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SALVATORE BRULLO, PIETRO PAVONE & CRISTINA SALMERI

Allium daninianum (*Alliaceae*), a new species from the Middle East

Abstract

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Allium daninianum, a member of the *A. stamineum* group, is described as a species new to science and illustrated. The new species is distributed in Syria, Lebanon, Israel, Jordan and Transjordan, where it grows mainly in shrub communities below c. 900 m. Up to date it has been mingled with *A. stamineum* s. str., a species from SW Turkey.

Introduction

According to Boissier (1859, 1882), Wendelbo (1971), Kollmann & Shmida (1977), Shmida & Kollmann (1977), Stearn (1978, 1980), Miceli & Garbari (1979), and Kollmann (1984, 1985, 1986), *A. stamineum* Boiss. is distributed in numerous localities of Greece, Turkey, Syria, Lebanon, Israel, Jordan, Iraq and Iran; its populations, however, show a remarkable morphological variation. Previous investigations by the present authors (Brullo & al. 1993) revealed that *A. stamineum* actually represents a species complex, which is in need of a thorough examination mainly based on living material. Brullo & al. (1993) tackled the nomenclature of this species designating a lectotype out of the various syntypes quoted in the protologue by Boissier (1859), and provided an illustration as well as karyological data of populations from Caria in SW Turkey, the locus classicus of this species in its narrower sense.

The present paper deals with populations, hitherto referred to *A. stamineum* (Kollmann 1986), of Israel and the adjacent countries. An investigation of some populations in various localities of Israel revealed that these clearly differ in several morphological characters from typical *A. stamineum*. Examination of additional herbarium material led to the conclusion that this taxon, here described as a new species, *A. daninianum*, is widespread also in other areas of the Middle East. We are pleased to dedicate this species to Avinoam Danin, botanist at the Hebrew University of Jerusalem, in recognition of the perfect organization of the 2nd OPTIMA expedition in Israel.

Material and methods

The investigation was based on specimens from the herbaria B, BM, CAT, FI-W, G, HUJ, K, and MA as well as on plants collected in several localities of Israel (*Brullo* A1, A8, A14, A39, A40, A53, A54, A56, A60) and cultivated in the Botanical Garden of Catania. For the karyologi-

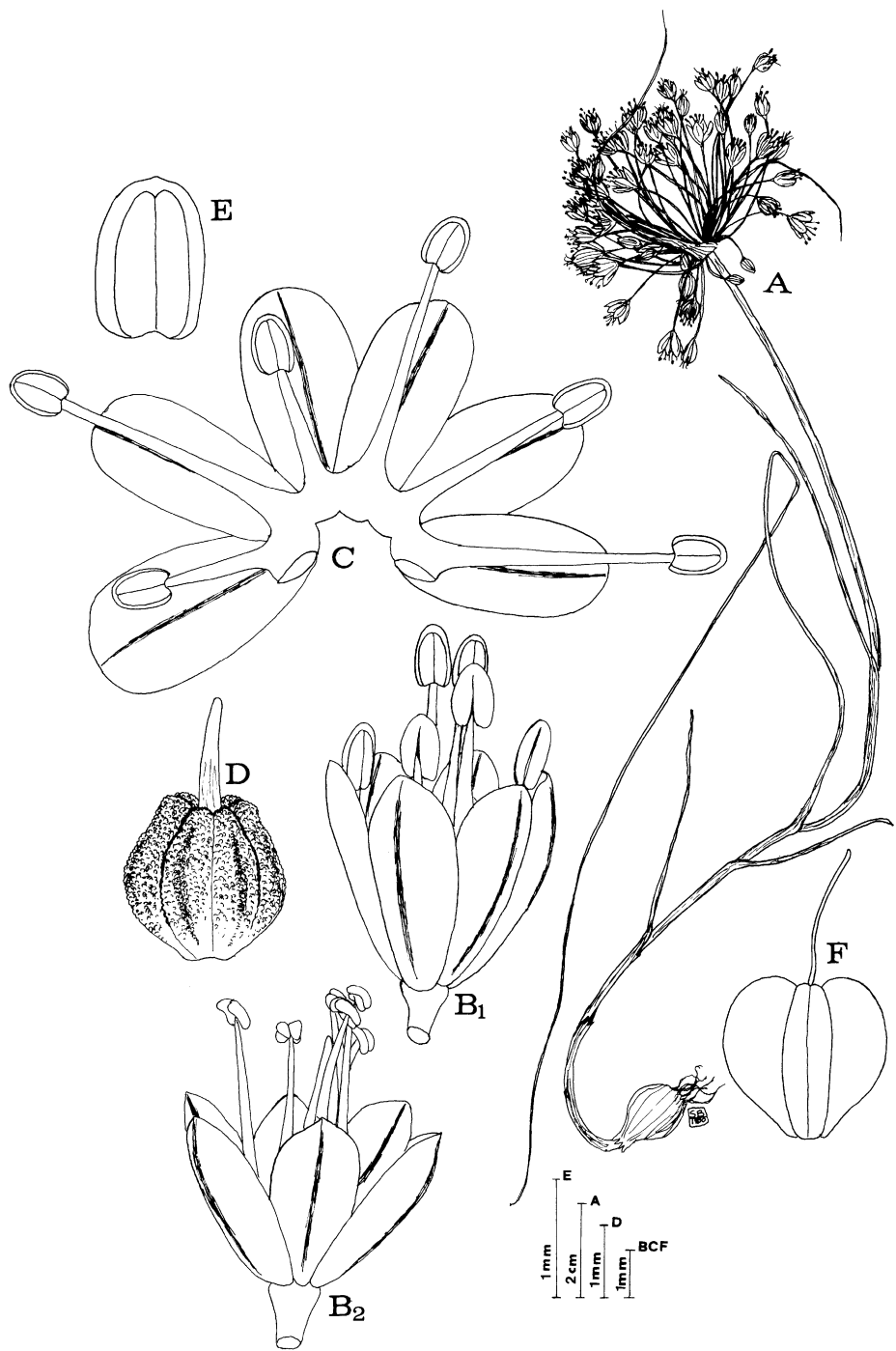


Fig. 1. *Allium daninianum* Brullo, Pavone & Salmeri – A: habit; B: flowers; C: perigon with stamens; D: ovary; E: anther; F: capsule.

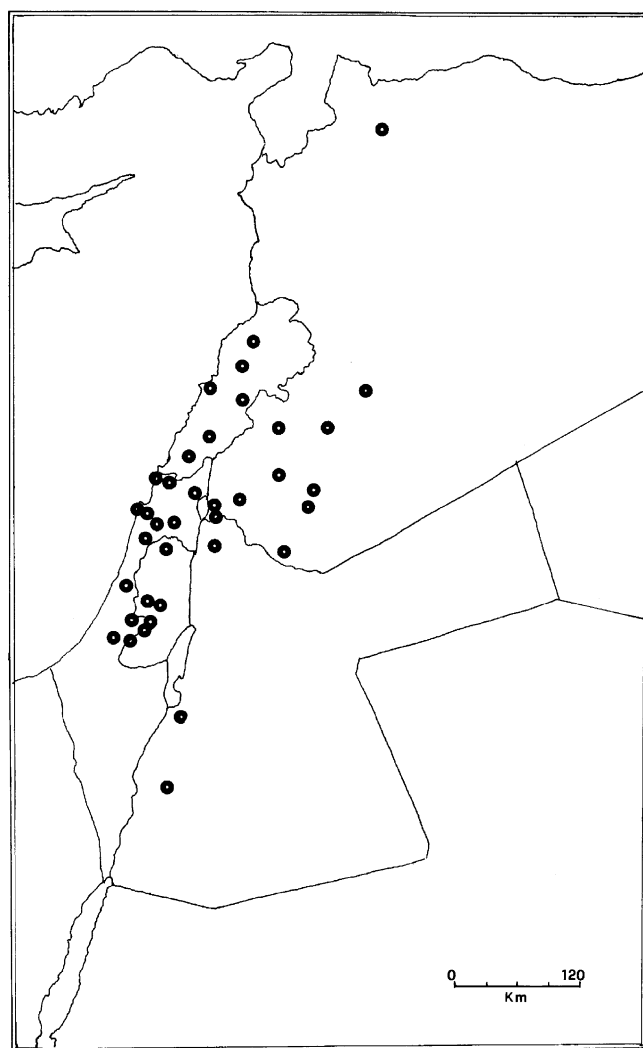


Fig. 2. Geographical distribution of *Allium daninianum* based on herbarium material.

cal studies, root tips of bulbs were pretreated with 0.3% colchicine, fixed in Carnoy and stained according to the Feulgen technique. Leaf anatomy was studied on cultivated material fixed in Karpetschenko and embedded in paraffin; the transverse sections were stained with ruthenium red and lightgreen yellowish.

Allium daninianum Brullo, Pavone & Salmeri, **sp. nova** – Fig. 1, 5.

Holotypus: Israel, Esdraelon Valley, near Yoqneam, 15.5.1990, *Brullo A56*, cult. in the Botanical Garden of Catania (CAT; isotypi: B, FI).

Bulbus ovoideus, 7–12 x 6–10 mm, tunicis internis membranaceis, hyalinis, externis nigrescentibus vel fusco-violaceis, coriaceis, marcescentibus. Folia 4–5, filiformia, plana, saepe scapum

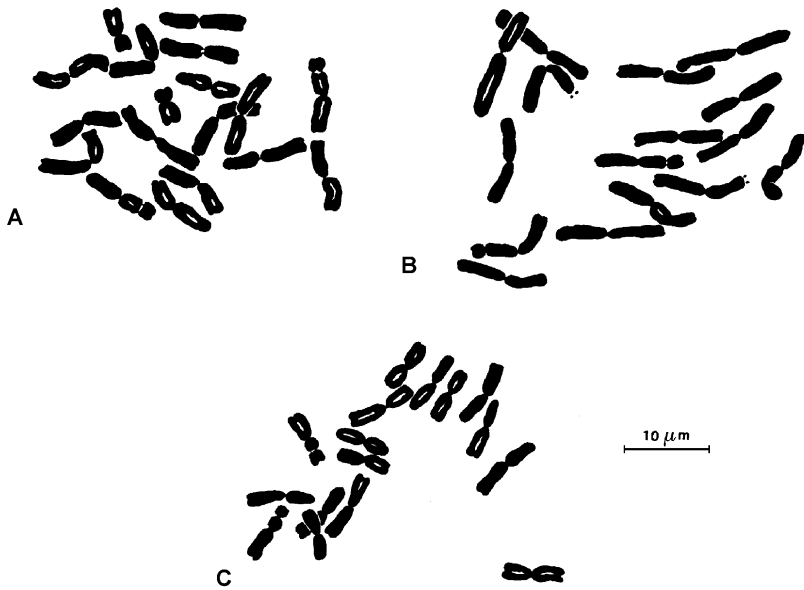


Fig. 3. *Allium daninianum* Brullo, Pavone & Salmeri – chromosome complements of Palestinian populations: Brullo A56 (A), Brullo A1 (B), and Brullo A14 (C)

excedentia, usque ad 25 cm longa et 1–1.5 mm lata, costata, fistulosa, vagina saepe violaceo-suffusa. Scapus solitarius, robustus, erectus, teres, glaber, 5–25 cm altus, 2–3.5 mm in diameter, vaginis foliorum per 1/2–2/3 longitudinis tectus. Inflorescentia laxa, multiflora, usque ad 80 flores, pedicellis inaequalibus, 1.5–4 cm longis, flexuoso-pendulis. Bostryces 10. Spatha bivalvis, persistens, valvis inaequalibus, majore 8–20 cm, minore 3.5–10 cm longa, 5–7-nervatis, longe appendiculatis. Perigonium conico-campanulatum, roseo-purpurascens vel purpureum, tepalis subaequalibus, oblongo-ellipticis, apice rotundatis, 4–5 mm longis, 2–2.3 mm latis, vena mediana purpurea. Stamina tepalis longiora, filamentibus simplicibus, superne purpurascentibus, exterioribus 2–4 mm longis, interioribus 4–5 mm longis, inferne cum tepalis per 1 mm in anulum connatis, antheris luteis, ellipticis, 1.2 mm longis. Ovarium subglobosum, leviter strangulatum superne, viride, omnino confertim papillosum, 2 × 2.2 mm. Stylus 1.5 mm longus, inferne purpurascens. Capsula trivalvis, 3–3.5 × 3.2–3.5 mm. Semina nigra.

Specimina visa

SYRIA: Magdala, 1863 Lowne (BM); Beirût, 5.1925, *Post 313* (BM); Kasgun, 22.4.1878, *Post* (K); Auron inter Damaskus et Daraa, 62 km a Damaskus meridiem versus, 26.5.1957, *Wendelbo 13008* (G, K); in collibus prope Aleppum, 20.5.1841, *Kotschy 234* (FI-W, K) former syntype of *A. stamineum*; Felsspalten das Djebel Kasihnnab Damaskus, 17.5.1937, *Bertschunger 216* (G); ibid., Sug el Esharb, 6.1900, *Post* (G); 10 km on S Ode Mazz. (Damas S.O), 7.5.1952, *Pabot* (G); Valle on S de Jerak, 12.5.1956, *Pabot* (G); bas de Ouadi Harir (Masma), 5.6.1957, *Pabot* (G). — LEBANON: Libano, *Kotschy 767* (G-BOIS) former syntype of *A. stamineum*; collines du Liban au dentour de Baranice, 12.4.1854, *Gaillardot 1059* (G-BOIS) former syntype of *A. stamineum*; in Libani australis declivitatibus occidentalis sub-alpinis in aridis prope Ani Zahalta, 13.–20.6.1910 *Bornmüller 19 910* (BM); Sas el Metz, 1.10.1962, *Birkinshaw 110* (K); Beharré, Zederwald, 17.7.1936, *Bertschunger 1898* (G); Ras Beyrou, 26.5.1886, *Vincent* (G); entre le Dahr el Baidor et Foulugha, 25.6.1956, *Mouterde 9876* (G); vers Gadmous, 8.1965, *Mouterde 13 125* (G); Ezroa, 3.5.1942, *Mouterde 7203* (G); environs de Brumona, sur le versant

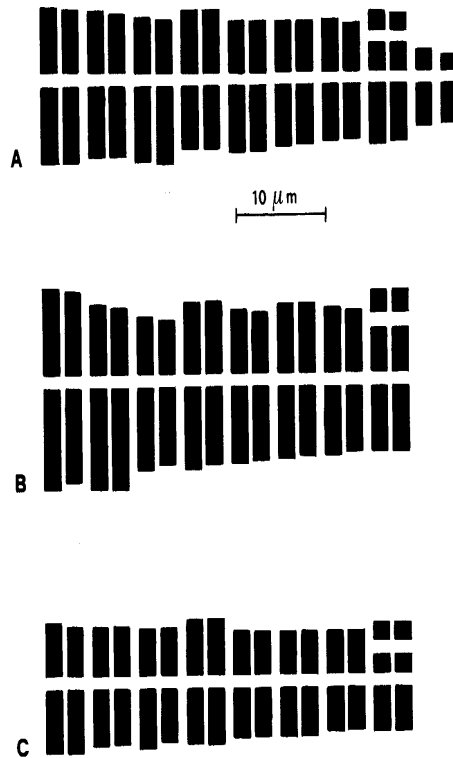


Fig. 4. *Allium daninianum* Brullo, Pavone & Salmeri – karyograms of complements of Palestinian populations: Brullo A56 (A), Brullo A1 (B), and Brullo A14 (C).

W de la chaine du Liban, 7.1879, *Cramer* (G); Beitaieri, 31.7.1884, *Peyron* (G). — ISRAEL: Palestine, Plaine Esdraelon, 4–5.1846, *Boissier* (G, G-BOIS) former syntype of *A. stamineum*; *ibid.*, ad Ascaloniam, 26.5.1897, *Bornmüller 1547* (G); *ibid.*, Mt. Karmel, near Harfa, 17.5.1950, *Amdursky 497* (BM, G, K, RO); *ibid.*, M. Karmel, *Labillardière* (G); *ibid.*, Carmel, 4–5.1843, *Boissier* (G-BOIS); *ibid.*, Monte Carmelo, 28.5.1884, *Peyron* (G); *ibid.*, Jerusalem, 5.1857, *Roth 426* (G-BOIS); *ibid.*, 1860, *Kiener* (G); *ibid.*, rocky places, 21.6.1912, *Dinsmore 8064* (MA); *ibid.*, on ledge of rocks leading down to Jamb of Kings, 11.5.1963, *Maitland 30* (G); *ibid.*, Shoshana, 10.5.1989, cult., *Brullo A60* (CAT); environs de Jerusalem, 3–5.1858, *Kiener* (G); Hierosolyma, 5.1861, *Roth* (K); M. Tabor, 1963–64, *Lowne* (K); East Sorder, 1873, *Paine* (K); Sheekh Tairah, Jerusalem on rocky, 11.5, *Gosh 30* (K); outer Jerusalem between Beit Vagan al Beit Akenem, 19.6.1978, cult., *Chaovat & Shaw* (K); Kulonieh, Champ ground, 22.7.1911, *Dinsmore 2064b* (MA); Rocks, Ras en Nakura, 1.5.1913, *Dinsmore 31 070* (G); Fillads Shahbab, 25.5.1933, *Dinsmore 11 070* (K); fields Ascent to Ayum Musa, 22.4.1911, *Meyers & Dinsmore 1070* (G, K); Ain Ballota, 12.5.1911, *Meyers & Dinsmore 3070* (K); above Jabok river, 2.5.1911, *Meyers & Dinsmore 91 070* (K); dry places Yarmuh to Shyara, 7.5.1914, *Meyers & Dinsmore 83 070* (G); in collibus arenosis haud Ramlech, 18.5.1881, *Letourneux* (G);

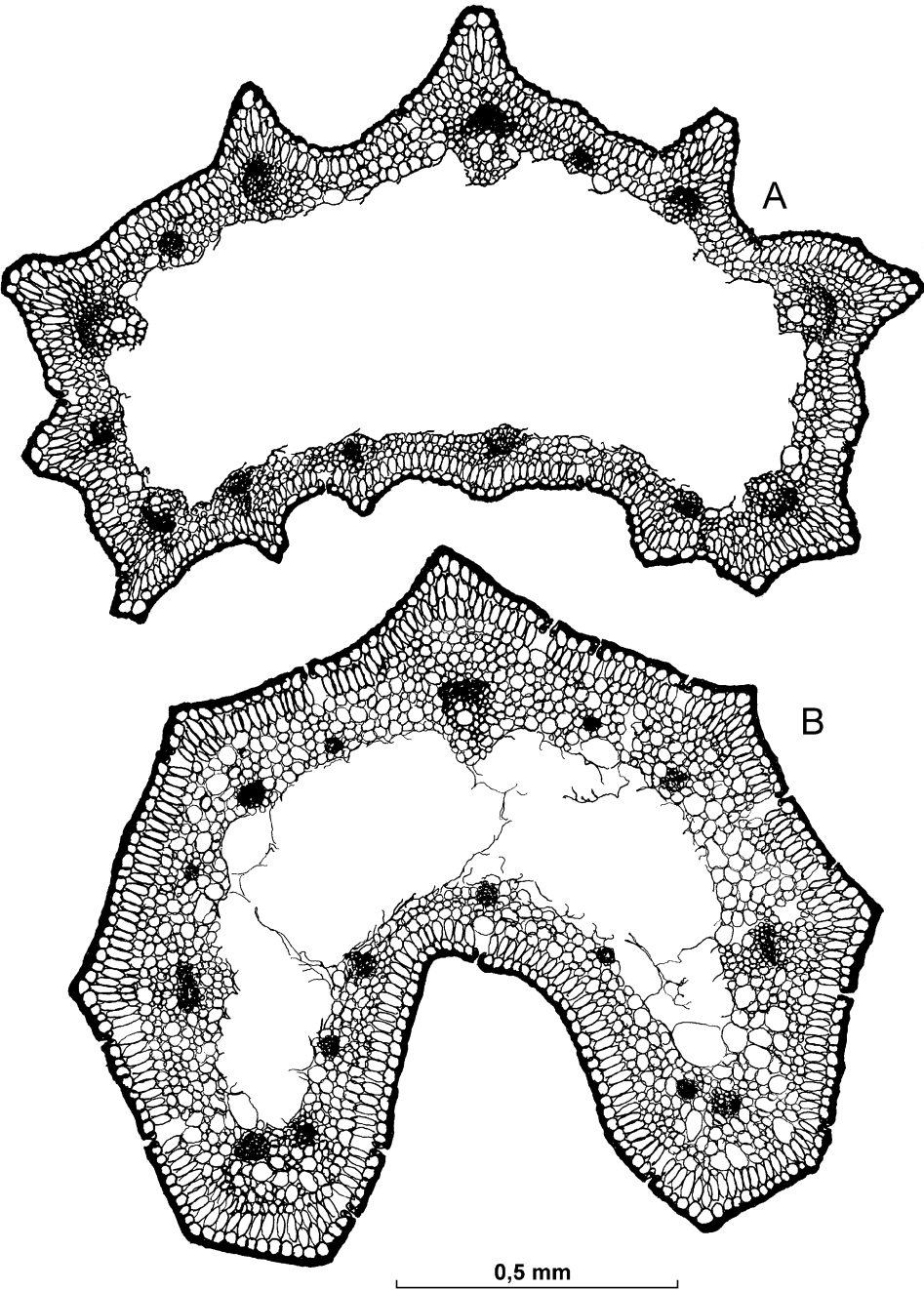


Fig. 5. *Allium daninianum* Brullo, Pavone & Salmeri – leaf cross sections of *Brullo A14* (A) and *Brullo A56* (B).

Phaure Qatat Duba, 27.4.1939, *Dinsmore 13 070* (G); Azovad Zekhran Jacol, 1933, *Aaronsohn* (G); in rupestribus Palestina pr. Gennin, 1.5.1887, *Ball 1255* (G-BOIS); Sharon Palin, Ein Hai, 14.5.1925, *Eig* (HUJ); Hezzliya region C. on Kurkar rock, 10.4.1941, *Zohary* (HUJ); Hadera, 8.4.1926, *Zohary* (HUJ); Dar Kurkar hills, 16.4.1966, *Kollmann 1972* (HUJ); Kinnrot Valley, near En Sheva (Tabkha), 3.4.1989, *Danin & al. 40 014* (CAT); *ibid.*, 15.5.1992, cult., *Brullo A40* (CAT); *ibid.*, near Kibbutz Haon, 20.4.1989, cult., *Brullo A39* (CAT); Judean Foothills, near Netiv Halamed-hei, 10.5.1989, cult., *Brullo A1* (CAT); Samarian desert, near Ma'ale Mich-mash, 10.5.1989, cult., *Brullo A8* (CAT); Judean, Mt. Kiryat Anavim, 5.5.1989, cult., *Brullo A14* (CAT); Upper Galilee, near Ya'ara, 20.4.1989, cult., *Brullo A53* (CAT); Coastal Galilee, coast of Rosh Hanipra, 20.4.1989, cult., *Brullo A54* (CAT); Esdraelon Valley, near Yoqneam, 15.5.1990, cult., *Brullo A56* (B, CAT, FI). — JORDAN: Wadi Wala, 7.5.1974, *Boulos 7182* (K). — TRANSJORDAN: Dlubanto Wadi Hemad, 27.4.1945, *Hwavis 9613* (K); Gebel Uxeigi (Edon) on basalt, 22.4.1945, *Hwavis 9211* (K).

Ecology and distribution

Allium daninianum is widespread in the Middle East (Syria, Lebanon, Israel, Jordan, Trans-jordan) (Fig. 2), where it grows in maquis, dwarf shrub communities, batha, rocky places. It occurs from the coastal belt to an altitude of 800–900 m. It flowers from late March to mid-May.

Karyology

All the investigated populations of *Allium daninianum* showed a diploid chromosome complement with $2n = 16 + 0-2B$ (Fig. 3). This count confirms the reports for this taxon (sub *A. stamineum*) by Feinbrun (1950) and Kollmann (1985, 1986) from Palestine and by Shmida & Kollmann (1977) from Lebanon. The karyotype is quite regular and uniform, characterized by seven metacentric pairs, one of which is microsatellited on the short arms, and by one submetacentric pair with large satellites. The plants from the collection *Brullo A56* occasionally show metaphases with 1 or 2 B-chromosomes (Fig. 4); B-chromosomes were also observed by Kollmann (1985, 1986) in some Palestinian populations. In *A. stamineum* s. str. also $2n = 16$ were counted and seven metacentric and one submetacentric pairs found, but in contrast to *A. daninianum*, 3–4 pairs are microsatellited and none is macrosatellited (Brullo & al. 1993).

Leaf anatomy

The leaves are flat outline and have many ribs. The epidermis has bigger cells on top of the ribs and is covered by a well-developed cuticle; the stomata are distributed on the whole surface. The palisade tissue is single-layered except for the ribs where it is two-layered. The spongy tissue is rather compact, regular in the peripheral portion and with several secretory canals, while widely fistulous in the centre; 8 abaxial and 6–8 adaxial vascular bundles occur (Fig. 5).

Relationships

Several species were previously (Kollmann 1984, 1986, Brullo & al. 1993) included in the *Allium stamineum* group, i. e. *A. hymettium* Boiss. & Heldr., *A. decaisnei* C. Presl, *A. pictistamineum* O. Schwarz, *A. albotunicatum* O. Schwarz, *A. pseudostamineum* Kollmann & Shmida, *A. cyprium* Brullo, Pavone & Salmeri, *A. lefkareense* Brullo, Pavone & Salmeri and *A. marathasicum* Brullo, Pavone & Salmeri. This group, belonging to *A. sect. Codonoprasum* Reichenb., is characterized by a spathe with two free valves much longer than the inflorescence, a lax and diffuse umbel, a usually campanulate or cup-shaped perigon, simple (never trifid) and long exerted stamens (at least the inner ones and the outer ones then normally lengthened after anther dehiscence). It is circumscribed to the E Mediterranean region spreading into the Irano-Turanian region.

A. daninianum differs from *A. stamineum* s. str. from SW Turkey in many morphological characters: *A. stamineum* is characterized (Brullo & al. 1993) by a taller (25–50 cm) and more slender stem covered up to half the length by the leaf sheaths, by semicylindrical leaves, shorter spathe valves (the longer one up to 10 cm, the shorter one up to 5 cm), a less flowered umbel

(max. 40 flowers), 12 bostryces, greenish or purplish and unequal tepals (the outer ones 2.5 mm, the inner ones 2 mm wide), by all stamens long exerted with filaments up to 6 mm and oblong-elliptical anthers 1.5 mm long, the only apically slightly scabrid-papillose ovary, and the entirely white style.

For the lax inflorescence, the conical-campanulate perigon, the inner stamens longer than the outer ones and the entirely papillose ovary, *A. daninianum* is similar to *A. decaisnei*, but the latter species differs in its fibrous outer bulb coats, the few-flowered inflorescence (max. 30 flowers), shorter spathe valves (1–3 cm long), the smaller perigon (3–4 mm long) with brown-greenish or yellow-greenish and shortly apiculate tepals, the white stamen filaments, the smaller ovary (1.5 × 1.8 mm) and the white style.

A. daninianum can be considered as a southern vicariant of *A. stamineum* and its allied species with a northern distribution; thus its origin could be assigned to geographic isolation. *A. daninianum* and *A. decaisnei* both occur in Palestine but show a clear ecological differentiation; *A. decaisnei* is linked to subdesertic climatic conditions, whereas *A. daninianum* is usually found in habitats characterized by a typical Mediterranean climate. The adjustment to different ecological conditions probably influenced the speciation processes of these two species.

Acknowledgements

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