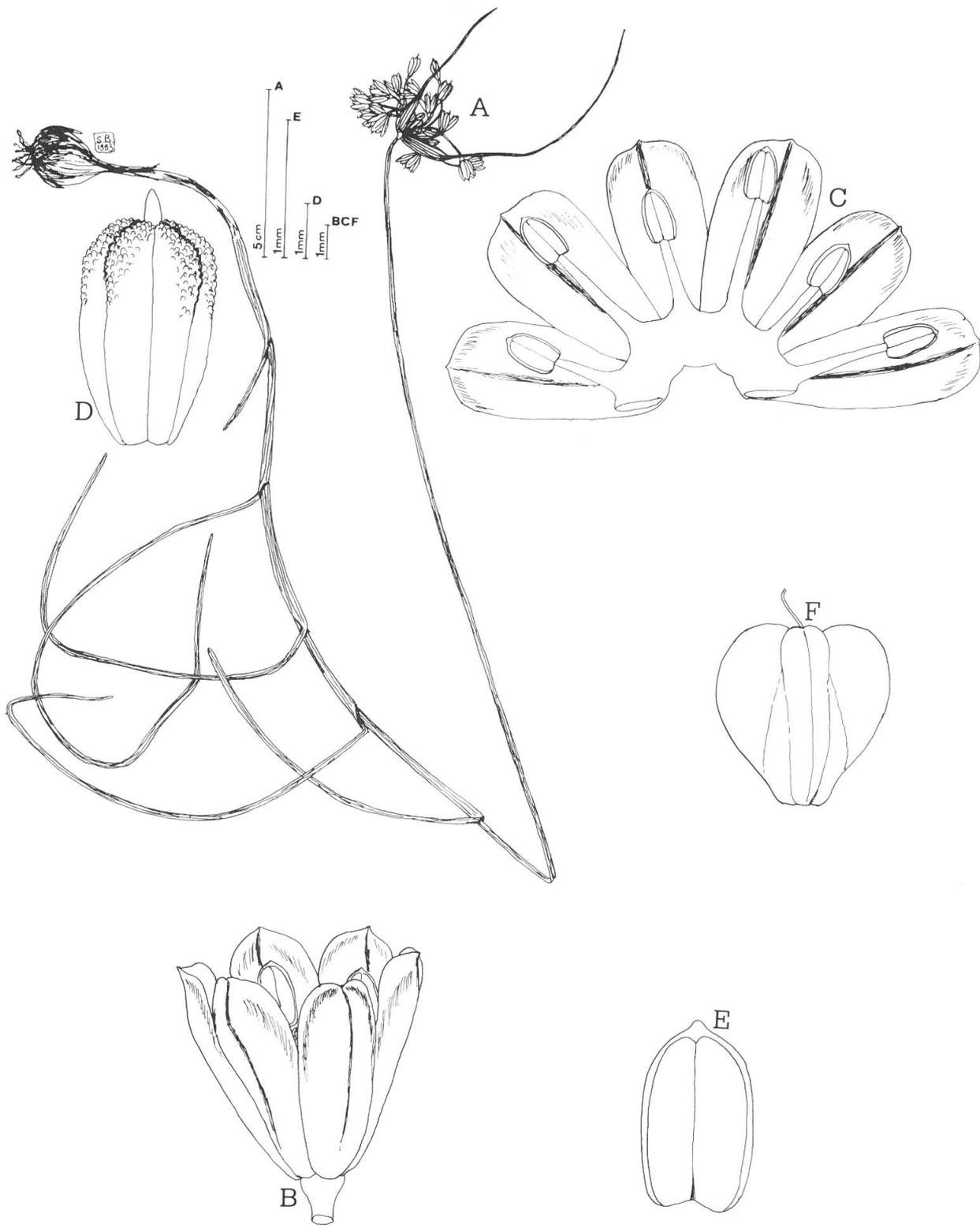


Fig. 1. — *Allium savii* Parl. A, habit; B, flower; C, perigon with stamens; D, ovary; E, anther; F, capsule.

GUINOCHET & VILMORIN, 1978). More recently, KERGUÉLEN (1987) raised it to subspecific level, proposing the new combination *A. paniculatum* L. subsp. *salinum*. To clarify the taxonomical position of these populations, it was necessary to carry out an investigation on herbarium specimens and living material. This study allowed to ascertain that the above mentioned populations must be all attributed to a same species, represented by *A. savii*, which is well differentiated from the other taxa of the *A. paniculatum* group. This autumnal species results distributed in some N. Tyrrhenian localities as Tuscany, Latium, Corsica, Sardinia and S. France, where it grows exclusively in the damp or submerged places.

### Material and methods

The investigation was based on specimens collected in Tuscany (Ansedonia), Sardinia (Laconi), Corsica (Saint-Florent) and cultivated in the Botanical Garden of Catania (Sicily). In addition to personal collections and field observations, much material from various herbaria was examined (BOLO, CAG, CAT, FI, G, MA, MPU, P, PI). For the karyological study, root-tips of bulbs were pretreated with 0.2% colchicine, fixed in Carnoy and stained according to the Feulgen technique. The leaf anatomy was studied on cultivated material, which was fixed in Karpetschenko and embedded in paraffin; the transversal sections were stained with ruthenium red and lightgreen yellowish.

### Description

**Allium savii** Parl., Fl. Ital. 2: 554 (1852) (Fig. 1).

**Type:** Al Tombolo a Pisa, s.d., Savi (FI!).

Syn.: *A. pallens* var. *savii* (Parl.) Cesati, Passer. & Gibelli, Comp. Fl. Ital.: 141 (1884).

*A. paniculatum* var. *salinum* Debeaux in Magnier, Scrinia Fl. Selecta 9: 175 n° 2269 (1890); *A. paniculatum* subsp. *salinum* (Debeaux) Botté & Kerguélen in Kerguélen, Lejeunia 120: 41 (1987).

Bulb ovoid, 12-15 × 10-12 mm, with fibrous outer tunics, breaking into parallel fibres, black-greyish, the inner ones membranaceous and whitish. Stem 45-55 cm high, glabrous, erect or subscandent, up 1/2 of its length covered by the leaf sheaths. Leaves 5-6, flat or semicylindrical, up to 25 cm long, 1-2 mm wide. Inflorescence lax, 20-28 flowered. Pedicels unequal, 1-3 cm long. Spathe bivalve; valves unequal, longer than the umbel, the larger 7-nerved, up to 16 cm long, the smaller 5-nerved, up to 11 cm long. Perigon campanulate, 6-7 mm long, with tepals subequal, 2.5-3 mm wide, oblong-elliptical, rounded and lightly apiculate at the apex, white-pinkish to pink-purplish, suffused with brown-purplish, with a purplish mid-vein. Stamens included, with filaments simple, unequal, the inner 2.5-3.3 mm long, the outer 2-2.2 mm long, connate at the base into an annulus 1.5 mm high; anthers white, oblong-elliptical, shortly apiculate, 0.7-1 × 1.4-1.5 mm. Ovary green, obovate, papillose in the upper part, 2-2.2 × 4 mm. Style white, 0.5-1 mm long. Capsule trivalve, obovate-subglobose, 4.5-5.5 × 5-5.5 mm.

### Specimens examined

Italy: al Tombolo a Pisa, s. d., *Savi* (FI); Tombolo, 9.1847, s. l. (PI); Marina di Pisa, 8.9.1903, *Fiori* (FI); Pisa nella selva a Palazzetto, 14.9.1855, *Caruel* (FI); Paludetta, 28.8.1861, *Beccari* (PI); Livorno, Paludetta, marais à sec, 8.8.1871, *Sommier* (FI); Livorno al Paludetto, 24.8.1886, *Costa-Reghini* (PI); Stradone delle Cascine, 21.8.1858, s. l. (PI); Palude di Vada, 20.9.1922, *Chiarugi* (FI); Monte Argentario a Calambrone in Tombolo, 10.1874, *Arcangeli* (FI); Argentario, colt. Orto Botanico, 2.9.1899, *Chiovenda 9979* (FI); Stagni maritimi presso Ansedonia, prov. Grosseto, 30.9.1894 *Chiovenda* (FI); Argentario, laguna presso Ansedonia, 11.10.1989, *Brullo & Pavone*

(CAT); Bagni a Monte Catini lungo il Rio Salsero, 22.8.1888, *Fantozzi* (FI); Galceto, 9, *Levier* (FI); Veglia, s. d., *Noe* (PI); Monte Circeo, 1893, *Sommier* (FI); Sardegna: Laconi, 7.1865, *Masala 693* (CAG); Laconi (Nuoro), C. Scala Martini (zona umida), 18.9.1988, *Mura & Scrugli* (CAG); *ibid.*, 25.9.1988, *Mura & Scrugli* (CAG); *ibid.*, 25.9.1989, *Mura* (CAG, CAT); Corsica: in arenosis prope mare, 8.10, *Seraffino* (BOLO); in Bastia, 11.1847, *Requien* (PI); Bastia in maritimis, s. d., *Requien* (FI); Marais de Biguglia, 15.9-2.10.1867, *Debeaux & Mabilie 275* (G, FI, MPU, P, PI); Bastia, prairies saumastres et marecageneuses qui bordent l'étang de Biguglia, 18-25.9.1869, *Debeaux 2269*, type of *A. paniculatum* var. *salinum* (G, MPU, P); Bonifacio, 7.10.1896, *Revelière* (MPU); Saint-Florent littoral à l'W de la Ville (rive gauche de l'Aliso), paturage maritime a *Limonium*, *Artemisia.....*, 7.9.1978, *Lambinon & al.* (MA); Saint-Florent, bordi del fiume Aliso, 14.10.1991, *Brullo & Pavone* (CAT); France: Herault Portiragnes, près Vias, Plateau de Roque Haute, 6.11.1887, *Neyraut* (MPU).

### Ecology

*A. savii* occurs on damp places with soil periodically submerged by fresh or salt water. It grows in plant communities characterized by the dominance of *Phragmites australis* Trin. as well as in subhalophilous vegetation of *Juncus* sp. pl. or of *Artemisia* sp. and *Limonium* sp. pl.

### Caryology

All three investigated populations of *A. savii* resulted tetraploid with  $2n = 32$ . This chromosome number confirms that one observed by CONTANDRIOPOULOS (1957, 1962) on specimens coming from Santa Manza, near Bonifacio (S. E. Corsica), referred to *A. paniculatum* var. *salinum*. The numerous mitotic plates examined (Fig. 2) present an idiogram quite homogeneous with 13 metacentric pairs, three of which are microsatellited, and 3 submetacentric pairs (Fig. 3). From the literature data, in the *A. paniculatum* group the tetraploid chromosome complement is not frequent, as the species belonging to this cycle are normally diploid with  $2n = 16$ . Up to now, the chromosome number  $2n = 32$  is reported in particular for *A. dentiferum* Webb & Berthelot and *A. pallens* L. (cf. BRULLO & al., 1991, CONTANDRIOPOULOS, l.c.).

### Leaf anatomy

*A. savii* shows a leaf blade characterized by an epidermis with a developed cuticle and stomata distributed along the whole perimeter. The palisade tissue is regular and one-layered along the whole surface, sometimes it results two-layered in correspondence of the ribs. The spongy tissue is quite compact with big cells in the central portion or a little fistulous. In the peripheral part of the spongy tissue, numerous secretory canals occur. The vascular bundles are 10-18, of which 4-6 adaxial and 5-12 abaxial (Fig. 4).



Fig. 2. — Mitotic plates of *A. savii* ( $2n = 32$ ) from Ansedonia (A), Laconi (B) and Saint-Florent (C).

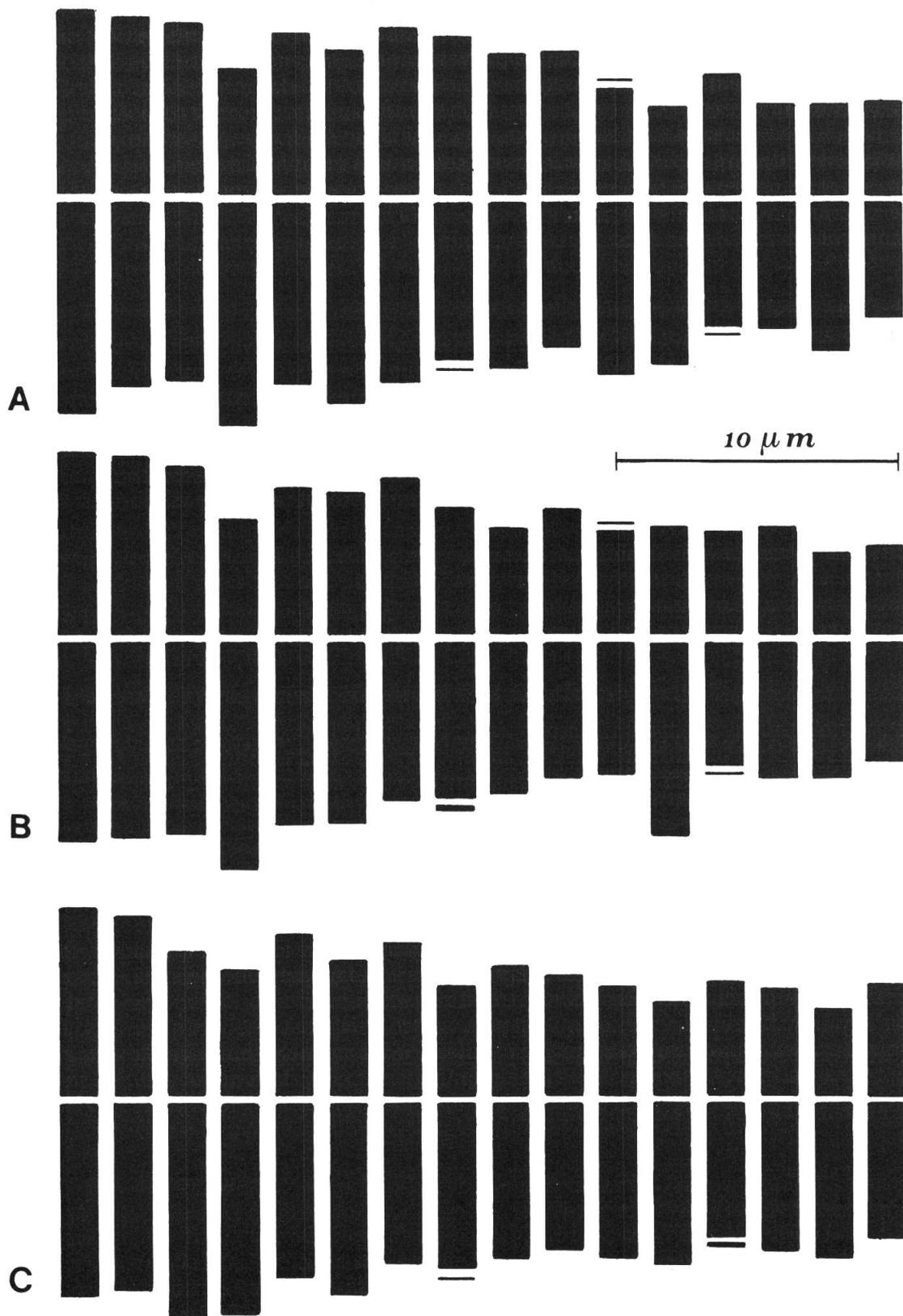


Fig. 3. — Idiograms of *A. savii* from Ansedonia (A), Laconi (B) and Saint-Florent (C).

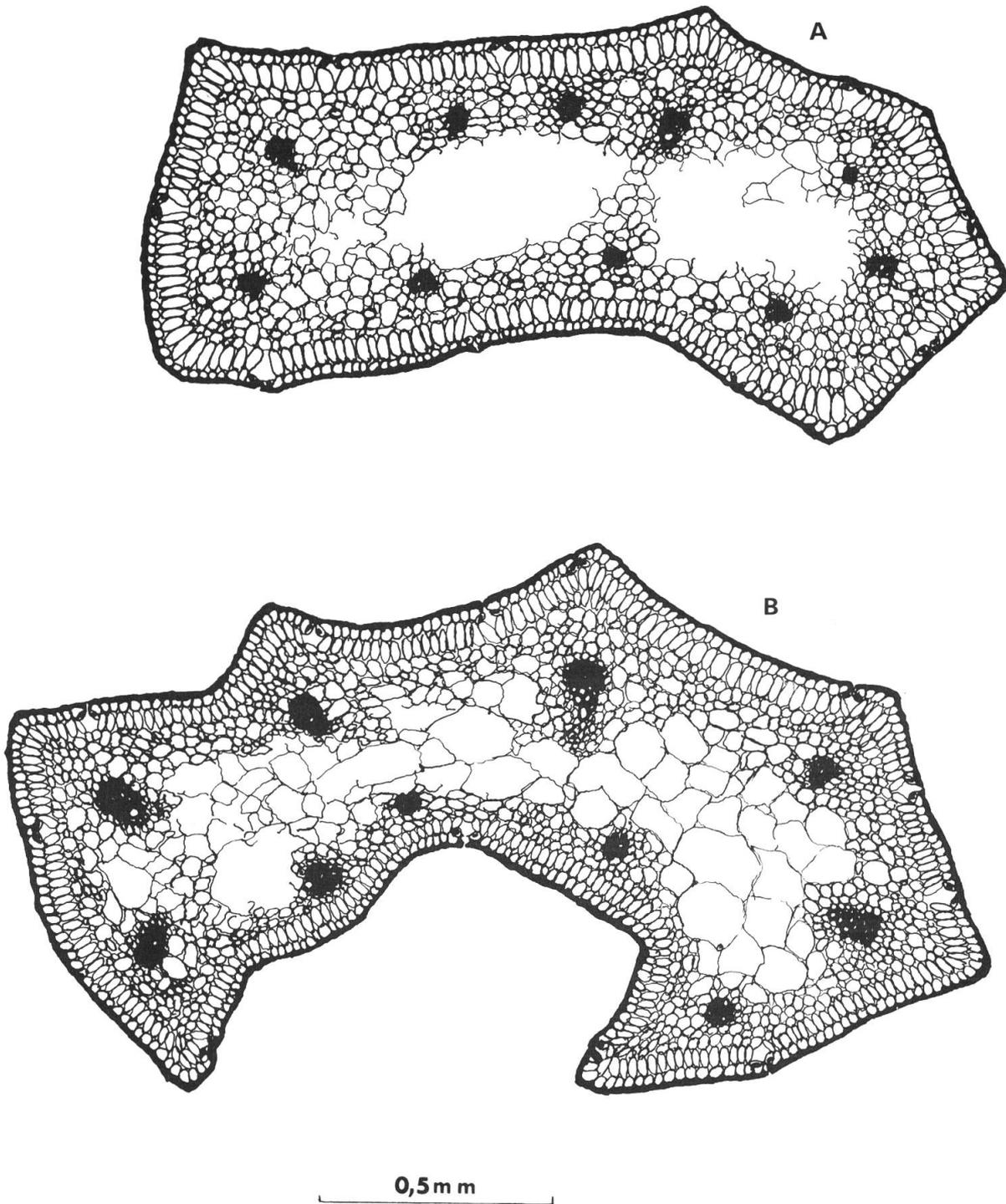


Fig. 4. — Leaf cross sections of *A. savii* from Laconi (A) and Saint-Florent (B).

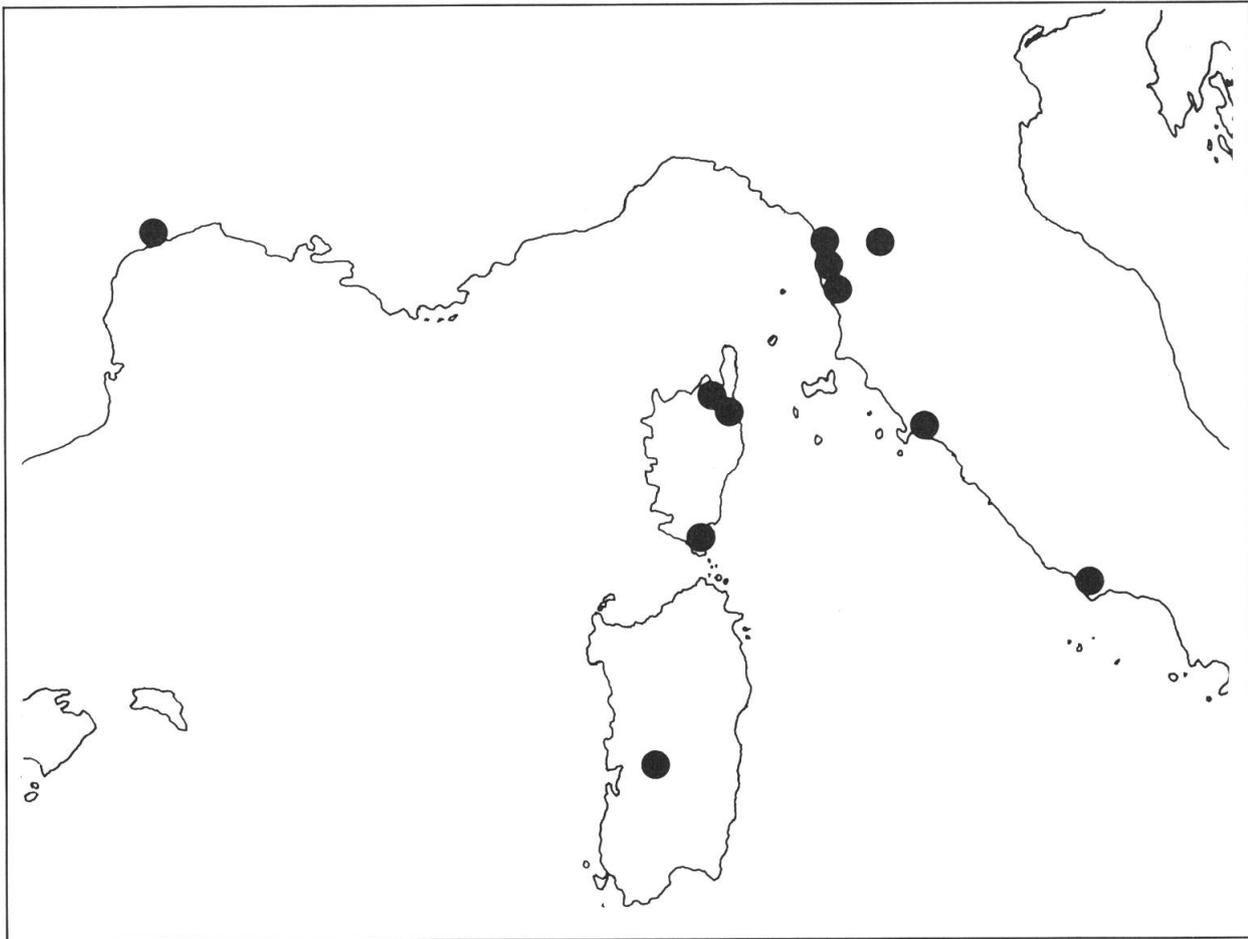


Fig. 5. — Geographical distribution of *A. savii* from herbarium specimens.

### Taxonomical relationships

From the morphological point of view, *A. savii* clearly belongs to the *A.* sect. *Codonoprasum* Reichenb. In particular, it shows close resemblance with the taxa of the *A. paniculatum* group. In fact, it is characterized by leaves glabrous, flat or semicylindrical, spathe bivalve with a long appendage at the apex, inflorescence very shorter than the spathe, stamens simple, not exerted from the perigon and ovary with inconspicuous nectaries. Due to the big size, the spathe with very long valves, the perigon campanulate, quite large, with tepals suffused with brown, the ovary papillose in the upper part and provides with a short style, as well as for its tetraploid chromosome number, *A. savii* is more related to *A. dentiferum* Webb & Berthelot (cf. BRULLO & al., 1991). But the latter differs from *A. savii* in the outer bulb tunics membranaceous and dark-brown, inflorescence denser and many flowered, perigon yellowish-green to purplish-green, shorter anthers yellow and ovate, ovary cylindrical-subpyriform and occurrence of small teeth between the stamen filaments. Remarkable differences there are also as regard the ecology, as *A. dentiferum* is a synantropic species linked to cultivated or ruderal habitats and flowering in June-July, while *A. savii* is an autumnal species exclusive of natural damp places.

*A. savii* shows some taxonomical relations with *A. tardans* Greuter & Zahariadi too, species distributed in South Aegean area (cf. ZAHARIADI, 1975; GREUTER & al., 1985). Both species have in common the autumnal flowering period, the outer bulb tunics fibrous, the perigon cam-

panulate with tepals suffused with brown-purplish, the anthers oblong-elliptical, the ovary lengthened and papillose in the upper part. Nevertheless, *A. tardans* is well distinct by *A. savii* in the ecology, occurring normally in the rupestrian sites, and in some relevant morphological characters, as the stem covered completely or in the most part by the leaf sheaths, the spathe with shorter valves, the inflorescence few flowered (4-12 rarely 20 flowers), the perigon smaller (4-6 mm long) and the ovary shorter (2-3 mm long), as for its diploid chromosome complement (cf. MICELI & GARBARI, 1979).

From the phytogeographical point of view, *A. savii* represents a typical Tyrrhenian element (Fig. 5), which, for its scattered distribution and peculiar ecology, can be considered an old taxon. It rose probably from diploid ancestors living in the dry soils, to adjust itself to a new environment very different from the usual one. On this subject, it is to emphasize that the taxa of the *A. paniculatum* group have probably their main differentiation centre in the Irano-Turanian area, where they are prevalently linked to steppic places. In the case of *A. savii*, its localization in this peculiar damp soil was probably determined by processes of poliploidy, which normally favour the fitting to new habitats. It is possible to presume that this colonization happened in a very old period (probably in the late Tertiary), according to the clearly relict distribution that *A. savii* has at the present.

#### ACKNOWLEDGEMENT

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