

Zeitschrift: Candollea : journal international de botanique systématique = international journal of systematic botany
Herausgeber: Conservatoire et Jardin botaniques de la Ville de Genève
Band: 48 (1993)
Heft: 1

Artikel: Three new species of Allium (Alliaceae) from Cyprus
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DOI: <https://doi.org/10.5169/seals-879655>

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Three new species of *Allium* (Alliaceae) from Cyprus

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RÉSUMÉ

BRULLO, S., P. PAVONE & C. SALMERI (1993). Trois nouvelles espèces d'*Allium* (Alliaceae) de Chypre. *Candollea* 48: 279-290. En anglais, résumés français et anglais.

Trois nouvelles espèces d'*Allium*: *A. cypricum*, *A. lefkarensis* et *A. marathasicum*, de Chypre sont illustrées et décrites. Elles appartiennent à la section *Codonoprasum* et se rattachent au complexe de *A. stamineum* Boiss. Les caractères morphologiques, les nombres chromosomiques, l'anatomie de la feuille et les affinités taxonomiques des trois espèces sont examinés.

ABSTRACT

BRULLO, S., P. PAVONE & C. SALMERI (1993). Three new species of *Allium* (Alliaceae) from Cyprus. *Candollea* 48: 279-290. In English, French and English abstracts.

Three species of *Allium*: *A. cypricum*, *A. lefkarensis*, and *Allium marathasicum*, from Cyprus are illustrated and described as new to science. They belong to the section *Codonoprasum* and show close resemblance with the species of *A. stamineum* Boiss. group. Morphological characters, chromosome numbers, leaf anatomy and taxonomical relationships are discussed.

KEY-WORDS: Taxonomy — Flora — Cyprus — *Allium* — *Codonoprasum*.

Introduction

In the ambit of cytotaxonomical investigations carried out on the taxa belonging to *A.* Sect. *Codonoprasum* from the Mediterranean area, a contribution regarding some populations from Cyprus related to *A. stamineum* Boiss. cycle is given. According to MEIKLE (1985), only *A. stamineum* was recorded from that island, though he emphasized the necessity of an investigation on Cyprus populations because of their polymorphism. In effects, the specimens previously referred to that species are characterized by a spathe longer than umbell with 2 valves unequal, umbell diffuse and fastigiate, perigon usually campanulate or cup-shaped, stamens simple and long exerted from the perigon. But these characters are generally in common with all the species of *A. stamineum* cycle, as for instance *A. hirtovaginum* P. Candargy, *A. hymettium* Boiss. & Heldr., *A. decaisnei* C. Presl, *A. pictistamineum* O. Schwarz, *A. albotunicatum* O. Schwarz, etc. Nevertheless, there are many morphological differences regarding the habit, leaves, inflorescence and flowers, which allow to distinguish fairly well the Cyprus populations from the species of this group known in literature. In particular, three well-differentiated populations were collected at Cyprus

by some of the authors during an excursion for phytosociological and floristical surveys. The morphological and karyological analyses showed that they can be considered as distinct species new to the science.

Material and methods

The specimens used for the cytotaxonomical study are represented by plants coming from bulbs gathered in the type localities of Cyprus and cultivated in the Botanical Garden of Catania. For the karyological investigation, 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 that was fixed in Karpetschenko and embedded in paraffin; the cross sections were stained with ruthenium red and light green yellowish.

Allium cypricum Brullo, Pavone & Salmeri, *spec. nov.* (Fig. 1).

Typus: cultivated plant originating from Cyprus, versante occidentale di monte Olympus, ca. 1600 m, 20.6.1989, Brullo & Pavone s.n. (holotypus: CAT; isotypi: CAT, FI).

Bulbus ovoideus, 15 × 8 mm, tunicis internis membranaceis, hyalinis, externis fuscis, induratis, marcescentibus. Folia 3-4, subtilia, subcylindrica, glauco-viridia, glabra, 8-20 cm longa et usque 1.5 mm lata, pluricostata. Scapus viridi-violaceus, solitarius vel geminatus, 10-13 cm altus, 1.5-2 mm in diameter, glaber, teres, erectus-suberectus, ad dimidium usque vaginis foliorum tectus. Inflorescentia laxa, pauciflora, 15-20 floribus, pedicellis inaequalibus, subtilibus, 5-15 mm longis, flexuoso-pendulis. Spatha bivalvis, persistens, valvis inaequalibus, umbella longioribus vel brevioribus, liberis, 1-3.5 cm longis, 3-6-nervatis. Perigonium atrovioleaceum, ovale-subglobosum, ca. 3-3.5 mm longum, tepalis aequalibus, ellipticis, 1.5-1.7 mm latis, ad apicem rotundatis. Stamina exteriora tepalis longiora, filamentibus nigro-violaceis, omnibus simplicibus, interioribus usque 4.5 mm longis, exterioribus ca. 2 mm longis, inferne cum tepalis 0.5 mm in anulum connatis, antheris albo-stramineis, ovatis, ca. 1 mm longis. Ovarium subglobosum, angustatum basi, ca. 1.6 mm longum, superne leviter rugosum. Stylus albus, ca. 1 mm longus. Stigma incospicuum. Capsula trivalvis, 3.5 × 5 mm.

Allium lefkareense Brullo, Pavone & Salmeri, *spec. nov.* (Fig. 2).

Typus: cultivated plant originating from Cyprus, colline presso Lefkara, in ambienti rocciosi, 2.6.1989, Brullo & Pavone s.n. (holotypus: CAT; isotypi: CAT, FI).

Bulbus ovoideus, 7-12 × 12-20 mm, tunicis internis membranaceis, aurantiacis vel brunneolis, externis fuscis, induratis, marcescentibus. Folia 3-4, subtilia, semicylindrica, viridia, glabra, 8-27 cm longa, 1-2 mm lata, sublaevia vel leviter costata. Scapus solitarius, 20-40 mm altus, 1.5-2.5 mm in diameter, glaber, teres, erectus, vaginis foliorum per 1/3-1/2 longitudinis tectus. Inflorescentia laxa, multiflora, 30-55 floribus, pedicellis inaequalibus, subtilibus, 1-3 cm longis, flexuosis, fructiferis erectis. Spatha bivalvis, persistens, valvis inaequalibus, umbella brevioribus vel subaequalibus, 1-4 cm longis, 3-5-nervatis. Perigonium obovato-subglobosum vel leviter campanulatum, 3-3.5 mm longum, tepalis viridibus, apice purpurescentibus, venis medianis purpureo-viridibus; tepala exteriora elliptica, apice leviter cucullata, ca. 2 mm lata, interiora oblonga, ca. 1.5 mm lata. Stamina inaequalia plerumque aequalia, tepalis longiora, filamentibus atropurpureis, simplicibus, 1-4 mm longis, interdum exteriora tepalis breviora, filamentibus 1.5-2 mm longis, inferne cum tepalis per 0.5 mm in anulum connatis, antheris albo-stamineis, ellipticis, 1.3 mm longis. Ovarium subgloboso-pyriforme, laeve, 1.7-1.8 × 1.5-1.7 mm. Stylus purpureus, ca. 1 mm longus. Stigma incospicuum, album. Capsula trivalvis, 3.5 × 3.5 mm.

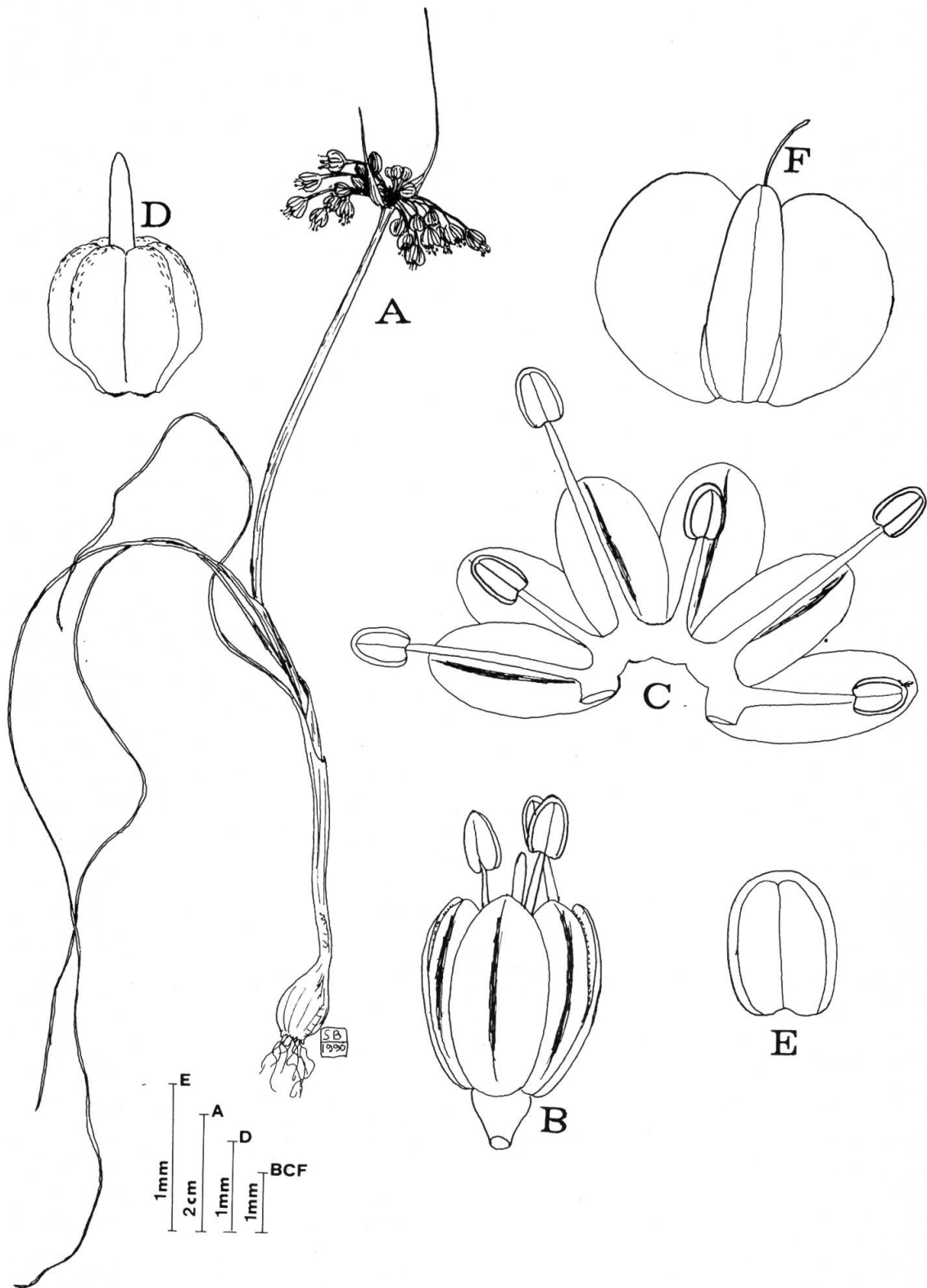


Fig. 1. — *Allium cypricum* Brullo, Pavone & Salmeri, spec. nov.
A, habit; **B**, flower; **C**, perigon with stamens; **D**, ovary; **E**, anther; **F**, capsule.

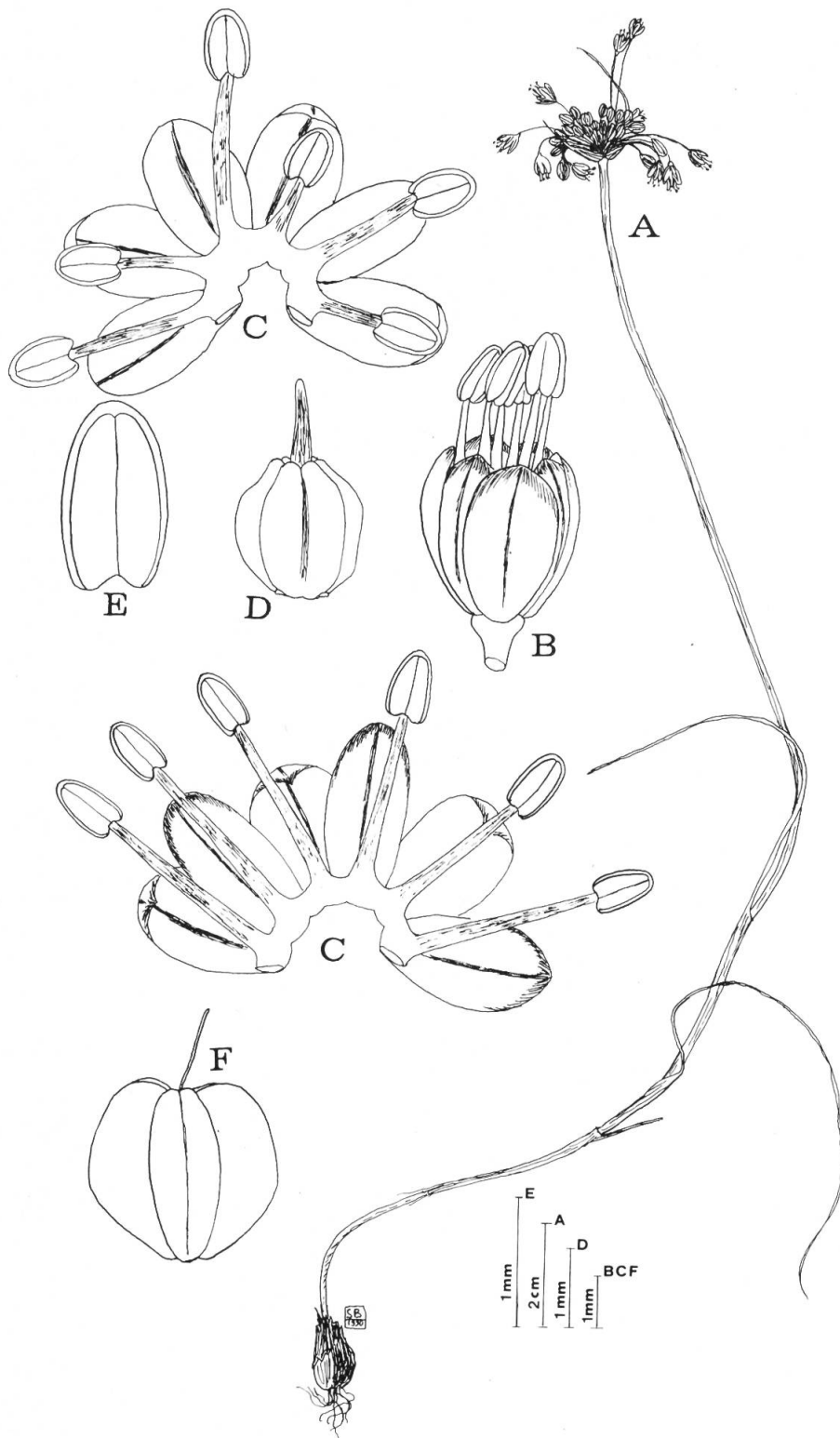


Fig. 2. — *Allium lefkarenses* Brullo, Pavone & Salmeri, spec. nov.
 A, habit; B, flower; C, perigon with stamens; D, ovary; E, anther; F, capsule.

Allium marathasicum Brullo, Pavone & Salmeri, *spec. nov.* (Fig. 3).

Typus: cultivated plant originating from Cyprus, Marathasa presso Prodhromos, negli incolti, 7.6.1989, Brullo & Pavone s.n. (holotypus: CAT; isotypi: CAT, FI).

Bulbus ovoideus, bulbiferus, 8-10 × 12-13 mm, tunicis internis membranaceis, hyalinis, externis fuscis, induratis, marcescentibus. Folia 3-4, subtilia, semicylindrica, viridia, glabra, 15-25 cm longa, 1-2 mm lata, pluricostata. Scapus solitarius, 28-45 cm altus, 1.5-2 mm in diameter, glaber, teres, erectus, ad dimidium usque vaginis foliorum tectus. Inflorescentia laxa, multiflora, 20-60 floribus, pedicellis inaequalibus, subtilibus, usque 2 cm longis, flexuosis, fructiferis erectis. Spatha bivalvis, persistens, valvis inaequalibus, umbella longioribus, maiore 7-10 cm longa, 5-nervata, minore 3-4.5 cm longa, 3-nervata. Perigonium campanulato-urceolatum, 4-4.5 mm longum, tepalis brunneo-viridibus, venis medianis brunneis, ellipticis apiculatis, exterioribus 2.2-2.3 mm latis, interioribus ca. 2 mm latis. Stamina aequalia, tepalis longiora, filamentibus albidis, simplicibus, ca. 5 mm longis, inferne cum tepalis per 0.8 mm in anulum connatis, antheris luteis, ellipticis, ca. 1.7 mm longis. Ovarium subgloboso-pyriforme, superne tuberculatum, 2.2 × 2 mm. Stylus albus, ca. 3.5 mm longus. Stigma inconspicuum. Capsula trivalvis, 4 × 3.5 mm.

Ecology

Concerning the ecology, the three species examined result well differentiated. For the matter of fact, *A. cyprium* occurs in the Troodos area on the western slope of M. Olympus above 1400-1700 m, where it grows in *Pinus brutia* woods. *A. lefkarensis* was collected in the southern part of the island near Lefkara, where it is localized on low hills (100-200 m) in the xeric garigues. Then, *A. marathasicum* is a synantropic species occurring in the ruderal places along the roads of the Marathasa area.

Karyology

The karyological investigations on the examined material showed that the populations of *A. cyprium* and *A. lefkarensis* are diploid with a somatic chromosome number of $2n = 16$ (Fig. 4A, B), while *A. marathasicum* results triploid with $2n = 24$ (Fig. 4C). The idiograms of *A. cyprium* and *A. lefkarensis* (Fig. 5A, B) are very similar, with 8 metacentric pairs, 2 of which are microsatellited. On the contrary, *A. marathasicum* shows an idiogram (Fig. 5C) characterized by 3 sub-metacentric and 21 metacentric chromosomes, 3 of the latter microsatellited. From the literature data (FEINBRUN, 1950; ARYAVAND, 1975; VOSA, 1976; KOLLMANN, 1985) the chromosome complement of all the *A. stamineum* populations studied up to now resulted diploid, while the triploid count was yet unknown; the latter was observed only in some populations of *A. paniculatum* group by CHESHMEJIYEV (1970), KOLLMANN (1973) and TORNADORE (1981).

Regarding *A. marathasicum*, it can be considered as an apomittic species of quite recent origin due to adjustment to secondary nitrophilous habitats. On the contrary, the diploid species are localized in natural places (primary habitats).

Leaf anatomy

As for the transversal sections of the leaves, the three species examined result well distinguished by some remarkable differences (Fig. 6). All the leaves show an epidermis with big cells in correspondence of the ribs, covered by a developed cuticle. The stomata are distributed on the whole surface. The one-layered palisade tissue is regular and compact with cylindrical cells, while the spongy tissue is rather compact mainly in the peripheral portion. In the outer part of the spongy tissue several secretory canals occur. The vascular bundles are numerous and 5 of them are large and abaxial. As concerns the differences, the *A. cyprium* leaves result more narrow with subcylindrical outline, not or lightly fistulose in the central part; the maximum number of the vascular bundles is 15,

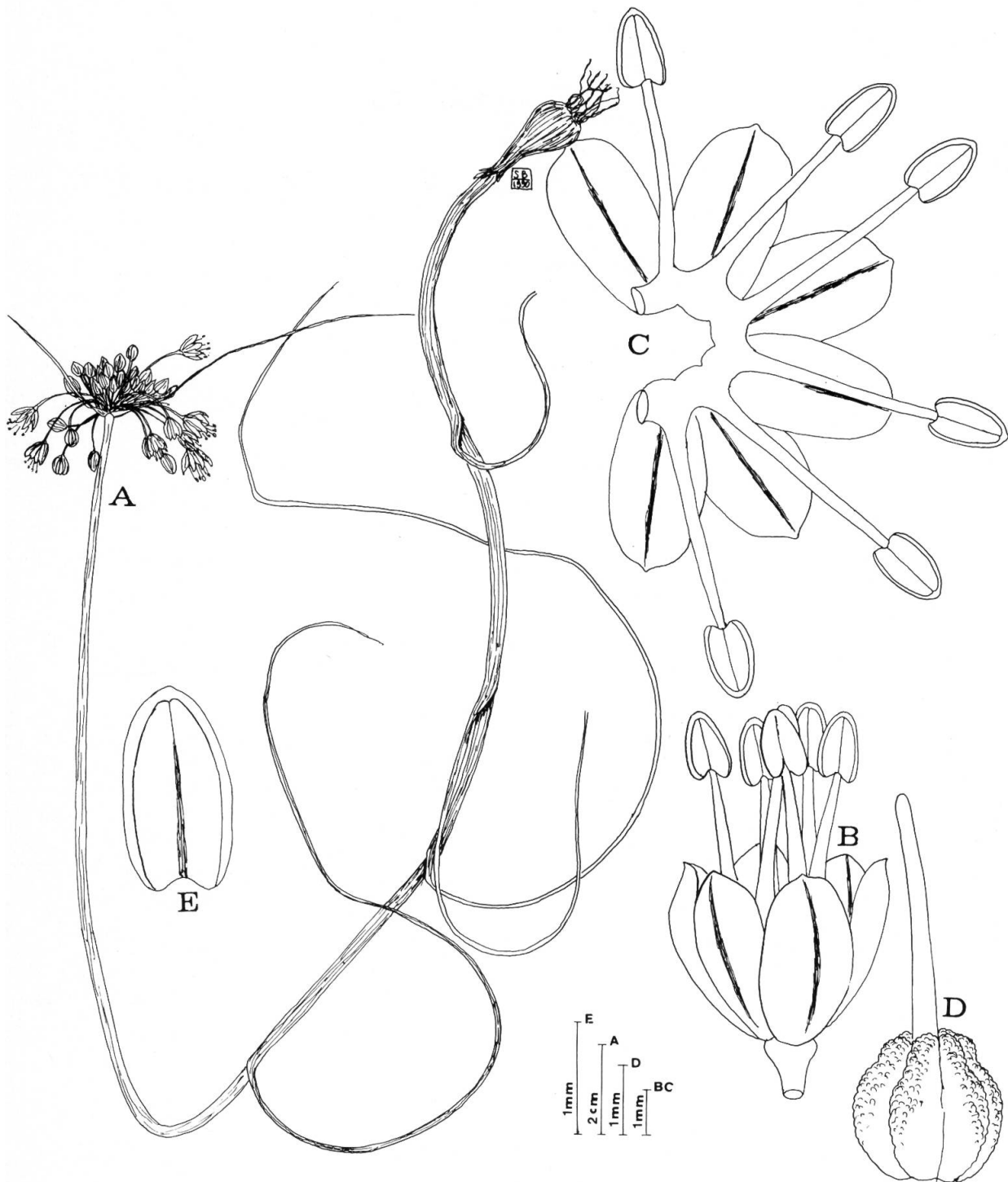


Fig. 3. — *Allium marathasicum* Brullo, Pavone & Salmeri, spec. nov.
 A, habit; B, flower; C, perigon with stamens; D, ovary; E, anther.



Fig. 4. — Mitotic chromosome plates.
A, *A. cyprum*; B, *A. lefkarensis*; C, *A. marathasicum*.

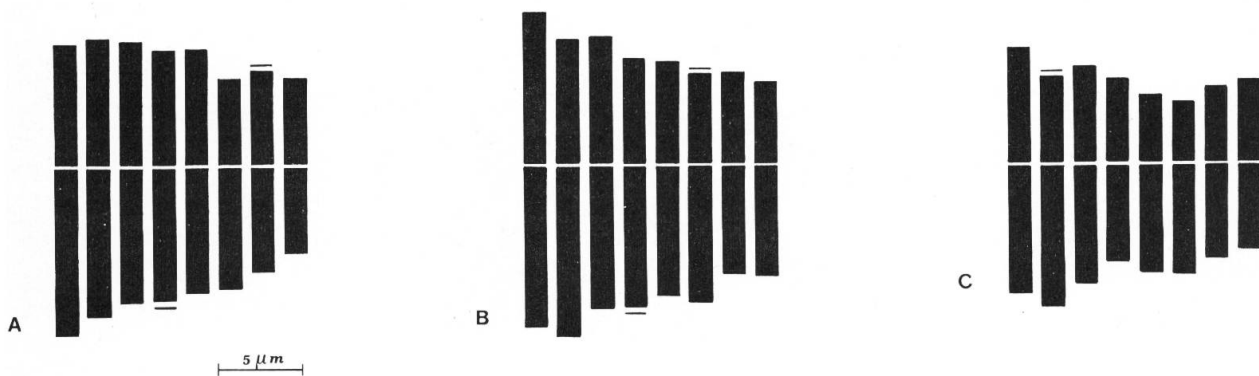


Fig. 5. — Idiograms.
A, *A. cyprium*; B, *A. lefkarensis*; C, *A. marathasicum*.

four of which are adaxial. The *A. lefkarensis* leaves show a semicylindrical outline with lightly marked ribs, a fistulous central portion and up to 18 vascular bundles, 5 of which are adaxial. Then, *A. marathasicum* leaves have a semicylindrical outline quite flat and are largely fistulous in the centre; the maximum number of vascular bundles is 21, nine of which are adaxial.

Discussion

From the literature and herbarium data, *A. stamineum* can be considered a species complex. In fact, according to WENDELBO (1971), it was always treated as a very variable species, in that many well-differentiated populations, coming from numerous localities of E. Mediterranean area and Middle-East, were referred to it (BOISSIER, 1859; WENDELBO, 1971; STEARN, 1978, 1980; KOLLMANN, 1985, 1986). Also BOISSIER (l.c.) in the protologue referred to *A. stamineum* several specimens coming from Greece, Turkey, Syria, Lebanon, Palestine and Persia.

Because of the remarkable morphological differences existing among the populations in origin attributed to this species, it is absolutely necessary a lectotypification. Among the syntypes reported in the protologue, it is here designated as lectotype: "Caria, 1843 Pinard (G-Boiss!)". This specimen is chosen because it is that one cited at the side of binomial: "*Allium stamineum* Boiss. in Pinard pl. exs. 1843. (Sect. *Codonoprasum*)".

To clarify the cytotaxonomical relations among the different populations of *A. stamineum*, several living plants coming from E. Mediterranean area (Greece, Turkey, Rhodos, Cyprus and Israel) were cultivated in the Botanical Garden of Catania. In particular, in this paper are examined the specimens collected in some localities of Caria (S-W Turkey) which, as it is above emphasized, represents the *locus classicus* of *A. stamineum*. They come from Aydin, Manisa Dagh, Alikurt near Denizli and show on the whole a remarkable morphological and karyological homogeneity.

These specimens (Fig. 7) are characterized by: small bulbs (12 × 7 mm) with dark brown outer tunics; scape green, solitary, erect, 25-50 cm high, covered in the lower 1/2 by the leaf sheaths; leaves 4, glabrous, semicylindrical, up to 20 cm long; spathe with 2 valves unequal, the longer up to 10 cm, the shorter up to 5 cm; umbell lax, usually many flowered, with pedicels unequal, 1-4 cm long; perigon lightly campanulate with tepals oblong-elliptical, rounded, greenish or purplish, 5 mm long, the outer 2.5 mm wide, the inner 2 mm wide; stamens exserted with filaments 4-6 mm long, white below and dark purplish above; anthers yellow, 1.5 mm long; ovary subglobose, scabrid-papillose above, 1.8-2 mm long; style white, 1.5 mm long.

As regards *A. cyprium*, it differs from *A. stamineum* in the smaller size, scape green-violet, sometimes geminate, 10-13 cm high, leaves subcylindrical, umbell smaller with tepals 3-3.5 × 1.5-1.7 mm, stamen filaments black-violet, 2-4.5 mm long, anthers white-yellowish, ca. 1 mm long, ovary 1.6 mm long, lightly rugose above. On the contrary, *A. marathasicum* compared with *A. stamineum* shows flower pedicels max. 2 cm long, perigon 4-4.5 mm long, campanulato-urceolate, with tepals elliptical, apiculate, 2-2.3 mm wide, stamen filaments equal and white, anthers 1.7 mm long, ovary

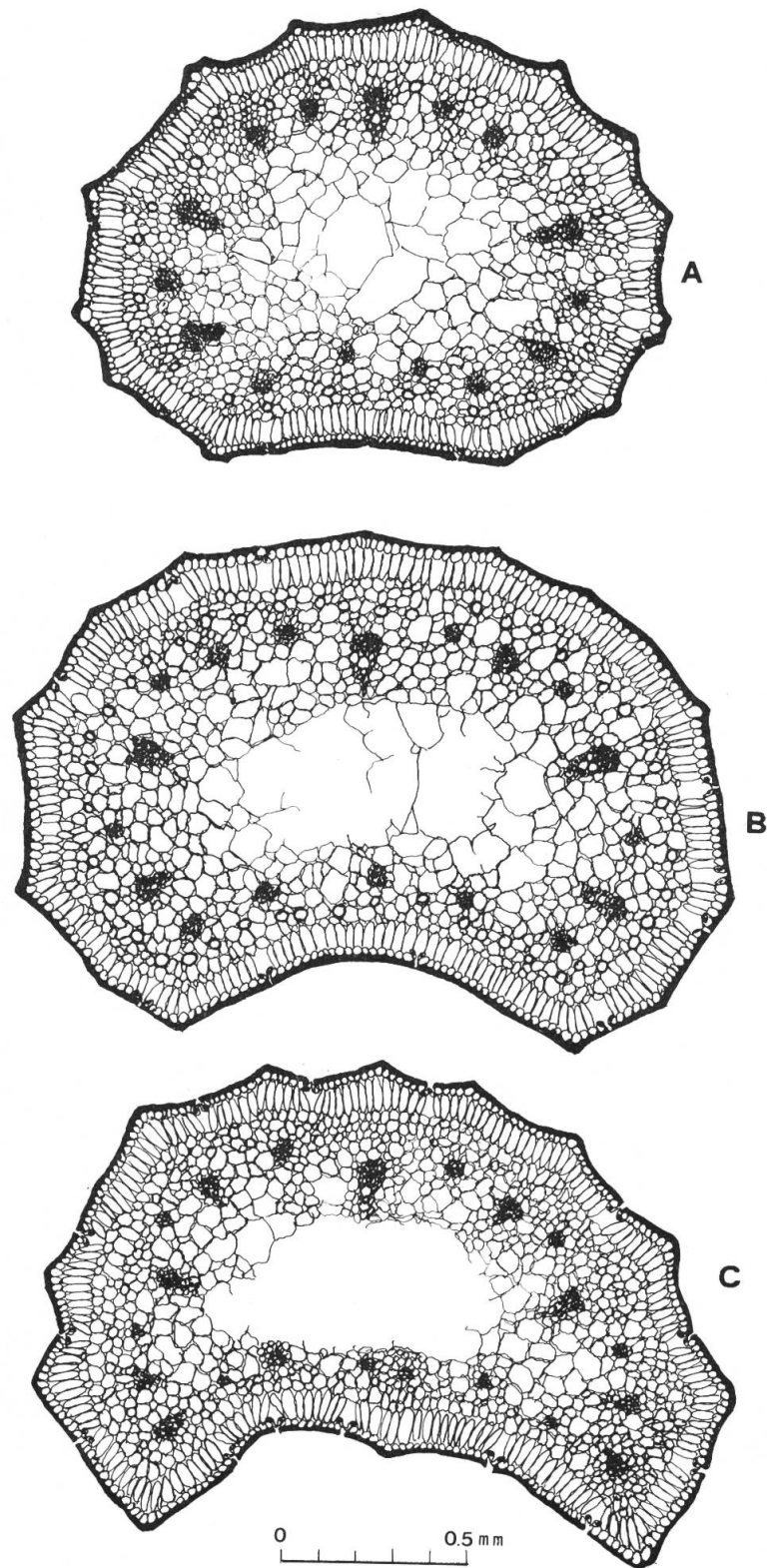


Fig. 6. — Leaf cross sections.
A, *A. cyprium*; B, *A. lefkarensis*; C, *A. marathasicum*.

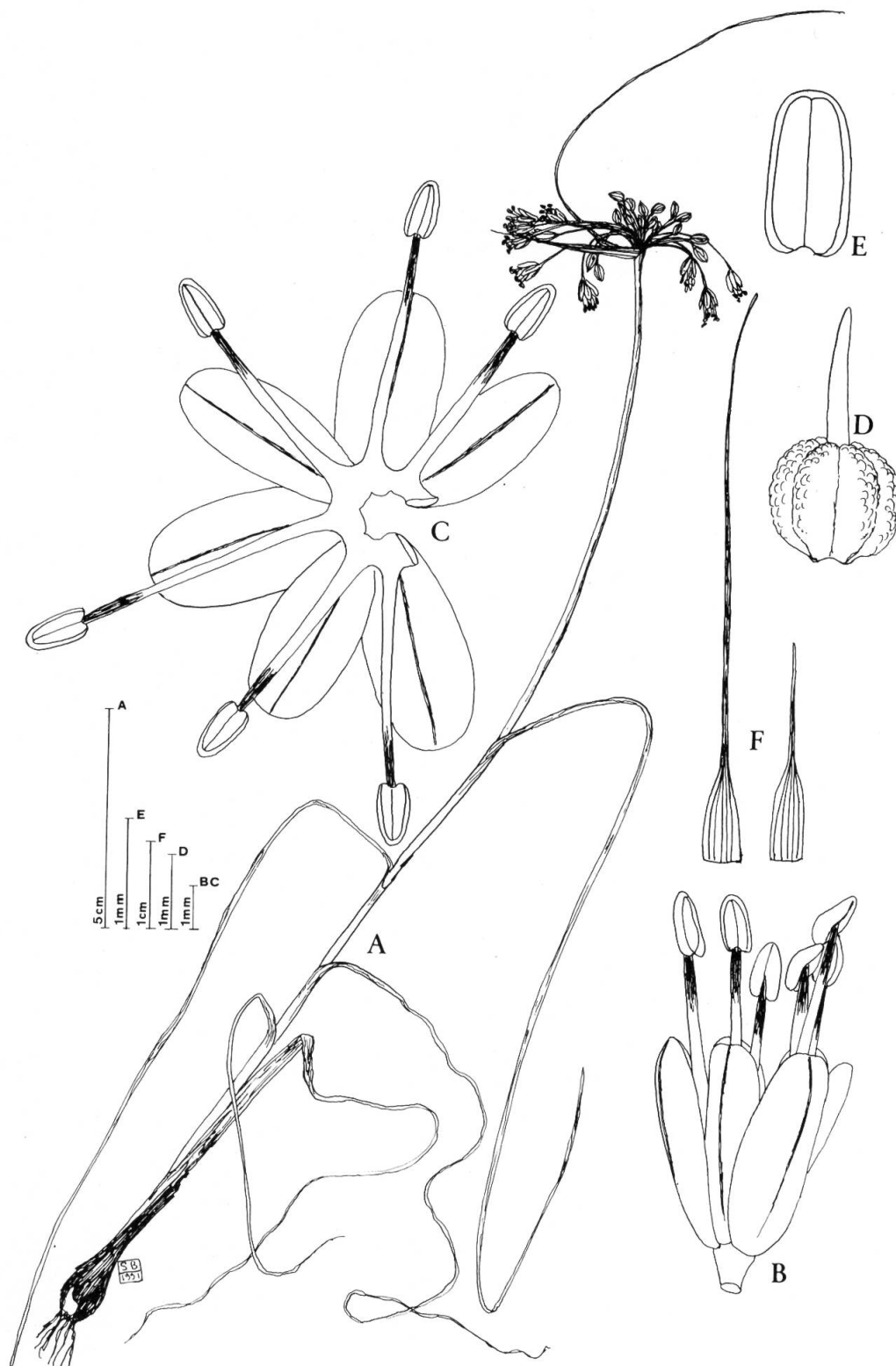


Fig. 7. — *Allium stamineum* Boiss.
 A, habit; B, flower; C, perigon with stamens; D, ovary; E, anther; F, spathe.

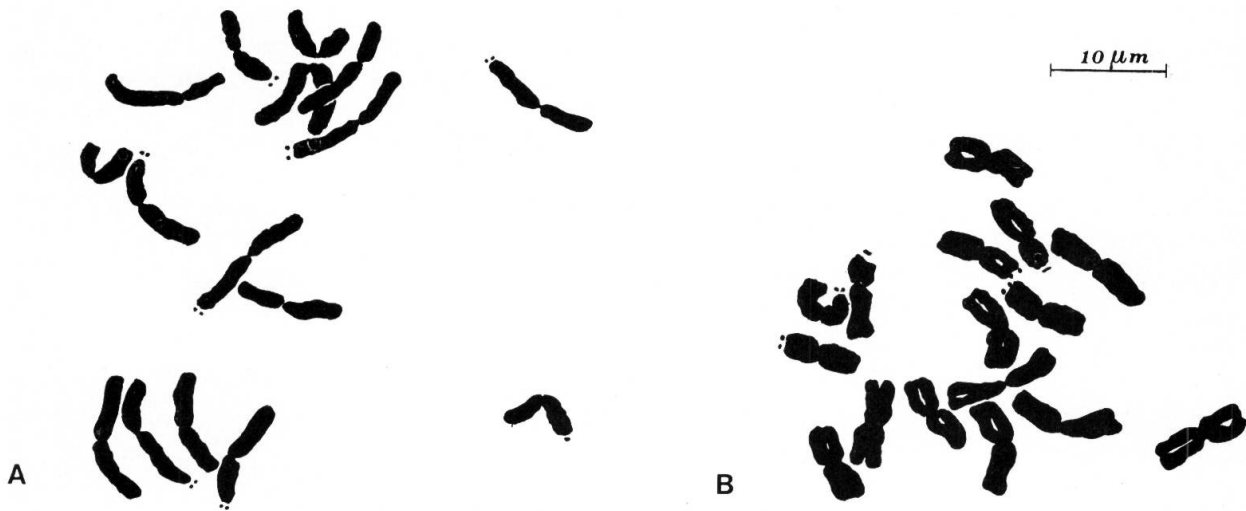


Fig. 8. — Mitotic chromosome plates of *A. stamineum* from Alikurt (A) and Aydin (B).

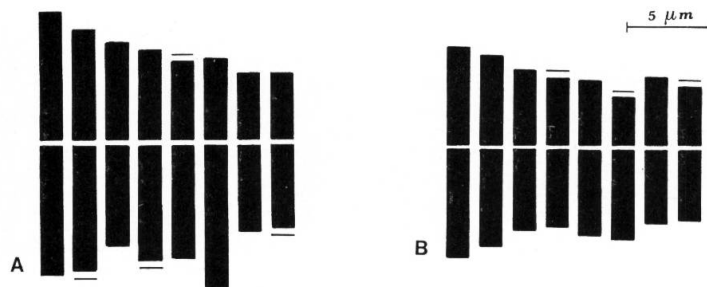


Fig. 9. — Idiograms of *A. stamineum* from Alikurt (A) and Aydin (B).

subgloboso-pyriforme, markedly tuberculate upper, 2.2×2 mm with style ca. 3.5 mm long. At least, also *A. lefkarensis* results well distinguished from *A. stamineum* in the inner bulb tunics often orange, flower pedicels up to 3 cm long, spathe valves 1-4 cm long, perigon cupshaped, 3-3.5 mm long with outer tepals elliptical and cucullate, ca. 2 mm wide, inner ones oblong, 1.5 mm wide, stamen filaments 1-4 mm long, dark purple, anthers white-yellowish, 1.3 mm long, ovary subgloboso-pyriforme, smooth, $1.7-1.8 \times 1.5-1.7$ mm, style purple, ca. 1 mm long.

From the karyological point of view, *A. stamineum* is a diploid species with $2n = 16$ (Fig. 8). In particular, the two investigated populations coming from Alikurt and Aydin show a karyotype quite similar, consisting of 7 metacentric pairs and 1 submetacentric pair (Fig. 9). Some differences regard the number and the position of the satellites, since in the Aydin population the satellites are localized in two metacentric pairs and in that one submetacentric, while the Alikurt population has satellited only four metacentric pairs. The two diploid species of Cyprus, viz. *A. cyprium* and *A. lefkarensis*, differ karyologically from *A. stamineum* mainly for the lack of the submetacentric pair. Concerning *A. marathasicum*, it results clearly more differentiated from *A. stamineum* for its triploid chromosome complement, although in its haploid set there is one submetacentric chromosome as well as in that one of *A. stamineum*.

Within *A. stamineum* cycle, likewise in other allied groups of *Allium* as for instance *A. paniculatum* L., *A. flavum* L., *A. myrianthum* Boiss., etc., the speciation processes are quite marked and they are mainly favoured by the geographic isolation, edaphic factors and reproduction systems. Regarding the three investigated species of Cyprus, it is possible to point out that their rise is due to the very old geographic isolation from the continental populations of *A. stamineum*.

In particular, *A. cyprium*, with a summer flowering (late June-July), seems to be the oldest species, taxonomically the most isolated, for its very peculiar morphological characteristics as well as for its confinement in the oromediterranean belt; while, the populations of *A. lefkarensis*, occurring in the basal zone with a xerothermo-mediterranean climate, result well distinguished from the previous species for their ecology, morphology and flowering period (May-early June); besides, *A. lefkarensis* results on the whole more related to *A. stamineum* s. str. for the big size and flower colour. On the contrary, *A. marathasicum*, for its triploid chromosome complement, apomixis and vegetative reproduction by bulbils, can be considered the species of more recent origin; that is also confirmed by its localization in synantropic habitats.

ACKNOWLEDGMENTS

Financial support by M.U.R.S.T. (40%, 60%) is gratefully acknowledged.

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