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Minuartia favargeri: a new species from Peloponnesus (Greece)

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RÉSUMÉ

IATROÚ, G. & T. GEORGIADIS (1985). *Minuartia favargeri*: une espèce nouvelle du Péloponnèse (Grèce). *Candollea* 40: 129-138. En anglais, résumé français.

Minuartia favargeri a été trouvée sur des rochers calcaires dans la partie orientale du Mt. Parnon, en Arcadie (Péloponnèse). Cette espèce, qui appartient à *Minuartia* sect. *Acutiflorae* ser. *Pichleriae* est en rapport avec l'endémique du sud du Péloponnèse *M. pichleri* et l'endémique du sud de l'Anatolie *M. rimarum*. Les nombres chromosomiques ($2n = 26$) et les caryotypes des deux endémiques grecques sont nouveaux. Les auteurs présentent aussi le nombre total des taxa endémiques grecs du genre *Minuartia* ainsi que leur distribution.

ABSTRACT

IATROÚ, G. & T. GEORGIADIS (1985). *Minuartia favargeri*: a new species from Peloponnesus (Greece). *Candollea* 40: 129-138. In English, French abstract.

Minuartia favargeri is described from calcareous rocks of the E. side of Mt. Parnon, in the province of Arkadhia, Peloponnesus. This species belonging to *Minuartia* sect. *Acutiflorae* ser. *Pichleriae* is related to the Peloponnesian endemic *M. pichleri* and to the S. Anatolian endemic *M. rimarum*. The chromosome number ($2n = 26$) and the karyotypes of the two Greek endemic species are new. The total number of the Greek endemic taxa of *Minuartia* as well as their distribution are presented.

***Minuartia favargeri* Iatroú & Georgiadis, sp. nova** (Fig. 1).

Typus: Greece: Peloponnesus, prov. Arkadhia, in declivibus orientalibus montis Parnon; prope Monasterium Elona, in saxosis calcareis alt. ca. 550 m, 7.VII.1983, *Gr. Iatroú & E. Kokkinos 1915* (holotypus UPA).

Planta perennis, dense pulvinato-caespitosa. Caules erecti vel adscententes 3-8 cm alti, cum foliis dense glanduloso-pilosis; folia basalia 3-nervia 8-10(-12) mm longa, 1 mm lata. Flores (2-)3-6(-8) in cymas terminalis dispositi. Pedicelli dense glanduloso-pilosi, calycibus campanulatis 3-vel 5-plo longiores. Sepala ovato-lanceolata, dense glanduloso-pilosa, anguste scarioso marginata 2.5-3 mm longa 1 mm lata. Petala cuneato-oblongo-obovata 4.5-5 mm longa calyce sesqui vel duplo longiora. Capsula calyce sesquilongior. Glandes staminales 0.1-0.2 mm longae. Semina dorso tenuiter tuberculata.

Numerus chromosomatum: $2n = 26$.

Ex affinitate *M. pichleri* (Boiss.) Maire & Petitmengin et *M. rimarum* (Boiss. & Bal.) Mattf.

Densely caespitose, cushion-forming, perennial. The whole plant densely glandular pubescent. Stems 3-8 cm high, erect. Basal leaves 8-10(-12) mm long, 1-1.2 mm broad, 3-veined, somewhat falcate. Cymes (2-)3-6(-8) flowered; pedicels 3-5 times as long as sepals. Calyx campanulate with sepals ovate-lanceolate 2.5-3 × 1 mm, with narrow membranous margins. Petals 4.5-5 mm long, at least 1½ times as long as sepals. Capsule very obviously exerted calyx, about 1½ times as long as calyx. Staminal glands 0.15-0.2 mm long, forming a short finger-like process with an apical nectar pit. Seeds black, slightly tuberculate on the back. Flowering period from late May to early July.

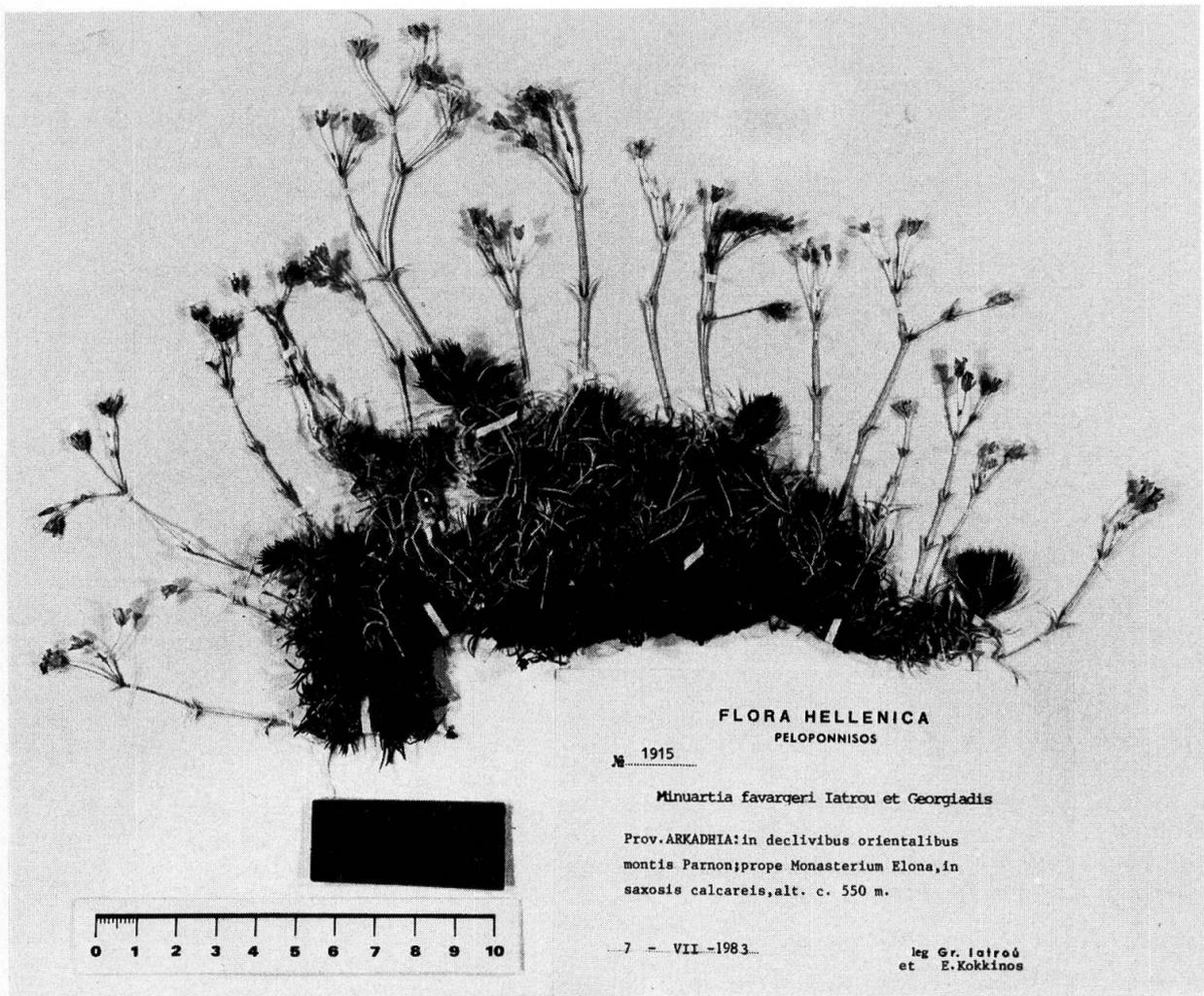


Fig. 1. — *Minuartia favargeri* (holotypus).

Minuartia favargeri is endemic on Mt. Parnon of E. Peloponnesus. It is a typical chasmophyte growing in rock crevices of hard limestone, at an altitude of 500-600 m above sea level. The station in which it prospers consists of a rocky limestone ecosystem, just before the Monastery of Elona, in the gorge which starts from the village of Leonidion and ends before the village of Kosmas. In this ecosystem predominate the following plants: *Asperula boryana* (Walpers) Ehrend., *Asperula taygetea* Boiss. & Heldr., *Asperula elonea* Iatroú & Georgiadis, *Athamantha macedonica* (L.) Sprengel subsp. *arachnoidea* (Boiss. & Heldr.) Tutin, *Stachys chrysantha* Boiss. & Heldr. *Trachelium asperuloides* Boiss. & Orph., *Petrorhagia grandiflora* Iatroú, *Centaurea raphanina* Sibth. & Sm. subsp. *mixta* (DC.) Runemark, *Onosma graeca* Boiss., *Ceterach officinarum* DC., *Micromeria juliana* (L.) Bentham ex Reichenb., *Briza minor* L., *Parietaria* sp., *Galium* sp., *Sedum* sp., *Inula* sp., *Odontites* sp. The area around this station belongs to the sub-humid Mediterranean bioclimatic zone, with a mean annual rainfall of 600-800 mm and a mean annual sunlight of 2800 hrs.

M. favargeri and *M. pichleri* are closely related to each other and have the same chromosome number, $2n = 26$. They are schizoendemics (FAVARGER, 1964). *M. rimarum* is closely related and geographically vicarious with both. The two former species are restricted to Peloponnesus and the latter is endemic in C. Anatolia, with its main centre of distribution in the Taurus mountain range.

Taxon	Locality	Collector	Chromosome number
<i>M. favargeri</i>	Greece, Peloponnesus: Mt. Parnon, Monasterium Elona, ca. 550 m	Iatroú & Kokkinos 1915	$2n = 26$
<i>M. pichleri</i>	Greece, Peloponnesus: Mt. Taygetos, Langada gorge, ca. 500 m	Iatroú & Georgiadis 2142	$2n = 26$
<i>M. rimarum</i> var. <i>rimarum</i>	Turkey, Izmir: Ödemiş, Bozdağ Boz Dağ	Contandriopoulos 68-196	$n = 13$ (ÇELEBIOĞLU & FAVARGER, 1982)
<i>M. rimarum</i> var. <i>rimarum</i>	Turkey, Kayseri: Erciyas Dağı, alt. 2200 m	Welter & Hébert 34 A. W.	$n = 13$ (ÇELEBIOĞLU & FAVARGER, 1982)
<i>M. rimarum</i> var. <i>multiflora</i>	Turkey, Konya: Ermerek, Yellibel, alt. 2000 m	Contandriopoulos	$n = 13$ (ÇELEBIOĞLU & FAVARGER, 1982)

Table 1. — Collecting sites of populations used for the cytological study. The Turkish material is according to ÇELEBIOĞLU & FAVARGER, 1982.

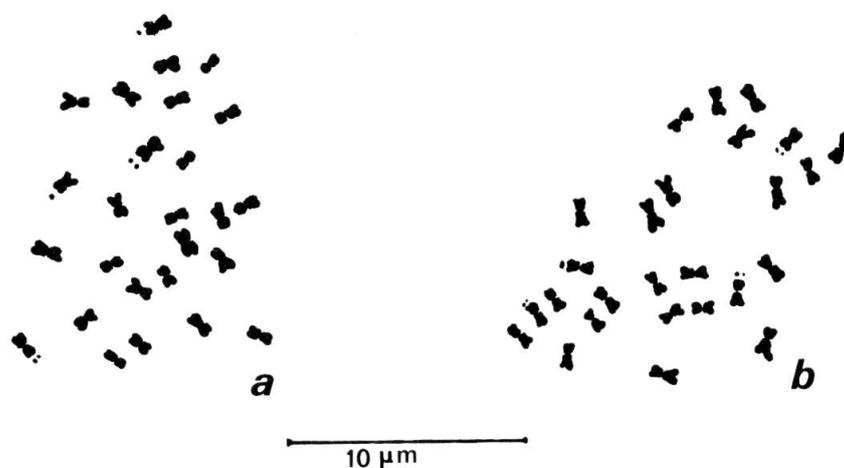


Fig. 2. — Mitotic chromosome plates: **a**, *Minuartia favargeri*; **b**, *Minuartia pichleri*.

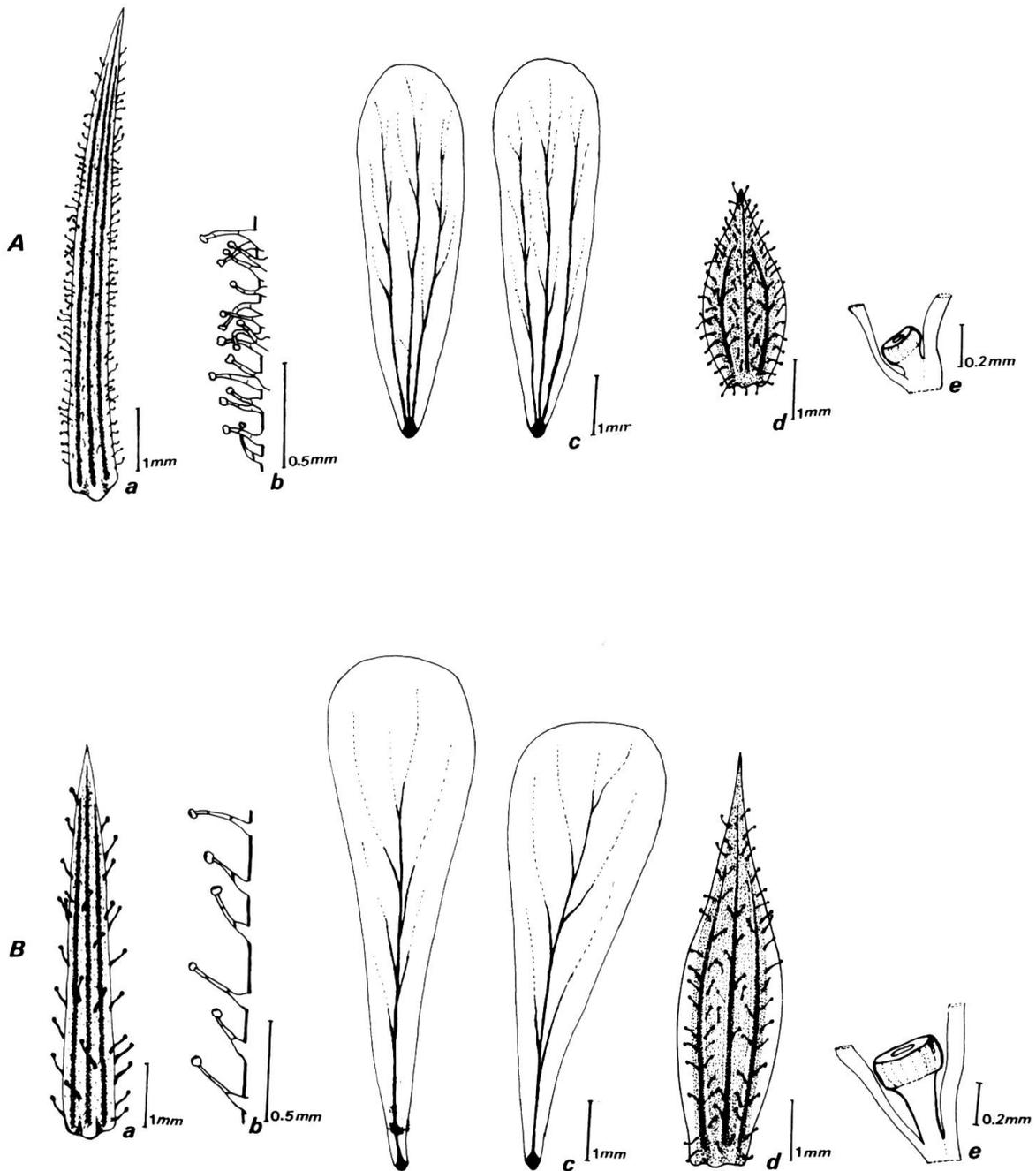


Fig. 3. — Differences between basal leaves, hair-covering, petals, sepals and staminal glands.
A. *Minuartia favargeri*: **a**, basal leaf; **b**, hair-covering; **c**, petals; **d**, sepal; **e**, staminal gland.
B. *Minuartia pichleri*: **a**, basal leaf; **b**, hair-covering; **c**, petals; **d**, sepal; **e**, staminal glands.

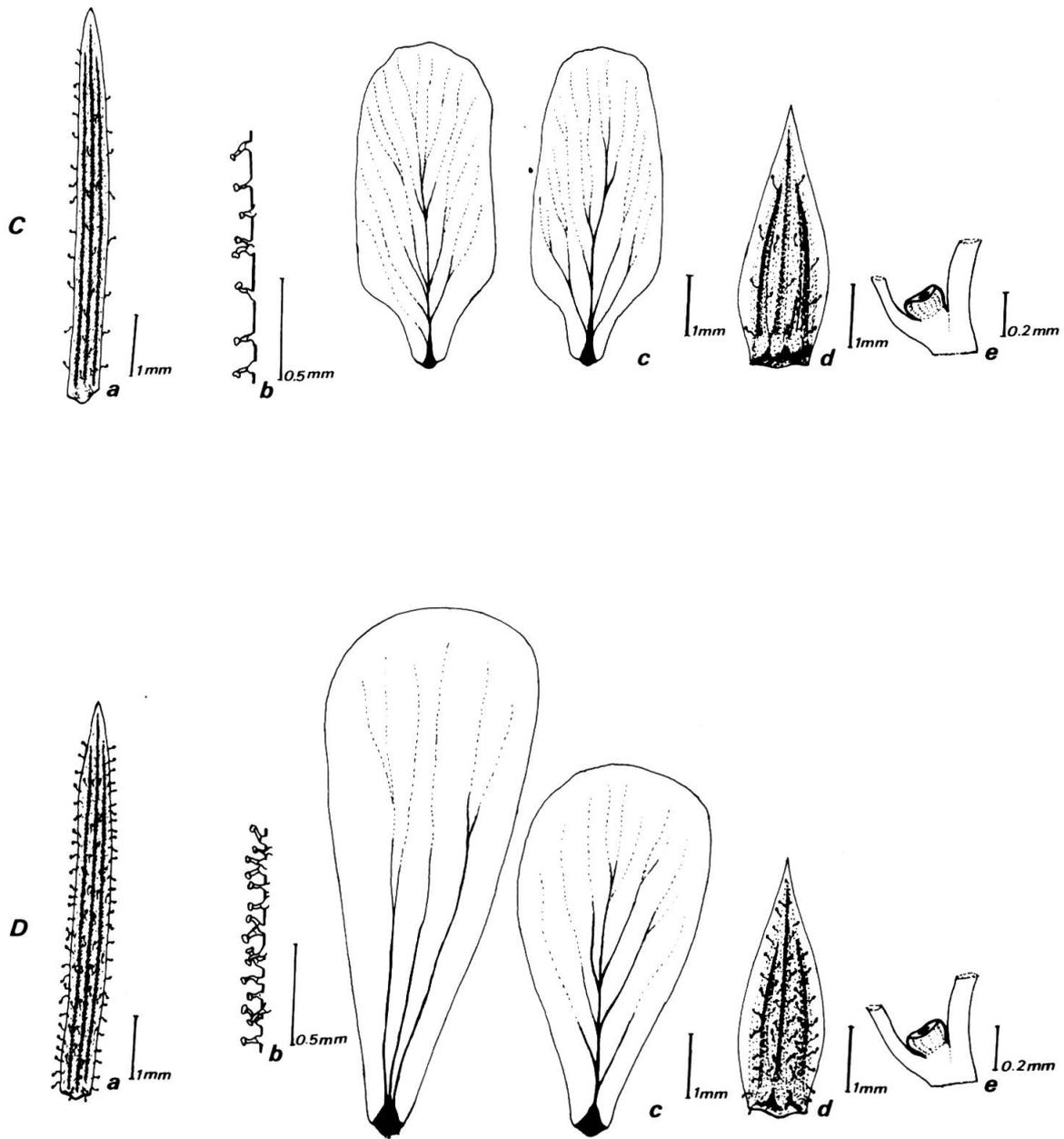


Fig. 4. — Differences between basal leaves, hair-covering, petals, sepals and staminal glands.
B. *Minuartia rimarum* var. *rimarum*: **a**, basal leaf; **b**, hair-covering; **c**, petals; **d**, sepal; **e**, staminal gland.
D. *Minuartia rimarum* var. *multiflora*: **a**, basal leaf; **b**, hair-covering; **c**, petals; **d**, sepal; **e**, staminal gland.

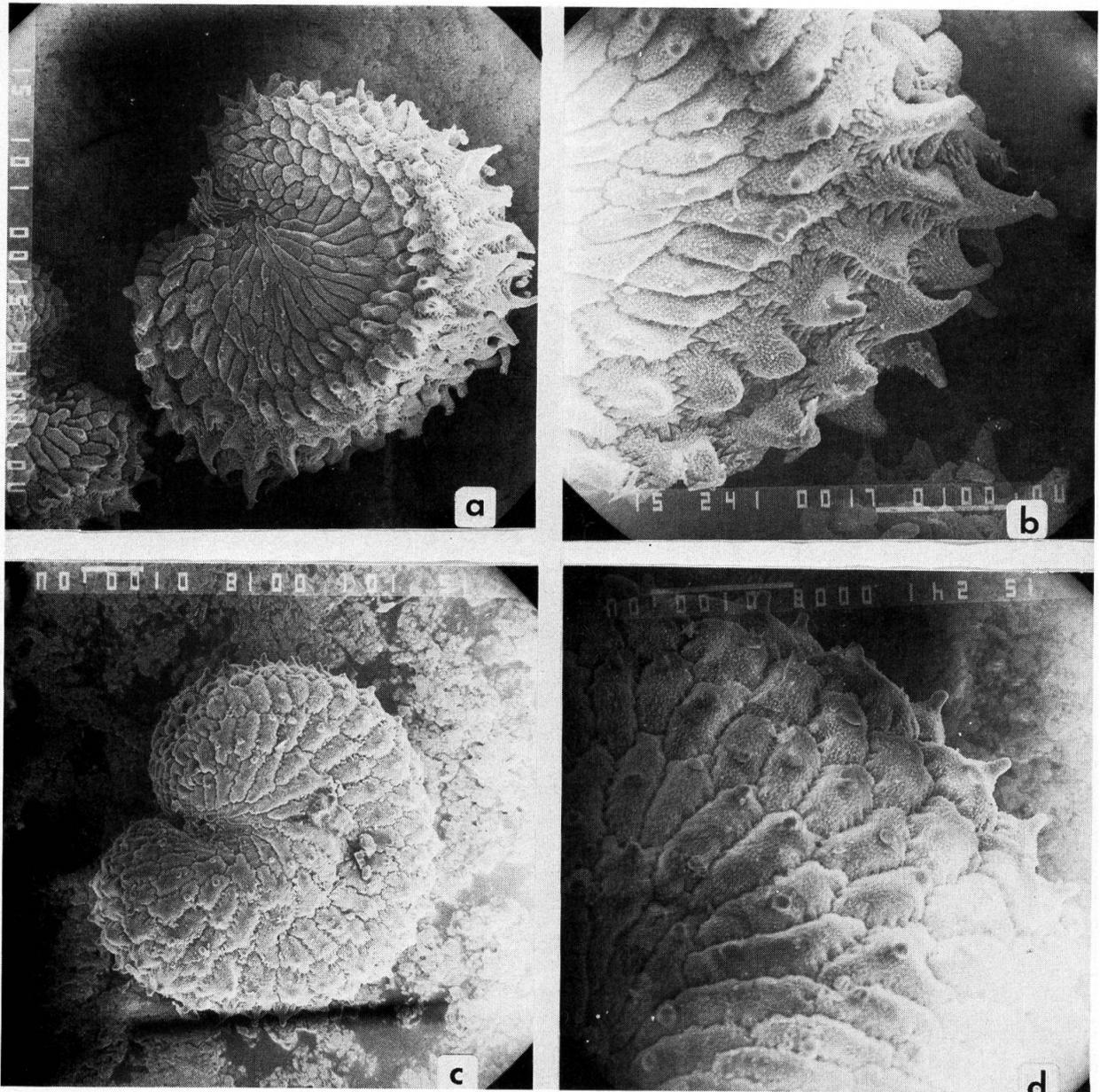


Fig. 5. — SEM photographs of the seeds (a, b) *Minuartia pichleri*: a, whole seed ($\times 100$); b, outer cells of the median zone ($\times 240$).

(c, d) *Minuartia favargeri*: c, whole seed ($\times 100$); d, outer cells of the median zone ($\times 240$).

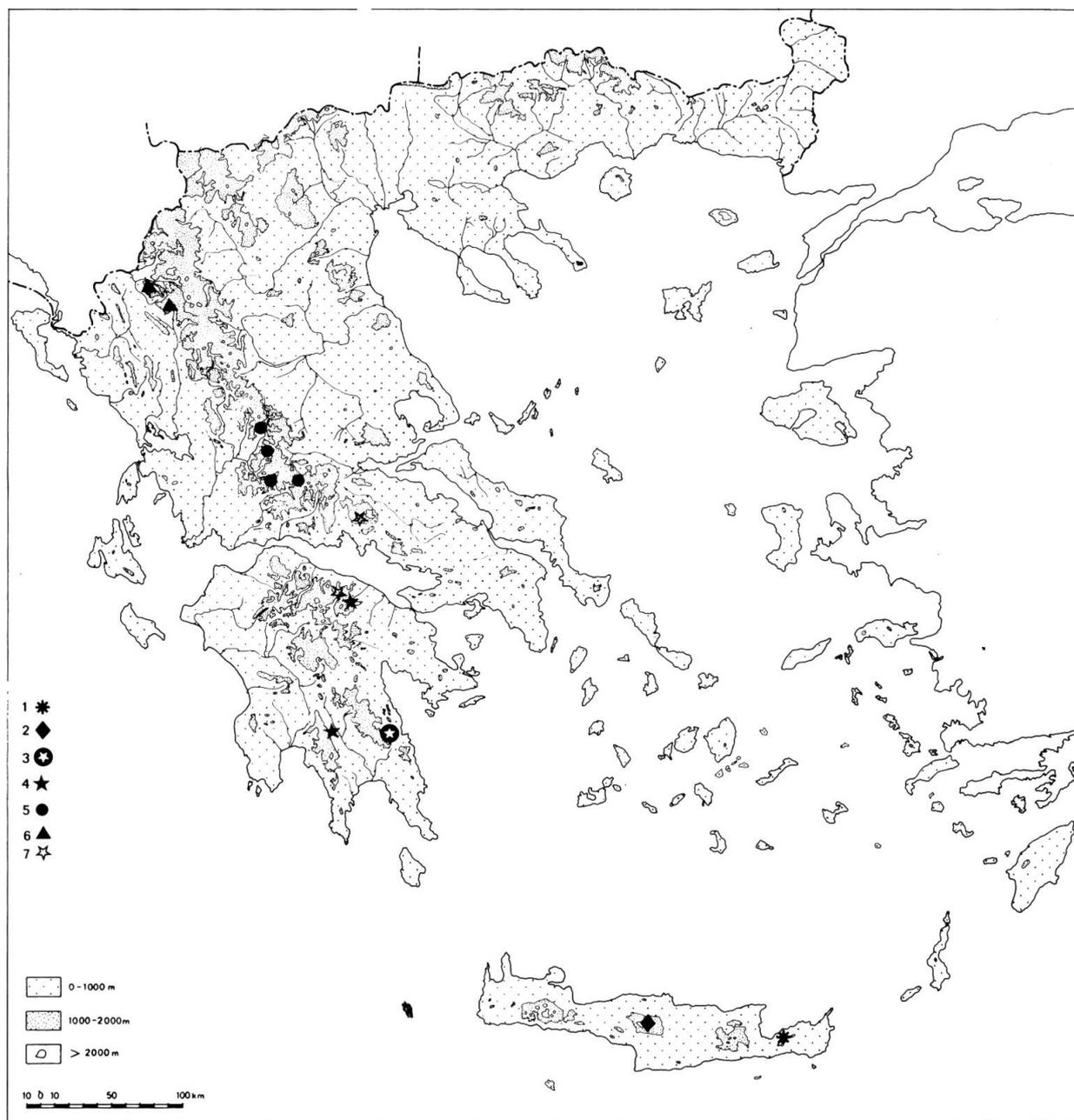


Fig. 6. — Map of geographical distribution of the taxa endemic in Greece of the genus *Minuartia*. 1. *Minuartia wettsteinii* Mattf. 2. *M. verna* (L.) Hiern subsp. *idaea* (Halacsy) Hayek. 3. *M. favargeri* Iatrou & Georgiadis. 4. *M. pichleri* (Boiss.) Maire & Petitmengin. 5. *M. eurytanica* (Boiss.) & Heldr.) Hand.-Mazz. 6. *M. pseudosaxifraga* (Mattf.) Greuter & Burdet. 7. *M. confusa* (Heldr. & Sart.) Maire & Petitmengin.

<i>Minuartia favargeri</i>	<i>Minuartia pichleri</i>	<i>Minuartia rimarum</i>
Perennial plants, cushion-forming, densely caespitose glandular pubescent.	Perennial plants, cushion-forming, densely caespitose glandular pubescent.	Perennial, mat- to cushion-forming glandular or densely glandular pubescent.
Stems 3-8 cm high, erect.	Stems 3-10 cm high, erect.	Stems up to 8 cm high erect.
Leaves 3-veined, basal 8-10(-12) × 1 mm.	Leaves 3-veined, basal 5.5-6 × 1 mm.	Leaves 3-veined, basal 4-8 × 1 mm.
Cymes (2-3)-6(-8) flowered, pedicels 3-5 times as long as sepals.	Cymes (1)2-4(6) flowered, pedicels 3-5 times as long as sepals.	Cymes 1-5 flowered, pedicels 3-5 times as long as sepals.
Calyx campanulate with sepals ovate-lanceolate 2.5-3 × 1 mm, with narrow membranous margin, densely glandular pubescent.	Calyx funnelled with sepals oblong-lanceolate 4.5-5 × 1 mm, with broad membranous margin, glandular pubescent.	Calyx ± campanulate with sepals ovate-lanceolate, acuminate, 4-5 × 1 mm, with ± broad membranous margin, glandular or densely glandular pubescent.
Petals 4.5-5 mm long, at least 1½ times as long as sepals.	Petals 7-7.5 mm long, up to 1½ times as long as sepals.	Petals 5.5-8.5 mm long, 1½ times as long as sepals.
Capsule very obviously exerted calyx (about 1½ times as long as calyx).	Capsule slightly exceeds calyx.	Capsule shorter than calyx.
Staminal glands 0.15-0.2 mm, forming a very short finger-like process with an apical nectar pit.	Staminal glands 0.5-0.75 mm, forming a long finger-like process with an apical nectar pit.	Staminal glands c.o. 1 mm consisting of a sessil nectar pit.
Seeds, black, sheghtly tuberculate on the back.	Seeds dark brown to black acutely tuberculate on the back.	Seeds, black, shightly tuberculate on the back.
Chromosome number 2n = 26.	Chromosome number 2n = 26.	Chromosome number 2n = 26.
Distribution: endemic in Greece, Peloponnesus (Parion, ca. 550 m).	Distribution: endemic in Greece, Peloponnesus (Kyllene, ca. 1300 m, Taygetos, ca. 500 m).	Distribution: endemic in Turkey (Cilicia, Erzincan, Antalya, Maras Sivas, 1750-2900 m).

Table 2. — Differences between *Minuartia favargeri* and related species. Measurements are based on herbarium material checked by the authors.

	Genus <i>Minuartia</i>	<i>x or x'</i>
subgenus I	<i>Rhodalsine</i> (J. Gay) Graebner	9
subgenus II	<i>Spergella</i> (Fenzl) McNeill	11
subgenus III	<i>Minuartia</i> (L.) Hiern	
	Sect. <i>Spectabiles</i>	13 (12)
	Sect. <i>Plurinerviae</i>	15
	Sect. <i>Lanceolata</i> (Fenzl) Graebner	
		ser. <i>Graminifoliae</i>
		ser. <i>Diantifoliae</i>
		ser. <i>Lanceolatae</i>
		ser. <i>Grigneenses</i>
	Sect. <i>Aretioideae</i> Mattf.	18
	Sect. <i>Sclerophylla</i>	15
	Sect. <i>Acutiflorae</i> (Fenzl) Hayek	13
	Sect. <i>Tryphane</i> (Fenzl) Hayek	12 (13)
	Sect. <i>Alsinnanthe</i> (Fenzl) Graebner	15
	Sect. <i>Minuartia</i>	
		ser. <i>Montanae</i>
		ser. <i>Minuartia</i>
		ser. <i>Leucocephalae</i>
		ser. <i>Setaceae</i>
		ser. <i>Xeralsine</i>
		ser. <i>Campestres</i>
	Sect. <i>Sabulina</i> (Reichb.) Graebner	15 (14 & 13)
		15
		15 (14)
		15 (14)
		15
		11, 12, 23, 35

Tab. 3. — The basic chromosome numbers (x or x') of sections and series of genus *Minuartia* according to ÇELEBIOĞLU & FAVARGER, 1982.

Cytology

The cytological study is based on material collected in nature and cultivated in pots outdoors. For the study of the mitotic chromosomes, actively growing root tips were pretreated in a saturated solution of 1-Bromonaphthalene, 4°C, 6 hrs.; fixed in carnoy's solution, 4°C, 24 hrs.; hydrolized in 1N HCl, 60°C, 12 min.; stained with Feulgen reagent, room temperature, 3 hrs.; treated in 4% pectinase, 20 min. Squashes were prepared and made permanent according to ÖSTERGREN & HENEEN (1962). The drawings were made with the aid of a camera lucida.

M. favargeri and *M. pichleri* have the same chromosome number $2n = 26$. This number coincides with the ones, studied before, of all the other species belonging to the same section (FAVARGER, 1962a, 1967, ÇELEBIOĞLU & FAVARGER, 1982). The chromosomes are small 1-2µm, but with well visible constrictions. Due to their small size all the chromosomes appear very similar and seem to belong to the m, sm categories (LEVAN & al., 1964), and are difficult to identify. This makes the observation of any differences in the karyotype almost impossible (Fig. 2a, b). For the same reasons morphological details could not be studied, except for two pairs of satellited chromosomes present in both karyotypes.

This new species belongs to *Minuartia* (L.) Hiern sect. *Acutiflorae* (Fenzl) Hayek ser. *Pichleriae* Mattf. (McNEILL, 1963) and is undoubtedly related to *M. pichleri* endemic also in Peloponnesus (HALIDAY, 1964), as well as to *M. rimarum* endemic in S. Anatolia (McNEILL, 1967), but it differs from both in a number of characters (Tabl. 1). The most important differences between *M. favargeri* and the other two species are the size of the leaves and petals, the shape and the size of sepals, the exsertion of the capsule from the calyx, the size of the staminal glands and the morphology of the seeds. The leaves of *M. favargeri* are 8-10(-12) mm, almost double the size of the leaves of *M. pichleri* (5.5-6 mm) and much longer than the ones of *M. rimarum* (4-8 mm). The petals of *M. favargeri* are 4.5-5 mm much smaller than the ones of the other two, being for *M. pichleri* 7-7.5 mm and for *M. rimarum* 5.5-8.5 mm. The sepals of *M. favargeri* are 2.5-3 mm, almost half the size of the ones of *M. pichleri* (4.5-5 mm) and *M. rimarum* (4-5 mm). The capsule in *M. favargeri* exceeds very obviously the calyx (1¹/₂ times as long as calyx), in *M. pichleri* is equal to the calyx or slightly exceeds it; in *M. rimarum* the capsule is shorter than the calyx. The staminal glands in *M. favargeri* have an intermediate size (0.15-0.2 mm) between the very long ones of *M. pichleri* (0.5-0.7 mm) and the almost sessile ones of *M. rimarum* (ca. 0.1 mm).

The chief characters for the comparative study of the seeds are: the ornamentation of the outer cells of the median zone, the shape and the ornamentation of the papillae and the degree of differentiation of the cells of the median zone (ÇELEBIOĞLU & al., 1983). All the above characters

have been studied by SEM and proved very different between *M. favargeri* and *M. pichleri*, with as most striking difference, the ornamentation of the outer cells of the median zone (base) (Fig. 3b, c). Unfortunately we did not study seeds of *M. rimarum*.

In genus *Minuartia* each section, and sometimes the series as they have been divided by MATTFELD (1922) & McNEILL (1962, 1963), is characterized by a unique basic chromosome number, usually different between them (Tabl. 3).

The cytological independence of each section and series confirms the antiquity of this genus. The different sections are all very isolated from each other and own their origin to allopolyploidy or disploidy effects, what has been called secondary swarming ("foisonnement secondaire", ÇELEBIOĞLU & FAVARGER, 1982). According to the same authors (1982) the section *Acutiflorae* ($n = 13$) and probably also the sect. *Spectabiles*, which are considered to be the less evolved groups of the genus (McNEILL, 1962), seem to have been derived, by amphidiploidy, from the primitive numbers $x = 6$ and $x = 7$ ($6 + 7 \rightarrow n = 13$). MATTFELD (1922) believes that sect. *Acutiflorae* is derived from a primitive type of *Univerviae*. In fact one of its primitive basic numbers ($x = 7$) exists today in the species of *Univerviae* (ÇELEBIOĞLU & FAVARGER, 1982).

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