

# The local endemic flora of Evvia (W Aegean, Greece)

Authors: Trigas, Panayiotis, and Iatrou, Gregoris Source: Willdenowia, 36(1) : 257-270 Published By: Botanic Garden and Botanical Museum Berlin (BGBM) URL: https://doi.org/10.3372/wi.36.36121

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at <u>www.bioone.org/terms-of-use</u>.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

## PANAYIOTIS TRIGAS & GREGORIS IATROU

## The local endemic flora of Evvia (W Aegean, Greece)

## Abstract

Trigas, P. & Iatrou, G.: The local endemic flora of Evvia (W Aegean, Greece). – Willdenowia 36 (Special Issue): 257-270. – ISSN 0511-9618; © 2006 BGBM Berlin-Dahlem. doi:10.3372/wi.36.36121 (available via http://dx.doi.org/)

The local endemic element in the flora of the W Aegean island of Evvia comprises 39 taxa (2.1 % of an estimated total of 1833 taxa). The three centres of endemism on the island are the ophiolitic areas of N Evvia, Mt Dirphis in central Evvia and Mt Ochi and the Cape Kafireas area in S Evvia. The majority of the endemic taxa inhabit limestone and ophiolitic habitats. Schizoendemics (80.8 %) form the largest category, followed by apoendemics (11.5 %) and palaeoendemics (7.7 %). Taxonomical comments on selected taxa are provided. The chromosome number of ten taxa is given for the first time.

Key words: island biogeography, taxonomy, vascular plants, serpentine, chromosome numbers.

## Introduction

The Aegean area is an important centre of Mediterranean plant endemism, floristically pioneered by Rechinger (1943, 1944, 1949). In the W Aegean, the flora of the island of Evvia was studied in detail (Rechinger 1961, partly based on Phitos 1960). Much floristic and biosystematic work has subsequently been carried out in Evvia and adjacent regions (e.g. Künkele & Paysan 1981, Akeroyd & Preston 1987, Boratyński & al. 1988, Trigas & Iatrou 2000) and many taxa have been described from the island in the last decades (Phitos 1964, 1965, 1981, Ehrendorfer & Schönbeck-Temesy 1975, Georgiadis 1980, Phitos & Georgiadis 1981, Phitos & Tzanoudakis 1981, Papanikolaou & Kokkini 1982, Tiniakou 1991, Brullo & al. 1997, 2003, Trigas & Tzanoudakis 2000, Trigas & Iatrou 2003, 2005). Endemism in the local flora was analysed by the first author only recently (Trigas 2003). Actually, 1833 taxa (species and subspecies) are known to occur in Evvia. The Greek endemic element includes 178 taxa (9.7 %). Of these, 39 taxa (2.1 % of the total flora) are island endemics of Evvia, discussed in the present paper as to their taxonomy, estimated origin and evolution. For topographical, geological, climatic and edaphic properties of the investigated area (Fig. 1) the reader is referred to Rechinger (1961), Trigas & Iatrou (2000) and Trigas (2003), for paleogeography in particular to Creutzburg (1966), Greuter (1970), Dermitzakis (1990) and Andel & Tzedakis (1996).

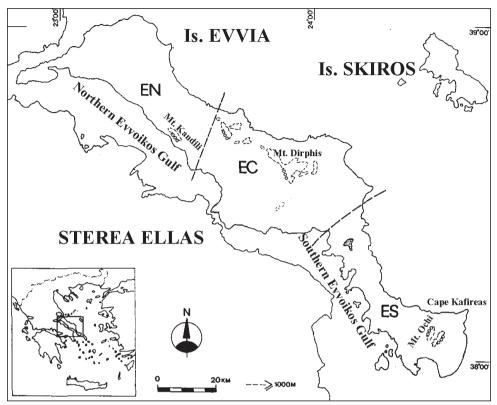


Fig.1. Topographic map of Evvia with the northern (EN), central (EC) and southern (ES) divisions according to Rechinger (1961).

## Material and methods

This paper is based on field studies carried out from 1995 to 2003, studies of herbarium specimens (ATH, C, UPA, W), and evaluation of the literature. The collection of plant material and field observations were made in different seasons of the year to fully cover different altitudinal belts and representative types of habitats. Nomenclature follows Tutin & al. (1968-80, 1993), Greuter & al. (1984-89), Strid (1986) and Strid & Tan (1991, 1997, 2002). The classification by cytotaxonomic criteria of the local endemic taxa of Evvia follows Favarger & Contandriopoulos (1961). The karyological studies are based on material collected in nature and cultivated in pots outdoors in the experimental botanical garden of the University of Patras (for laboratory methods applied, see Trigas & Iatrou 2005).

## **Results and discussion**

The endemic flora of Evvia consists of 39 taxa (32 species and 7 subspecies; Table 1) in 14 families and 23 genera. Highly diverse genera with many endemics in the Greek flora (e.g., *Allium*, *Centaurea, Silene, Verbascum, Viola*) are also represented in the endemic flora of Evvia. The chromosome number is known for 27 taxa but not yet studied in the remaining 11 taxa. Of the endemic taxa of Evvia 20 are chamaephytes, 12 hemicryptophytes, 5 geophytes (*Allium* spp., *Geocaryum euboeum*), 1 therophyte (*Ammi topalii*), and 1 phanerophyte (*Quercus trojana* subsp. *euboica*). When referring to age of taxa and times of speciation processes, either taken from literature or derived from own observations, the present authors are aware of the fact that conclusive evaluations may point towards plausibilities rather than proved evidence.

## 1. Geographical distribution of the endemics

The local endemic taxa of Evvia are not evenly distributed. The highest concentration is observed in central Evvia (21 taxa), followed by N Evvia (18 taxa) and S Evvia (9 taxa). Three centers of endemism can be observed:

a) The ophiolitic regions of N Evvia with 12 local endemics; eight exclusively on serpentine and four on both serpentine and limestone at low altitudes, plus six on limestone or on calcareous quaternary sediments at higher altitudes of Mt Kandili and its surroundings.

b) Mt Dirphis and the nearby mountainous areas of central Evvia whith 18 local endemics; ten at medium and higher altitudes, five (*Allium dirphianum, Asperula suffruticosa, Cruciata taurica* subsp. *euboea, Minuartia dirphya, Silene dirphya*) restricted to the highest peak (Delphi) of Mt Dirphis, plus three (*Allium calamarophilon, Campanula cymaea, Ammi topalii*) at low altitudes and along the coast.

c) Mt Ochi (five taxa at medium and high altitudes) and Cape Kafireas in S Evvia (four taxa at low altitude, partly coastal).

Most (i.e. 30) of the insular endemics of Evvia occur in only one of the three geographical divisions of the island (Fig. 1). Twelve taxa are confined to N Evvia, twelve to central Evvia and six to S Evvia. The distribution of these taxa is limited to very small areas on the mountains or in the lowland. The remaining nine endemics are distributed in two of the three geographical divisions, none expanding from N through S Evvia.

As many as 26 of the insular endemics of Evvia are lowland taxa occuring below 1000 m, eight taxa grow only above 1000 m and 5 taxa are distributed over both altitudinal ranges. A similar altitudinal distribution pattern has been observed in the endemic flora of Peloponnisos (Iatrou 1986, Tan & Iatrou 2001).

#### 2. Edaphic endemism – distribution according to substrate

The strong link of taxa to a specific geological substrate is one of the most important characteristics of the endemic flora of Evvia. The majority of the local endemic taxa (17 taxa or 43.6 %) are exclusively distributed on limestone, viz. Allium dirphianum, A. calamarophilon, Asperula euboea, A. suffruticosa, Campanula constantini, C. cymaea, Chaerophyllum euboeum, Cruciata taurica subsp. euboea, Geocaryum euboeum, Hypericum fragile, Linum goulimyi, Nepeta argolica subsp. dirphya, Senecio eubaeus, Silene dirphya, Verbascum euboicum, Verbascum zuccarinii, Viola dirphya. Nine local endemics (23.1%) grow exclusively on ultramafic rock (serpentine), viz. Alyssum euboeum, Asperula ophiolithica, Centaurea ebenoides, C. euboica subsp. euboica, C. euboica subsp. intermedia, C. mantoudii, Minuartia dirphya, Quercus trojana subsp. euboica, Silene oligantha subsp. pseudoradicosa. Four local endemics grow equally well on serpentine and limestone (Alyssum densistellatum, Bolanthus intermedius, Campanula goulimyi, Scutellaria goulimyi), another four occur exclusively on schist in S Evvia (Allium karistanum, A. runemarkii, Armeria johnsenii, Campanula celsii subsp. carystea). Sideritis euboea and Viola euboea grow on both limestone and schist. Inula subfloccosa is confined to cipolin and marbles, whereas Asperula brachyphylla grows on both schist and cipolin. Finally one species, Ammi topalii, inhabits coastal sands.

The influence of serpentines in speciation processes in plants is well known (Kruckeberg 1951, 1954, 1967, Proctor & Woodell 1975). The serpentines of Evvia, concentrated in the north while being only scattered in the central and southern divisions, are of special interest in terms of phytogeography, in particular with respect to their position at the southeastern periphery of the whole system of serpentine areas in the Balkans, and their insular isolation. The serpentine areas of the Balkan Peninsula represent an ancient core of speciation and act likewise as an important refugial habitat for relict elements. Numerous relict and endemic taxa on various taxonomic levels, predominantly or facultatively found on serpentine, support this view (Stevanović & al.

Table 1. The endemic vascular plant taxa of Evvia, with geographical distribution in the three geographical divisions of Evvia as defined in Fig. 1, altitudinal range, substrate preference and chromosome number. Previously unpublished chromosome numbers are marked with an asterisk.

				Altitude		
Taxon	EN	EC	ES	(m)	Substrate	2n
Allium dirphianum Brullo & al.		+		1400-1500	Limestone	32
A. calamarophilon Phitos & Tzanoud.		+		20-30	Limestone	16
A. karistanum Brullo & al.			+	5-30	Schist	16
A. runemarkii Trigas & Tzanoud.			+	5-20	Schist	16
Alyssum densistellatum T. R. Dudley	+	+		50-700	Limestone-Ophiolite	-
A. euboeum Halácsy	+	+		30-600	Ophiolite	16
Ammi topalii Beauverd		+		0-20	? Sand	-
Armeria johnsenii Papan. & Kokkini			+	5-20	Schist	18*
Asperula brachyphylla Trigas & Iatrou			+	1100-1300	Schist-Cipolin	-
A. euboea (Ehrend.) Trigas		+	+	300-800	Limestone	22*
A. ophiolithica Ehrend.	+			50-450	Ophiolite	44*
A. suffruticosa Boiss. & Heldr.		+		1000-1700	Limestone	44*
Bolanthus intermedius Phitos	+			0-50	Limestone-Ophiolite	-
Campanula celsii subsp. carystea Phitos			+	0-600	Schist	34*
C. constantini Beauverd & Topali		+		450-1600	Limestone	34
C. cymaea Phitos		+		0-750	Limestone	34
C. goulimyi Turrill	+			0-450	Limestone-Ophiolite	34
Centaurea ebenoides Heldr.	+			0-700	Ophiolite	20
C. euboica Rech. f. subsp. euboica	+			200-700	Ophiolite	22
C. euboica subsp. intermedia Phitos & Georgiadis	+			200-700	Ophiolite	22
C. mantoudii Georgiadis	+			30-400	Ophiolite	36
Chaerophyllum euboeum Halácsy		+		1000-1200	Limestone	-
Cruciata taurica subsp. euboea (Ehrend.) Ehrend.		+		1000-1700	Limestone	-
Geocaryum euboeum (Rech. f.) Engstrand	+	+		600-1200	Limestone	-
Hypericum fragile Boiss	+	+		0-500	Limestone	18*
Inula subfloccosa Rech. f.			+	150-600	Cipolin	16 (+0-1B)*
Linum goulimyi Rech. f.	+			200-400	Limestone	-
Minuartia dirphya Trigas & Iatrou		+		900-1000	Ophiolite	26
Nepeta argolica subsp. dirphya (Boiss.) Strid & Kit Tan		+		400-1600	Limestone	16
Quercus trojana subsp. euboica (Papaioannou) K. I. Chr.	+			100-600	Ophiolite	-
Scutellaria goulimyi Rech. f.	+			250-700	Limestone-Ophiolite	34
Senecio eubaeus Boiss. & Heldr.	+	+		1000-1400	Limestone	40*
Sideritis euboea Heldr.		+	+	600-1700	Limestone-Schist	32*
Silene dirphya Greuter & Burdet		+		1550-1740	Limestone	24*
S. oligantha subsp. pseudoradicosa (Rech. f.) Greuter	+			50-700	Ophiolite	24
Verbascum euboicum Murb. & Rech. f.	+	+		400-900	Limestone	-
V. zuccarinii (Boiss.) I. K. Ferguson	+			50-400	Limestone	-
Viola dirphya Tiniakou		+		1000-1300	Limestone	40
V. euboea (Halácsy) Halácsy		+	+	800-1700	Limestone-Schist	40

2003). Of the local serpentine endemics of Evvia, four taxa belong to the genus *Centaurea* and two to *Alyssum*. Both genera are among the richest in obligate serpentine endemics in the Balkan Peninsula (Stevanović & al. 2003). The endemism related to ultramafic substrate on Evvia exhibits a mixture of evolutionary recent and older taxa which can be grouped into certain categories with respect to their origin (see also Table 2).

The first category includes endemics the taxonomic relatives of which are distributed in adjacent non-ophiolitic (usually calcareous) areas (*Centaurea euboica, C. mantoudii, Quercus trojana* subsp. *euboica, Silene oligantha* subsp. *pseudoradicosa). Alyssum densistellatum, Bolanthus intermedius* and *Scutellaria goulimyi* which grow on both ophiolite and limestone also belong here. This category is considered to include neoendemics and may represent the result of adaptation of older populations to the special ecological conditions of the ophiolitic substrate. Their differentiation probably took place in recent geological eras or may still be in progress.

The second category includes serpentine taxa the relatives of which are distributed quite far away, mostly in northern regions. *Centaurea ebenoides* and *Campanula goulimyi* belong here, the latter growing on both ophiolitic and calcareous substrates. These taxa seem to have reached Evvia from the north, probably during colder periods.

The third category includes taxa that are taxonomically isolated, or their relatives geographically disjunct, such as *Alyssum euboeum*, *Asperula ophiolithica* and *Minuartia dirphya*. Given the palaeogeography of the region, they seem to have evolved in the distant past, at least during Pliocene. The ophiolitic areas of Evvia, apart from contributing to the evolution of new taxa, Table 2. Classification of the local endemic taxa of Evvia into categories using cytotaxonomic criteria, including corresponding relatives with their distribution ranges. S = schizoendemic, P = palaeoendemic, A = apoendemic; after Favarger & Contandriopoulos (1961).

Alliam calamarophilon S A. thessilicum Thessilia, l.s. Sciathos   A. dirphianum S.V. a. S.V. ia   A. dirphianum S.V. a. S.V. ia   A. karistunum S.V. a. S.V. ia   A. karistunum S.V. a. S.V. ia   A. karistunum S.V. a. S.V. Antolia   A. ranemarkii S.V. a. S.V. A.   A. ranemarkii S.V. A. S. A. thessalicum   A. ranemarkii S.V. A. C.C. antolia, Isan   A. subora A. main topalii C. C. antolia, Isan   A. eubora P. - S. Iantora C. Elabel   A. eubora S.V. antolia Isanses S. A. Surget   A. eubora S.V. antolia Isanses Surget   A. eubora S.V. antolia Isanses Surget   A. eubora S.V. antolia, Isanses Surget Surget   A. eubora S.V. antolia, Isanses Surget Surget   A. eubora S.V. antolia, Isanses Surget Surget   A. eubora S.V. antolia, Isanses	Taxon	Category	Corresponding relatives	Distribution range of relatives
A. drphianna S. Evria   A. drphiannam S. A. perominanam SW Anatolia   A. karistanam S A. perominanam SW Anatolia   A. karistanam S A. perominanam SW Anatolia   A. ramemarkii S A. pertadet cyrin Cyrenaica   A. ramemarkii S A. thessalicam Thessalia, Is. Sciathos   A. ramemarkii S A. thessalicam Thessalia, Is. Sciathos   A. eubocain P - [solated] -   A. eubocain P - [solated] -   A. eubocain S A. canescens C & E. Machiterranean   A. eubocai S A. canescens C & E. Machiterranean   A. eubocai S A. amogian Stress Ellas, N. Poloponnisos   A. eubocai S A. amogian Stress Ellas, N. Poloponnisos   A. eubocain - A. lukca Stressalia, Stressalia, Nerosos   A. suffraticosa - A. lukca Stressalia, Stressalia, Nerosos   A. suffraticosa - A. suberosa M. Athos   C. constantia S C. colsi aggr. Stressalia, Stressalia, Norcee   C. goulonji S C. colsi aggr. Stressalia, Stressalia, Norcee   C. opticacaintis <td>Allium calamarophilon</td> <td>S</td> <td>A. thessalicum</td> <td>Thessalia, Is. Sciathos</td>	Allium calamarophilon	S	A. thessalicum	Thessalia, Is. Sciathos
A. dirphanum A. survit Mediterranean   A. karistanum S A. calificity on E. & C. Anatolia, Iran   A. karistanum S S. Ialy   A. calificity on E. & C. Anatolia, Iran   A. runenarkii S S. Ialy   A. runenarkii S A. estatuarum Chessian, Ia, S. Sciahlos   A. runenarkii S A. destaticum Chessian, Ia, S. Sciahlos   A. evafuracem C Basian C Basian   A. subspin densistellatum A. entorinamus subsp. montanum E Europe, W Asia   A. montinum subsp. montanum E Mediterranean   A. prinfolia S A. denseccent   A. prinfolia S A. denseccent   A. prinfolia S Reportal S. Product S Reportalisos   A. subforsiza A. denseccent S Rescenting   A. suffationa - A. temploita S Rescenting   A. dubaa S R. A. margieri S Rescenting S Rescenting   A. suffationa - A. temploita S Rescenting   Bolonthus intermedius - B. graccus E Storte Ellas, Evvia, E Naxos   Campanula celsii subsp. carystea S C ampanioficitis E Storte Ellas, Evvia, E Naxos   C. carbinita S C ampan	1		A. ervthraeum	Chalkidiki
A. dirphanum A. survit Mediterranean   A. karistanum S A. calificity on E. & C. Anatolia, Iran   A. karistanum S S. Ialy   A. calificity on E. & C. Anatolia, Iran   A. runenarkii S S. Ialy   A. runenarkii S A. estatuarum Chessian, Ia, S. Sciahlos   A. runenarkii S A. destaticum Chessian, Ia, S. Sciahlos   A. evafuracem C Basian C Basian   A. subspin densistellatum A. entorinamus subsp. montanum E Europe, W Asia   A. montinum subsp. montanum E Mediterranean   A. prinfolia S A. denseccent   A. prinfolia S A. denseccent   A. prinfolia S Reportal S. Product S Reportalisos   A. subforsiza A. denseccent S Rescenting   A. suffationa - A. temploita S Rescenting   A. dubaa S R. A. margieri S Rescenting S Rescenting   A. suffationa - A. temploita S Rescenting   Bolonthus intermedius - B. graccus E Storte Ellas, Evvia, E Naxos   Campanula celsii subsp. carystea S C ampanioficitis E Storte Ellas, Evvia, E Naxos   C. carbinita S C ampan			A. runemarkii	S Evvia
A. karistaman S A. perotarianam SW Anatolia   A. ranemarkii S A. calidicityon F. & C. Anatolia, Inn   A. ranemarkii S A. serateri Cyrenaica   A. ranemarkii S A. hessalicum Thessalia, IS. Sciahos   A. ranemarkii - A. nontonum subp. nontarum Thessalia, IS. Sciahos   A. subcourn P - Isolatedi   A. calamarophilon C Evvia E Europe, W Asia   A. endocum P - Isolatedi   A. endocum P - Isolatedi   A. endocum P - Isolatedi   A. endocum - A. differition Sterea Ellas, Strance   A. endocum - A. longinon Sterea Ellas, Strance   A. endocum - A. longinon Sterea Ellas, Evvia, Is Naxos   A. subersa - A. longinon E Sterea Ellas, Evvia, Is Naxos   A. subersa S C. celsi aggr. S Greece, W Aegaan, M. Athos   C. comatula celsiti subsp. carystea S C. celsi aggr. Thessalia, Sterea Ellas, Via, Is Naxos   C. comatula celsiti subsp. carystea S C. celsi aggr. Thessalia, Sterea Ellas, Necis, Necee   C. comatula celsiti subsp. carystea S	A. dirphianum			Mediterranean
A. calificity F. & C. Anatolia, Inn   A. renemarkii S S. Italy   A. greatederif Cyrenaica   A. renemarkii S S. A. hessolicum   A. exphoreaum Chakkikis   A. exboum C. Evvia   Alysam densistellatum - A. montanum subsp. montanum   E. and the composition C. Evvia   Anni Inpalii - A. monisterium subsp. montanum   P - Isolatedi   - A. monisterium subsp. montanum E. Europe, W. Asia   A. euboeu P - Isolatedi   - A. magias Mediterranean   A. provisita S. A. cancescens C. & E. Mediterranean   A. provisita S. A. cancescens S. Evera Ellas, Foria, E. Stranos   A. abbreviata S. Italy A. tatea   A. euboa - A. leada Streaz Ellas, Foria, E. Stranos   A. abbreviata - A. leada Streaz Ellas, Foria, E. Nacos   Bolamhus intermedius - B. gracciolitur E. Streaz Ellas, N. Necen   C. comotamitic-locovita S. C. Cripticitaggr. Thessalia, Stores Ellas, W. Accen   C. comotamitic-locovita S. C. Cripticitaggr. Thessalia, Stores Ellas, W. Accen   C. comotamitic-locovit		ŝ		
A. runemarkii S. A. perateri Cyrenaica   A. runemarkii S. A. thessilicum Thessilia, Is. Sciathos   A. endbaceum Chalkidik   A. extherame Chalkidik   A. extherame Chalkidik   A. extherame Chalkidik   A. endbaceum P - [solated]   A. endbaceum P - [solated]   A. endbaceum P - [solated]   A. endbaceum S A. canescens   A. endbaceum S A. canescens   A. endbaceum S A. canescens   A. endbaceum S A. endbilitica   A. endbaceum S A. endbilitica   A. endbaceum - A. endbilitica   A. endbaceum - A. endbaceum   A. endbaceum - A. endbolitica   S. diffuticosa - A. endbolitica   S. diffuticosa - A. endbolitica   S. G. creating agr. Creating agr. Sterce Ellas, Fivia, IS. Naxos   Bolenthus intermedius - B. graaccus Sterce Ellas, Fivia, IS. Naxos   C. constantini S C. rupestris aggr. Thessalin, Sterce Ellas, W. Aggean   C. constantini S C. rupestris aggr. Thessalin, Sterce Ellas,				
A. runemarkii S A. grederi Cyranica   A. runemarkii S A. hessalicaum Thessalia, Is, Sciatuba   A. exboum C. Evvia C. Evvia   Alysam densistellatum - A. montranow subsp. montanum E. Europe, W. Asia   Annei topoliti - A. montranow subsp. montanum E. Europe, W. Asia   Ammeria johnsenti S A. careexcers C. & E. Mediterranean   Ammeria johnsenti S A. careexcers C. & E. Mediterranean   Aperata brachophyla - A. dobreviata Is. Naxos, Is. Annogos   A. abbreviata Is. Naxos, Is. S. Mongos A. initida S.I. Anatolia, Is. Lesvos   A. euboea S A. initida S.I. Anatolia, Is. Lesvos   A. ophiofihica - A. lenafolia Sterae Ellas, Is. Samos   A. alphariticaa - A. lenafolia Wastanos   A. alphariticaa - A. lenafolia Sterae Ellas, Is. Neigen, M. Athos   C. growari S C. credia aggr. Thessalia, Sterae Ellas, Neigen, M. Athos   C. constantin S C. credia aggr. Thessalia, Sterae Ellas, N. Acgean   C. constantin S C. credia aggr. Thessalia, Sterae Ellas, N. Greece   C. gubarce S C. credia aggr				
A. ranemarkii   S   A. de subsculutum   Thessalia, Is, Sciatulos     A. coyhoraum   Chalkidiki   Charkidiki     A. coyhoraum   Chalkidiki   Charkidiki     A. coyhoraum   P   -     A. endocum subsp. montanum   P   -     A. endocum   P   -     A. endocum   P   -     Anmit lopaliti   -   -     A. endocum   S   A. caboreviata     Aspenda brachyphylla   -   A. caboreviata     A. philofola   Sterca Ellas, N Peloponnisos     A. endoca   S   A. munigeri     A. subfrorsa   M. A. thata   Sterca Ellas, Nevia, Is. Naxos     Bolanthus intermedius   -   A. subersa   M. Ataba     S. corpetris aggr.   Thessalia, Necoponnisos   Centare cellas, Evvia, Is. Naxos     B. graceus   S. C. celsi aggr.   Thessalia, Sterae Ellas, Vevia, Is. Naxos     Campanula celsi subsp. carystea   S. C. celsi aggr.   Thessalia, Necoponnisos     C. contatini   S. C. celsi aggr.   Thessalia, Necopean     C. contatini   S. C. celsi aggr.   Thessalia, Necopean     C.				
A. exponent C. Calkidiki   Alysam densistellatum - A. calamarophilon C. Evvia   A. euboean P - [Isolated] -   Armeria johnsonii S A. canescens C. & E. Wedhermanna   Asperula brachyphylla - A. britfolia Sterrae Ellas, S. Pindos   A. euboea S A. mungieri S. Peloponnisos   A. euboea S A. mungieri S. Peloponnisos   A. euboea S A. mungieri S. Peloponnisos   A. euboea S A. demarcus M. Attos   A. eubora - A. emufolia S. Samos   A. eubora - A. demarcus M. Attos   A. eubora - B. demarcus B. demarcus   A. eubora - B. demarcus B. demarcus   A. eubora - B. demarcus B. demarcus   A. eubora - A. europearis aggr. Thessalia, Netrose Ellas, Weegean   C. contantini S C. europearis aggr. Thessalia, Netrose Ellas, Weegean   C. contantini S C. europearis aggr. Thessalia, Netrose Ellas, Meegean   C. eurobica S C. curbairea S Greece. Waegean, M. Athos   C. eurobica S <td>1. runamarkii</td> <td>S</td> <td></td> <td></td>	1. runamarkii	S		
A. cidamaraphilon C. Evvia   A. cabaveam P - [isolated]   A. endream Functionarianam E. Europe, W. Asia   A. endream Mediterranean Amaria jahasenii   Armei ajahasenii S A. canescens C. & E. Mediterranean   Asperula brachyphylla A. abbrevian Is. Naxo, Is. Amorgos   Asperula brachyphylla A. abbrevian Is. Naxo, Is. Amorgos   A. euboea S A. mitida s. Is. Lesvos   A. euboea S A. mitida s. Is. Lesvos   A. euboea S A. mitida s. Is. Servos   A. opholibilitica - A. talea   A. suffraticosa - A. subcrosa   Bolanthus intermeditas B. graccus E. Betrea Ellas, Evvia, Is. Naxos   Bolanthus intermeditas S C. crustifi aggr. Thessalia, Stera Ellas, Weigean   C. constantini S C. rupestris aggr. Thessalia, Stera Ellas, Weigean   C. constantini S C. rupestris aggr. Thessalia, Stera Ellas, Weigean   C. constantini S C. crustifi aggr. Thessalia, Stera Ellas, Weigean   C. constantini S C. crustifi aggr. Thessalia, Stera Ellas, Meagean   C. constantini S C. crustifi aggr. Thessalia, Stera Ellas, Meag	A. runemurku	3		
Alysian denistellation   -   A montanum subsp. montanum   E Europe, W Asia     A enaboem   P   -   [solated]     Ammi topaliti   -   A magias   Mediterranean     Ammeria johnsenii   S   A canescens   C & E Mediterranean     Asperula brachyphylla   -   A canescens   C & E Mediterranean     A. euboea   S   A mungieri   S Peloponnisos     A. euboea   S   A mungieri   S Peloponnisos     A. eubora   -   A teada   Sterce Ellas, Neloponnisos     A. subfortiona   -   A teada   Sterce Ellas, Neloponnisos     A. subfortiona   -   A teada   Sterce Ellas, Neloponnisos     A. subforma   -   A teada   Kriti     Bolanthus intermedius   -   B graceus   E Sterce Ellas, Evvia, E Thessaia, NGrece     C. contantini   S   C rupestris aggr.   Thessaia, Sterce Ellas, Weagean     C. contantini   S   C rupestris aggr.   Thessaia, NE consectence     C. graburacensis   Y ugoslavia, N Grecee   C carbaia   Peloponnisos, Sterce Ellas, Thessalia     C. corantitica   C C contatia				
A. endowam   P   - [isolated]   -     Armi topalii   -   A majis M   Mediterranean     Armeria johnsonii   S   A. camescens   C & E Mediterranean     Asperula brachyphylia   -   A. abbreviata   Is Naxos, Is, Amorgos     Asperula brachyphylia   -   A. abbreviata   Is Naxos, Is, Amorgos     A. euboea   S   A. murgieri   S Peloponnisos     A. euboea   S   A. murgieri   S Peloponnisos     A. oblicititica   -   A. thera   Strera Ellas, Neisons     A. subersosa   M. Atoos   Kriti     Bolanthus intermedius   B. graccus   E Stera Ellas, Evvia, Is Naxos     C. comata   S   C cediti aggr.   Thessalia, Stera Ellas, Wagean     C. constantini   S   C cediti aggr.   Thessalia, Stera Ellas, Wagean     C. constantini   S   C cediti aggr.   S Greece, W Aggan, Mt Athos     C. endotca   S   C antonauteis-loewit   Bulgaria, N Greece     C. antonauteis-loewit   Bulgaria, N Greece   C graburacestra Blas, Thessalia     C. endotca   S   C continitica   S Greece, W Aggan, Mt Athos	Alexandra dana intellenteres			
Immit iopalii     A. majus     Mediteranean       Armeriz ofhorsmin     S     A. cansceers     C. & Mediteranean       Asperula brachyphylla     A. abbreviata     Is Naxos, Is. Amorgos       A. euboea     S     A. mitida s.I.     Anatola, Is. Leavos       A. euboea     S     A. mitida s.I.     Anatola, Is. Leavos       A. euboea     S     A. mitida s.I.     Anatola, Is. Leavos       A. euboea     S     A. mitida s.I.     Anatola, Is. Samos       A. subfruitosa     -     A. tendfolia     SW Anatola, Is. Samos       A. subfruitosa     -     A. tendfolia     SW Anatola, Is. Samos       Bolanthus intermedius     -     B. graccus     E. Sterce Ellas, F.Vria, E. Thessalia, N Greece       Campanula celsii subsp. carystea     S     C. cresti sugg.     Thessalia, Sterce Ellas, W. Aegean       C. constantini     S     C. cresti sugg.     Thessalia, Sterce Ellas, W. Aegean       C. constantini     S     C. cresti sugg.     Thessalia, Sterce Ellas, N. Aegean       C. constantini     S     C. cresti sugg.     Sterce Ellas, N. Evoia       C. euboica     S		- D		E Europe, w Asia
Armeria johnsonii   S   A. cabreviata   Is. Naxos, Is. Amorgos     Asperula brachyphylia   -   A. abbreviata   Is. Naxos, Is. Amorgos     A. euboea   S   A. mungieri   S Pelaponnisos     A. euboea   S   A. mungieri   S Pelaponnisos     A. ophiolithica   -   A. tenuifolia   SUeroa Ellas, N Peloponnisos     A. subrosa   -   A. tenuifolia   SW Anatola, Is. Samos     A. subrosa   -   A. tenuifolia   SW Anatola, Is. Samos     A. subrosa   -   A. tenuifolia   SW Create Ellas, Elvin, Is. Naxos     Bolanthus intermedius   -   B. graccus   E Sterce Ellas, Elvin, Is. Naxos     Campanula celsi subsp. carystea   S   C. celsi aggr.   S Greece, W Aegan, M Athos     C. constantini   S   C. cristi's aggr.   Thessilia, Sterce Ellas, W Aegan     C. goulinyi   S   C. celvia ggr.   S Greece, W Aegan, M Athos     Censtantini   S   C. celvia ggr.   S Greece, W Aegan, M Athos     Centance abenoides   S   C. celvia ggr.   S Greece, W Aegan, M Athos     Centance abenoides   S   C. celvia ggr.   S Greece, W Aegan, M Atho		Р		-
Asperulá brachyphylia		-		
A. euboea A. pinfolta Sterea Ellas, S Pindos   A. euboea S A. mungieri S Peloponnisos   A. ophiofilitica - A. tenuifolia S Peloponnisos   A. ophiofilitica - A. tenuifolia S Peloponnisos   A. suferosa M. Athos Krei   Bolanthus intermedius - B. graecas E Sterea Ellas, Evia, Is. Naxos   Bolanthus intermedius - B. graecas E Sterea Ellas, Evia, Is. Naxos   Campanula celsis subsp. carystea S C celsir aggr. Thessalia, Sterea Ellas, Wagean, M. Athos   C. constantini S C rupestris aggr. Thessalia, Sterea Ellas, Wagean, M. Athos   C. constantini S C celsir aggr. S Greece, W Agean, M. Athos   C. goulinyi S C contraversis aggr. Thessalia, Sterea Ellas, Wagean   C. enstantini S C contraversis aggr. Thessalia, Necreece   C. goulinyi S C cachaia Peloponnisos   C. euboica S C achaia Peloponnisos, Sterea Ellas, Thessalia   C. mantoudii A C goulary S terea Ellas, Thessalia, Necreece   C. mantoudii A C goulary Wagean, M. Athos   Geocaryum euboicum - C dorariatum M tiliyuoslavia, N		S		
A. euboeaSA. nitida S.I.Anatolia, Is. LevosA. euboeaSA. murgioriS PeloponnisosA. ophiofilirica-A. threaSterca Ellas, N PeloponnisosA. suffruticosa-A. suberosaMt. AthosA. suffruticosa-A. suberosaMt. AthosBolanthus intermedius-B. graceusE. Sterca Ellas, Evvia, Is. NaxosBolanthus intermedius-B. graceusE. Sterca Ellas, Evvia, It. Thessalia, N GreeceCampanula celsii subsp. carysteaSC. crupstris aggr.Thessalia, Sterca Ellas, W AegeanC. constantiniSC. celsii aggr.S Greece, W Aegean, Mt AthosC. constantiniSC. celsii aggr.S Greece, W Aegean, Mt AthosC. goulinyiSC. celsii aggr.S Greece, W Aegean, Mt AthosC. euboicaSC. centaureoles-lowinBulgaria, N GreeceC. euboicaSC. caronticumN GreeceC. autoricaN E Peloponnisos, E Sterce Ellas, ThessaliaC. nantoudiiAC. peliaS terce Ellas, Thessalia, NE GreeceC. functicaN E Peloponnisos, Sterce Ellas, ThessaliaC. carontacium-C. taurica sl.C. functica sl.I. Samos, Anatolia to Iran, CaucasusG. divaricatumMt HilliiniG. divaricatumMt HilliiniHypericum fragileSH. turgeteumInuda subfoccosaSM. turgeteumInuda subfoccosaSM. turgeteumInuda subfoccosaSM. turgeteum	Asperula brachyphylla	-	A. abbreviata	
A. euboea   S   A. mungjeri   S Peloponnisos     A. ophiofithica   -   A. tenuifolia   Sterea Ellas, N Peloponnisos     A. subrrosa   -   A. subrrosa   Mt. Athos     A. subrrosa   Mt. Athos   Kriti     Bolanthus intermedius   -   B. graecus   E Sterea Ellas, Evia, Is. Naxos     B. dympiolius   E Sterea Ellas, Evia, E Thessalia, N Greece   Constantini   S C celsii aggr.   S Greece, W Aegean, Mt Athos     C. constantini   S C crupestris aggr.   Thessalia, Sterea Ellas, W Aegean   C constantini   S C crupestris aggr.   Thessalia, Sterea Ellas, W Aegean, Mt Athos     C. constantini   S C crupestris aggr.   Thessalia, Sterea Ellas, W Aegean, Mt Athos   C constantini     C. gaulinyi   S C celsii aggr.   S Greece, W Aegean, Mt Athos   C cantaica     C. euboica   S C caphia   Peloponnisos, E Sterea Ellas, Thessalia     C. antoutii   A C pelia   Sterea Ellas, Thessalia, Ne Greece     C. annaticuta turbi acture auboeam   -   C turbica s.l.     C. mantoutii   A C C pelia   Sterea Ellas, Nevia     Mua subfloccosa   S I verbaccifolia subsp. methaned   E Peloponnisos, Sterea Ellas, N Evvia			A. pinifolia	Sterea Ellas, S Pindos
A. ophiolithica   -   A. threa   Stera Ellas, N. Peloponnisos     A. suffruticosa   -   A. suffruticosa   SW Anatolia, Is. Samos     Bolanthus intermedius   -   B. graecus   E. Steras Ellas, Evvia, Is. Naxos     Bolanthus intermedius   -   B. graecus   E. Steras Ellas, Evvia, Is. Naxos     Campanula celsii subsp. carystea   S. C. celsii aggr.   Steras Ellas, W. Agean     C. constantini   S. C. crupestris aggr.   Thessalia, Steras Ellas, W. Agean     C. constantini   S. C. crupestris aggr.   Thessalia, Steras Ellas, W. Agean     C. goulinyi   S. C. celsii aggr.   S Greece, W. Agean, M. Athos     C. entaurea ebenoides   S. C. cisti aggr.   S Greece, W. Agean, M. Athos     C. entaurea ebenoides   S. C. cisti aggr.   S Greece, W. Agean, M. Athos     C. entaurea ebenoides   S. C. cisti aggr.   S Greece, W. Agean, M. Athos     C. entaurea ebenoides   S. C. cisti aggr.   S Greece, W. Agean, M. Athos     C. anonaticum   C. aronaticum   Peloponnisos, Estera Ellas, Thessalia, N. Evea     C. mantoudii   A. C. pelia   S teras Ellas, Thessalia, N. Evea     C. aronaticum   C. daroitca   W. Esterea Ellas, Thevia     C. t			A. nitida s.1.	Anatolia, Is. Lesvos
A ophiolificia - A tenufolia Stera Ellas, N Peloponnisos   A suffraticosa - A suborosa Mt. Athos   Bolanthus intermedius - B graccus E Stera Ellas, Evvia, Is. Naxos   Bolanthus intermedius - B graccus E Stera Ellas, Evvia, Is. Naxos   Campanula celsii subsp. carystea S C. cokii aggr. Sterae Ellas, Evvia, It. Thessalia, Sterae Ellas, W Aegean   C. construitini S C. celsii aggr. Thessalia, Sterae Ellas, W Aegean   C. construitini S C. celsii aggr. Thessalia, Sterae Ellas, W Aegean   C. construitini S C. celsii aggr. Thessalia, Sterae Ellas, W Aegean   C. construitini S C. celsii aggr. Sterae Ellas, M Aegean   C. construitini S C. celsii aggr. Sterae Ellas, M Aegean   C. construitini S C. celsii aggr. Sterae Ellas, M Aegean   C. autorica Sterae Ellas, M Aegean C. construitinica N Greece   C. autorica Sterae Ellas, Thessalia, NE Greece C graduatica N E Peloponnisos, E Sterae Ellas, Thessalia   C. mattoudii A C. pelia Sterae Ellas, Thessalia, NE Greece   C. natoudii A C. graduatica stance N E Peloponnisos, Esterae Ellas, Thessalia, NE Greece <td< td=""><td>A. euboea</td><td>S</td><td>A. mungieri</td><td>S Peloponnisos</td></td<>	A. euboea	S	A. mungieri	S Peloponnisos
A. ophiolithica   -   A. ternulfolia   SW Anatolia, Is. Samos     A. suffruicosa   -   A. sidera   Kniti     Bolanthus intermedius   -   B. graecus   E Sterea Ellas, Evvia, Is. Naxos     Campanula celsii subsp. carystea   S   C. celsii aggr.   S Greece, W Aegean, Mt Athos     C. cymaea   S   C. crupestris aggr.   Thessalia, Sterea Ellas, W Aegean     C. constantini   S   C. crupestris aggr.   Thessalia, Sterea Ellas, W Aegean     C. constantini   S   C. crupestris aggr.   Thessalia, Sterea Ellas, W Aegean     C. constantini   S   C. constantinica   Peloponnisos, E Sterea Ellas, Thessalia     C. euboica   S   C. cachaia   Peloponnisos, E Sterea Ellas, Thessalia     C. anatoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. haerophyllum eubocum   -   C. caronaticum   C & E Europe, Balkan Peninsula     Crucica ta urica subsp. euboea   -   C. tartica s.l.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboixum   -   G. divaricatum   Mt Kullini   Guearophylum eubocum     Hypericum fragile   S   H. targetos   Nervaicefhitis subsp. parna				
A. suffruicosa   -   A. subérosa   Mi. Also     Bolanthus intermedius   -   B. graecus   E. Sterea Ellas, Evvia, Is. Naxos     Bolanthus intermedius   -   B. thrmifolius   E. Sterea Ellas, Evvia, Is. Naxos     Campanula celsii subsp. carystea   S   C. crupestris aggr.   Thessalia, Sterea Ellas, W. Aggean     C. constantini   S   C. rupestris aggr.   Thessalia, Sterea Ellas, W. Aggean     C. constantini   S   C. celsii aggr.   S Greece, W. Aggean, Mt Athos     C. constantini   S   C. celsii aggr.   S Greece, W. Aggean, Mt Athos     C. constantini   S   C. celsii aggr.   S Greece, W. Aggean, Mt Athos     C. cantonidi   S   C. cachowii   Bulgaria, N Greece     C. gribavacensis   Y ugoslavia, N Greece   C genammelis-lowvii     C. autonica   S   C. Cachia   Peloponnisos     C. autonica   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. nantoudii   A   C. parinasticum   Mt Stragetos     C. autoritica subsp. euboea   -   C. aromaticum   Mt Stragetos     Inuia subfloccosa   S   I. verbascifolia subsp. paranassica	A. ophiolithica	_		
And Bolanthus intermedius-A. idaeaKritiBolanthus intermedius-B. graecusE. Sterea Ellas, Evvia, Is. NaxosCampanula celsii subsp. carysteaSC. celsii aggr.S Greece, W. Aegean, Mt AthosC. cymaeaSC. rupestris aggr.Thessalia, Sterea Ellas, W. AegeanC. constantiniSC. rupestris aggr.Thessalia, Sterea Ellas, W. AegeanC. constantiniSC. rupestris aggr.S Greece, W. Aegean, Mt AthosC. entaurea ebenoidesSC. cimmanuelis-loewiiBulgaria, N GreeceC. euloicaSC. adniaPeloponnisos, Esterea Ellas, ThessaliaC. entoicaSC. aromaticumC aromaticumC. nantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. hourophyllum eubocum-C. aromaticumC & E Europe, Balkan PeninsulaC'naciata taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryam euboicum-G. divaricatumMt TaygetosInula subfloccosaSI. targeteumMt TaygetosInula subfloccosaSI. terexcifolia subsp. parnassicaN Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, N EvviaMinuartia dirphyaSM. wargolica subsp. varinensisN GreeceNepeta argolica subsp. varinensisN Greece </td <td></td> <td></td> <td></td> <td></td>				
Bolanthus intermedius   -   B. graecus   E. Sterea Ellas, Evvia, Is. Naxos     Campanula celsii subsp. carystea   S   C. celsii aggr.   S Greece, W Aegean, Mt Athos     C. constantini   S   C. rupestris aggr.   Thessalia, Sterea Ellas, W Aegean     C. constantini   S   C. rupestris aggr.   S Greece, W Aegean, Mt Athos     C. gondunyi   S   C. constantini   S Greece, W Aegean, Mt Athos     C. gubica   S   C. containamaulici-loewii   Bulgaria, N Greece     C. auboica   S   C. continitica   Peloponnisos, E Sterea Ellas, Thessalia     C. auboica   S   C. continitica   W Segean     C. auboica   S   C. continitica   W Segean     C. autoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Characticata ushy, euboea   -   C. tarricata s.1.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   C. divaricatum   M t Taygetos     Inula sulfloccosa   S   I. verbaccifolia subsp. parnasica   N Peloponnisos, Sterea Ellas, N Evvia     Inula sulfloccosa   S   N targeturica subsp. cargotica subsp. argotica subsp. argotica subsp. arupescifia subsp. parnasis   N	n. sujji uneosu	_		
B. Imprifolius   E. Sterea Ellas, Evvia, E. Thessalia, N. Greece     C. cognaca   S   C. celsii aggr.   S. Greece, W. Aegean, M. Athos     C. constantini   S   C. rupestris aggr.   Thessalia, Stera Ellas, W. Aegean     C. constantini   S   C. rupestris aggr.   Thessalia, Stera Ellas, W. Aegean     C. constantini   S   C. celsii aggr.   S. Greece, W. Aegean, M. Athos     Centaurea ebenoides   S   C. cimmanuelis-loewii   Bulgaria, N. Greece     C. autoica   S   C. cachaia   Peloponnisos, E. Sterea Ellas, Thessalia, NE Greece     C. harotoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. harotoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Chaerophyllam euboeum   -   C. connaticum   C. & E Europe, Balkan Peninsula     Crucita taurica subsp. euboea   -   C. taurica sl.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   M. Taygetos     Inula subfloccosa   S   I. verbaccifolia subsp. parnascica   N Peloponnisos, Sterea Ellas, N Evvia     Linum goulinyi   -   L. leaconthum   M. Taygetos     Minuartia dir	Polanthus intormodius			
Campanula celsii subsp. carysteaSC. C. clsii aggr.S G. C. rayestris aggr.S Thessalia, Sterea Ellas, W AegeanC. constaintintSC. rayestris aggr.Thessalia, Sterea Ellas, W AegeanC. goulinyiSC. colsii aggr.S Greece, W Aegean, Mt AthosC. gulinyiSC. colsii aggr.S Greece, W Aegean, Mt AthosC. gulinyiSC. colsii aggr.S Greece, W Aegean, Mt AthosC. euboicaSC. corinthiacaPeloponnisos, E Sterea Ellas, ThessaliaC. euboicaSC. corinthiacaNE PeloponnisosC. euboicaC. catolicaW Sterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE oreaceCharciata taurica subsp. euboea-C. taurica sl.Is. Samos, Anatolia to Iran, CaucasusGeocaryam euboicum-G. divaricatumMt YalgetosInula subfloccosaSI. L verbaccifolia subsp. methaneaiE Peloponnisos, Sterea Ellas, N EvviaInula subfloccosaSI. verbaccifolia subsp. parnassicaN Peloponnisos, Sterea Ellas, N EvviaInula subfloccosaSN. argolica subsp. methaneaiE Sterea Ellas, C EvviaLinum goulinyi-L. leacanthumE Sterea Ellas, C EvviaL. guraicumSN. argolica subsp. nargolicaN Peloponnisos, Sterea Ellas, N EvviaMinaartia dirphyaSN. argolica subsp	Dotaninus intermeatus	-		
C. CymacaSC. rupestris aggr.Thessalia, Sterea Ellas, W. AegeanC. constantiniSC. rapestris aggr.Thessalia, Sterea Ellas, W. Aegean, M. AthosC. goulinyiSC. celsii aggr.S Greece, W. Aegean, M. AthosCenturea ebenoidesSC. immanuells-loewiiBulgaria, N GreeceC. eudoicaSC. cachaiaPeloponnisos, E Sterea Ellas, Thessalia, NE GreeceC. eudoicaSC. actolicaW. Sterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. haerophyllum euboeum-C. aromaticumC. & E Europe, Balkan PeninsulaCrucitat taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryun euboicum-G. divaricatumMt KilliniHypericum fragileSH. taygeteumH TaygetosInula subfloccosaSI. verbascifolia subsp. marnassicaN Peloponnisos, Sterea Ellas, N EvviaLinum goulinyi-L. leucanthumS Peloponnisos, Sterea Ellas, N EvviaLinum goulinyi-L. leucanthumS Peloponnisos, Sterea Ellas, N EvviaMinuartia dirphyaSM. wettsteiniiE Sterea Ellas, C EvviaNepeta argolica subsp. dirphyaSM. wettsteiniiK Peloponnisos, E Sterea Ellas, N EvviaSuderliris euboeaSN. argolica subsp. malacatrichosN GreeceNargolica subsp. nalacatrichosN GreeceN argolica subsp. mala	<i>C 1 1 1 1 1</i>	G		
C. constantini   S   C. rupestris aggr.   Thessalia, Sterae Ellas, W Aegean     C. goulimyi   S   C. celsii aggr.   Sterae Ellas, W Aegean, Mt Athos     Centaurea ebenoides   S   C. immanuelis-loewii   Bulgaria, N Greece     C. eudoica   S   C. carbaia   Peloponnisos, E Sterae Ellas, Thessalia     C. eudoica   N Ereae Ellas   N Erecee     C. mantoudii   A   C. pelia   Sterae Ellas, Thessalia, NE Greece     C. mantoudii   A   C. pelia   Sterae Ellas, Thessalia, NE Greece     Charophyllum euboeum   -   C. aromaticum   C & E Europe, Balkan Peninsula     Cruciata taushirae aubop, euboea   -   C. dravica st.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   Mt Killini     Hypericum fragile   S   H. kaygeteum   N Taygetos     Inula subfloccosa   S   I. verbascifolia subsp. parnassica   N Peloponnisos, Sterae Ellas, N Evvia     Linum goulimyi   -   L. leucanthum   E Sterae Ellas, C Evvia   I. serbascifolia subsp. neutonea     Minuartia dirphya   S   M. argolica subsp. argolica   N Peloponnisos, Sterea Ellas, N Evvia				
C. goulinyi   S   C. celsii aggr.   S Greece, W Aegean, Mt Athos     Centaurea ebenoides   S   C. celsii aggr.   S Greece, W Aegean, Mt Athos     Centaurea ebenoides   S   C. celsii aggr.   Bulgaria, N Greece     C. euboica   S   C. achaia   Peloponnisos, E Sterea Ellas, Thessalia     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Chearophyllum euboeum   -   C. aromaticum   C & E Europe, Balkan Peninsula     Cruciata taurica subsp. euboea   -   C. taurica s.l.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   Mt Killini   Peloponnisos, Sterea Ellas, N Evvia     Hypericum fragile   S   I. taygeteum   Mt Taygetos   N Peloponnisos, Attica     Inua subfloccosa   I. verbascifolia subsp. narnassica   N Peloponnisos, Sterea Ellas, N Evvia     Linum goulinyi   -   L. leucanthum   E Sterea Ellas, C Evvia     Minuartia dirphya   S   M. vertsterinii   M. parnonia     Nepeta argolica subsp. dirphya   S   N argolica subsp. argolica   N Gr				
Centaurea ebenoides   S   C. immanuelis-loewii   Bulgaria, N. Greece     C. euboica   C. achaia   Peloponnisos, E. Sterea Ellas, Thessalia     C. euboica   N. E. Peloponnisos   Sterea Ellas, Thessalia, NE Greece     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Crucitat aurica subsp. euboea   -   C. taurica s.l.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   Mt Killini     Hypericum fragile   S   H. taygeteum   Mt Taygetos     Inula subfloccosa   S   I. verbascifolia subsp. methaned   Peloponnisos, Sterea Ellas, N Evvia     Linum goulimyi   -   L. leucanthum   E Sterea Ellas, C Evvia     Linum goulimyi   -   L. leucanthum   S Verbascifolia subsp. mantaned   Kriti     Minuartia dirphya   S   M. wettsteinii   Mt Parnon     Nepeta argolica subsp. dipfnya   S   N. argolica subsp. argolica   N Feloponnisos, Esterea Ellas     N. argolica subsp. nalacotrich				
C. euboicaC. grbavacensisYugoslavia, N GreeceC. euboicaSC. achaiaPeloponnisos, E Sterea Ellas, ThessaliaC. actolicaW Sterea EllasNE Peloponnisos, E Sterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceC. datoricata taurica subsp. euboea-C. aromaticumC & E Europe, Balkan PeninsulaCrucitata taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-G. divaricatumMt KilliniHypericum fragileSH. taygeteamMt TaygetosInula subfoccosaSI. verbascifolia subsp. methaneaiE Peloponnisos, Sterea Ellas, N EvviaLinum goulinyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulinyi-L. leucanthumE Sterea Ellas, C EvviaNepeta argolica subsp. dirphyaSM. vertsteiniiE KriiNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaN GreeceQuercus trojana subsp. euboicaSS. argolica subsp. vorinensisN GreeceQuercus trojana subsp. euboicaSS. syriacaItaly to IranSideritis euboeaSS. syriacaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. salida s.l.N GreeceVereta argolica subsp. dirphyaSN. argolica subsp. argolicaN GreeceNargolica subsp. verbaciaSS. albida s.l.N Italy to IranSilene dirphyaSS. salida s.l. <td< td=""><td></td><td></td><td></td><td></td></td<>				
C. euboica   S   C. achaia   Peloponnisos, E Sterea Ellas, Thessalia     C. aetolica   W Sterea Ellas   NE Peloponnisos     C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Chaerophyllum euboeum   -   C. aromaticum   C & E Europe, Balkan Peninsula     Cruciata taurica subsp. euboea   -   C. taurica s.l.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   Mt Killini     Geocaryum euboicum   -   G. divaricatum   Mt Taygetos     Hypericum fragile   S   I. verbascifolia subsp. methaneaí   E Peloponnisos, Sterea Ellas, N Evvia     Hypericum goulimyi   -   L. leucanthum   E Sterea Ellas, C Evvia     Linum goulimyi   -   L. leucanthum   E Sterea Ellas, N Evvia     Minuartia dirphya   S   M. wettsteinii   E Kriti     Minuartia durphya   S   M. wettsteinii   E Kriti     Meeta argolica subsp. diirphya   S   S. adoida s.l.   N Terece     N argolica subsp. vourinensis   N Greece   N Greece   Quercus trojana subsp. euboica   S     Scuellaria goulimyi   S   S. aldida s	Centaurea ebenoides	S	C. immanuelis-loewii	Bulgaria, N Greece
C. corinthiacaNE PeloponnisosC. antoudiiAC. corinthiacaC. mantoudiiAC. peliaChaerophyllum euboeum-C. aromaticumC. taurica sl.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-C. taurica sl.Geocaryum euboicum-C. divaricatumMt BilliniG. parnassicumHypericum fragileSH. taygeteumInula subfloccosaSI. verbascifolia subsp. methaneaiLinum goulimyi-L. leucanthumLinum goulimyi-L. leucanthumLinum goulimyi-L. leucanthumLinum goulimyi-SMinuartia dirphyaSM. wetsteiniiMinuartia dirphyaSN. argolica subsp. argolicaNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNectures trojana subsp. euboica?SQ. trojana subsp. trojanaSideritis euboeaSS. satifaa sliSideritis euboeaSS. satifaa sliSideritis euboeaSS. satifaa sliSideritis euboeaSS. satifaa sliSideritis euboeaSS. satifaa sliSidendarphyaSS. satifaa sliSideritis euboeaSS. satifaa sli </td <td></td> <td></td> <td>C. grbavacensis</td> <td>Yugoslavia, N Greece</td>			C. grbavacensis	Yugoslavia, N Greece
C. corinhiaca C. aetolicaNE Peloponnisos W Sterea Ellas, Thessalia, NE GreeceC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceChaerophyllum euboeum-C. aromaticumC & E Europe, Balkan PeninsulaCruciata taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-G. divaricatumMt KilliniGeocaryum euboicum-G. divaricatumMt KilliniHypericum fragileSH. taygeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methaneaiE Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumS PeloponnisosMinuartia dirphyaSM. wettsteiniiE KritiMinuartia dirphyaSN. argolica subsp. malacotrichosN Feloponnisos, E Sterea EllasNepeta argolica subsp. euboica?SQ. trojana subsp. trojanaN E Peloponnisos, E Sterea EllasScatellaria goulimyiSS. albida s.l.N If argoticaN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan PeninsulaSideritis euboeaSS. syracaItaly to IranSideritis euboeaSS. syracaItaly to AnatoliaSideritis euboeaSS. susp. varinensisN GreeceSideritis euboeaSS. susp. argoticaS EuropeSilene dirphyaSS. susfirgaS Europe <tr< td=""><td>C. euboica</td><td>S</td><td>C. achaia</td><td>Peloponnisos, E Sterea Ellas, Thessalia</td></tr<>	C. euboica	S	C. achaia	Peloponnisos, E Sterea Ellas, Thessalia
C. aetolicaW Stere's EllasC. mantoudiiAC. peliaSterea Ellas, Thessalia, NE GreeceChaerophyllum euboeum-C. aromaticumC & E Europe, Balkan PeninsulaCruciata taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-G. divaricatumPeloponnisos, Sterea Ellas, N EvviaHypericum fragileSH. targeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. parnassicaN Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMonuartia dirphyaSN. argolica subsp. malacotrichosN GreeceNepeta argolica subsp. euboica?SQ. trojana subsp. malacotrichosN GreeceQuercus trojana subsp. euboica?SS. magolica subsp. malacotrichosN GreeceScatellaria goulimyiSS. albida s.l.N Italy to IranSideritis euboeaSS. syriacaBlan PeninsulaSideritis euboeaSS. syriacaItaly to Anatolia, Crimea and AmanusSideritis euboeaSS. soligantha subsp. oparnesiaMt Parm			C. corinthiaca	
C. mantoudii   A   C. pelia   Sterea Ellas, Thessalia, NE Greece     Chaerophyllum euboeum   -   C. aromaticum   C & E Europe, Balkan Peninsula     Cruciata taurica subsp. euboea   -   C. taurica s.l.   Is. Samos, Anatolia to Iran, Caucasus     Geocaryum euboicum   -   G. divaricatum   Mt Killini     Hypericum fragile   S   H. targeteum   Mt Targetos     Inula subfloccosa   S   I. verbascifolia subsp. methanea'   E Peloponnisos, Sterea Ellas, N Evvia     Linum goulimyi   -   L. leucanthum   E Sterea Ellas, C Evvia     Minuartia dirphya   S   M. wettsteinii   E Kriti     Minuartia dirphya   S   N. argolica subsp. nalocarichos   N Greece     Nepeta argolica subsp. dirphya   S   N. argolica subsp. nourinensis   N Greece     Quercus trojana subsp. euboica   PS   Q. trojana subsp. vourinensis   N Greece     S. albida s.l.   S   S. albida s.l.   N Italy to Iran     S. acatagmeanus   S. acatagmeanus   Turkey, W & S Anatolia     S. S. albida s.l.   S Italy, Balkan Peninsula     S. albida s.l.   S Italy to Anatolia, Crimea and Amanus				
Chaerophyllum euboeum-C. aromaticumC & E Europe, Balkan PeninsulaCruciata taurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-G. divaricatumMt KilliniGeocaryum euboicum-G. divaricatumMt KilliniHypericum fragileSH. targeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methaneaiE Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMepeta argolica subsp. dirphyaSN. argolica subsp. argolicaN E Peloponnisos, E Sterea EllasOuercus trojana subsp. euboica?SQ. trojana subsp. vourinensisN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan PeninsulaSideritis euboeaSS. saragedonicusBalka PeninsulaSideritis euboeaSS. sargeanusTurkey, W & S AnatoliaSilene dirphyaSS. satifragaS EuropeSilene dirphyaSS. satifragaS EuropeSilene dirphyaSS. satifragaS EuropeSilene dirphyaSS. satifragaS EuropeSilene dirphyaSS. algantha subsp. oliganthaMt OlimbosSilene dirphyaSS. coligantha subsp. parnesiaMt OlimbosSilene dirphyaSS. col	C. mantoudii	А		
Cruciala faurica subsp. euboea-C. taurica s.l.Is. Samos, Anatolia to Iran, CaucasusGeocaryum euboicum-G. divaricatumMt KilliniG. parrassicumPeloponnisos, Sterea Ellas, N EvviaHypericum fragileSH. taygeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methanedE Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMinuartia dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E sterea EllasNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE PeloponnisosQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan Peninsula, AnatoliaSideritis euboeaSS. satifaa s.l.N Italy to IranSideritis euboeaSS. satifagaS EuropeSideritis euboeaSS. satifagaS EuropeSoligantha subsp. pseudoradicosaSS. satifagaS EuropeSoligantha subsp. pseudoradicosaSS. oligantha subsp. parnesiaMt OlimbosSilene dirphyaAV. eipkanthinumPeloponnisos, Sterea Ellas, N & S Pindos, EvenVerbascriftis euboeaAS. castagreenusTurkey, W & S AnatoliaSilene dirphyaSS. castagreenusTuritey, W & S AnatoliaSilene dirphyaSS. oligantha subsp. parnesiaMt Olimbo		_		
Geocaryum euboicum_G. divaricatum G. parnassicumMt Killini Peloponnisos, Sterea Ellas, N EvviaHypericum fragileSH. taygeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methanea I. verbascifolia subsp. parnassicaN Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi_L. leucanthumE Peloponnisos, Sterea Ellas, N EvviaLinum goulimyiL. leucanthumSterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMinuartia dirphyaSN. argolica subsp. argolicaN E Peloponnisos, E Sterea EllasNepeta argolica subsp. dirphyaSN. argolica subsp. argolica N. argolica subsp. vourinensisN GreeceQuercus trojana subsp. euboica?SS. albida s.l.N Italy to IranSenecio cubaeusSS. satifragaS Italy, W & S AnatoliaSideritis euboeaSS. satifragaS EuropeSilene dirphyaSS. veizareaMt ParnisVerbascum euboicum(igantha subsp. oligantha S oligantha subsp. parnesiaMinuartia dirphyaAY. veitcanthitiumE ThessaliaV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V.		_		
G. parnassicumPeloponnisos, Sterea Ellas, N EvviaHypericum fragileSH. taygeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methaneaE Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMinuartia dirphyaSM. wettsteiniiE KritiMepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E Sterea EllasMepeta argolica subsp. dirphyaSN. argolica subsp. malacotrichosN GreeceQuercus trojana subsp. euboica?SS. albida s.l.N Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. sinacedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to Anatolia, Crimea and AmanusSilene dirphyaSS. oligantha subsp. parnesiaMt OlimbosSoligantha subsp. pseudoradicosaSS. oligantha subsp. parnesiaMt PennisulaVerbascum euboicumV. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, E StereaVerbasSVerbasSSS. albida s.l.N Italy to IranSenecio eubaeusSS-Silene dirphyaSS. oligantha subsp. parnesiaMt Oli				
Hypericum fragileSH. taygeteumMt TaygetosInula subfloccosaSI. verbascifolia subsp. methanedE Peloponnisos, AtticaLinum goulimyi-L. leucanthumE Sterea Ellas, N EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaLinum goulimyi-L. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMinuartia dirphyaSM. wettsteiniiE KritiMepeta argolica subsp. dirphyaSN. argolica subsp. argolica N. argolica subsp. malacotrichosN Feloponnisos, E Sterea EllasOuercus trojana subsp. euboica?SQ. trojana subsp. rojanaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. astida s.l.N Italy to IranSideritis euboeaSS. saxifragaS LaropenSilene dirphyaSS. saxifragaS EuropeSoligantha subsp. pseudoradicosaSS oligantha subsp. opanesiaMt OlimbosSilene dirphyaSS. saxifragaS EuropeSoligantha subsp. pseudoradicosaSS oligantha subsp. opanesiaMt ParnisVerbascum euboicum-V. epixanthnumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaVerbascum euboicum-V. epixanthnumFeloponnisosV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V. zuccariniiP-[	Geocuryum euboicum	-		
Inula subfloccosaSI. verbascifolia subsp. methanea' I. verbascifolia subsp. parnassicaE Peloponnisos, Attica N Peloponnisos, Sterea Ellas, N EvviaLinum goulimyi-I. leucanthumE Sterea Ellas, C Evvia I. s.Yioura, Is. Ikaria E. Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteinii M. parnoniaE Sterea Ellas, C Evvia I. S.Yioura, Is. IkariaNepeta argolica subsp. dirphyaSN. argolica subsp. argolica N. argolica subsp. nalacotrichos N. argolica subsp. nalacotrichos N. argolica subsp. nalacotrichos N. argolica subsp. vourinensisN Greece N GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojana S albida s.l.N Italy, Balkan Peninsula, Anatolia S. s. antedancius S. anatotica S. s. syriaca S. s. syriaca S. oligantha subsp. pore S. oligantha subsp. parnesiaN Italy to Iran S EuropeSilene dirphyaSS. s. satifraga S. s. syriaca S. oligantha subsp. parnesia M tarnisS EuropeSilene dirphyaSS. s. satifraga S. oligantha subsp. parnesia M to TimbosS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. parnesia M to ParnisM Parnis V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia V. epixanthinumV. zuccariniiP-[isolated] V. eichenbachiana V. ecphalnica K. euboea-V. zuccariniiP-[isolated] V. ecphalnica K. euboea-V. zuccariniiP-[isolated] K. eephalnica K. eubola-V. euboeaAV. cephalnica K. eubolaEurope, NW	II	c		
Linum goulinyiI. verbascifolia subsp. parnassicaN Peloponnisos, Sterea Ellas, N EvviaLinum goulinyiL. leucanthumE Sterea Ellas, C EvviaMinuartia dirphyaSM. vettsteiniiE Sterea Ellas, C EvviaMinuartia dirphyaSM. wettsteiniiE KritiMepeta argolica subsp. dirphyaSM. wettsteiniiE KritiNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E Sterea EllasNecus trojana subsp. euboica?SN. argolica subsp. malacotrichosN GreeceQuercus trojana subsp. euboica?SS albida s.l.N Italy to IranSenecio eubaeusSS. snacedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to AnatoliaSilene dirphyaSS. oligantha subsp. oliganthaMt OlimbosSoligantha subsp. pseudoradicosaSS. silgantha subsp. oliganthaMt OlimbosVerbascum euboicumV. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, Evvia-V. euccariniiP-[isolated]V. zuccariniiPV. zuccariniiP-[isolated]V. euboeaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephaloniccaIs. Kephallinia				
Linum goulimyi_L. leucanthumE. Sterea Ellas, C. Evvia L. gvaricumInnuartia dirphyaS.L. elucanthumIs. Youra, Is. Ikaria L. PhitostanumMinuartia dirphyaS.M. wettsteinii M. parnoniaS. PeloponnisosMinuartia dirphyaS.M. wettsteinii M. parnoniaE. Kriti M. parnoniaNepeta argolica subsp. dirphyaS.N. argolica subsp. argolica N. argolica subsp. malacotrichos N. argolica subsp. malacotrichos N. argolica subsp. vourinensisN. GreeceQuercus trojana subsp. euboica?S.Q. trojana subsp. trojanaS. Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiS.S. albida s.l.N. Italy to IranSenecio eubaeusS.S. macedonicus S. ablida s.l.Balkan PeninsulaSideritis euboeaS.S. syriaca S. sayriacaItaly to AnatoliaSilene dirphyaS.S. sozifraga S. sozifragaS. EuropeS. oligantha subsp. pseudoradicosaS. oligantha subsp. parnesia M. dTimbosMt ParnisVerbascum euboicum-V. epixanthinum Y. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, Evvia Y. epixanthinumV. zuccariniiP-[isolated] Y. eichenbachiana-V. zuccariniiP-[isolated] Y. eichenbachiana-V. euboeaAV. cechalonicca K. eichenbachianaEurope, NW Africa, SW Asia K. Kephallinia Y. euboea	Inula subfloccosa	5		
L. gyaricumIs. Yioura, Is. İkariaMinuartia dirphyaSM. wettsteiniiS PeloponnisosMinuartia dirphyaSM. wettsteiniiE KritiM. parnoniaMt ParnonNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E Sterea EllasNepeta argolica subsp. dirphyaSN. argolica subsp. nalacotrichosN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to AnatoliaSilene dirphyaSS. suffragaS EuropeSoligantha subsp. pseudoradicosaSS. oligantha subsp. oliganthaMt OlimbosVerbascum euboicum-V. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaV. zuccariniiP-[isolated]-V. zubeaaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephalonicaIs. Kephallinia				
L phitosianumS PeloponnisosMinuartia dirphyaSM. wettsteiniiE KritiMaparnoniaMt ParnonNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E Sterea EllasN. argolica subsp. argolica subsp. argolica subsp. argolica subsp. malacotrichosN GreeceN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to Anatolia, Crimea and AmanusSilene dirphyaSS. saxifragaS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. parnesiaMt ParnisVerbascum euboicum-V. epixanthumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V. zuccariniiAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephaloniccaIs. KephalliniaV. euboeaAV. cephalonicaS	Linum goulimyi	-		
Minuartia dirphya   S   M. wettsteinii   E Kriti     M. parnonia   MI Parnon   MI Parnon     Nepeta argolica subsp. dirphya   S   N. argolica subsp. argolica   NE Peloponnisos, E Sterea Ellas     Nepeta argolica subsp. dirphya   S   N. argolica subsp. malacotrichos   N Greece     Quercus trojana subsp. euboica   ?S   Q. trojana subsp. trojana   S Italy, Balkan Peninsula, Anatolia     Scutellaria goulimyi   S   S. albida s.l.   N taly to Iran     Senecio eubaeus   S   S. macedonicus   Balkan Peninsula     Sideritis euboea   S   S. saxifraga   Turkey, W & S Anatolia     Silene dirphya   S   S. saxifraga   S Europe     S. oligantha subsp. pseudoradicosa   S   S. oligantha subsp. parnesia   Mt Parnis     Verbascum euboicum   -   V. epixanthinum   Peloponnisos, Sterea Ellas, N & S Pindos, Evvia     V. zuccarinii   P   -   [isolated]   -     V. zuccarinii   P   -   [isolated]   -     V. ezohanthulum   Europe, NW Africa, SW Asia   V. cephalonica   Is. Kephallinia     V. euboea   A   V. cephanonica				
M. parnoniaMt ParnonNepeta argolica subsp. dirphyaSN. argolica subsp. argolicaNE Peloponnisos, E Sterea EllasN. argolica subsp. malacotrichosN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. vourinensisN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to AnatoliaSilene dirphyaSS. suifragaS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. oliganthaMt OlimbosVerbascum euboicum-V. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-Viola dirphyaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephalonicaIs. Kephallinia				S Peloponnisos
Nepeta argolica subsp. dirphya   S   N argolica subsp. argolica N. argolica subsp. malacotrichos N. argolica subsp. malacotrichos N. argolica subsp. vourinensis   N Greece     Quercus trojana subsp. euboica   ?S   Q. trojana subsp. trojana   S Iatly, Balkan Peninsula, Anatolia     Scutellaria goulimyi   S   S. albida s.l.   N Italy to Iran     Senecio eubaeus   S   S. albida s.l.   N Italy to Iran     Sideritis euboea   S   S. syriaca   Italy to Anatolia, Crimea and Amanus     Silene dirphya   S   S. satifraga   S Europe     S. oligantha subsp. pseudoradicosa   S   S. oligantha subsp. parnesia   Mt Parnis     Verbascum euboicum   -   V. epixanthinum   Peloponnisos, Estera Ellas, N & S Pindos, Evvia     V. zuccarinii   P   - [isolated]   -     V. zubea   A   V. reichenbachiana   Europe, NW Africa, SW Asia     V. euboea   A   V. cephalonica   Is. Kephallinia	Minuartia dirphya	S	M. wettsteinii	E Kriti
N. argolica subsp. malacotrichos N. argolica subsp. vourinensisN Greece N GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaN GreeceScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to Anatolia, Crimea and AmanusSilene dirphyaSS. saxifragaS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. parnesiaMt OlimbosVerbascum euboicum-V. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V. euboeaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephaloniccaIs. Kephallinia			M. parnonia	Mt Parnon
N. argolica subsp. malacotrichos N. argolica subsp. vourinensisN Greece N GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaN GreeceScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to Anatolia, Crimea and AmanusSilene dirphyaSS. saxifragaS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. parnesiaMt OlimbosVerbascum euboicum-V. epixanthinumPeloponnisos, Sterea Ellas, N & S Pindos, EvviaV. zuccariniiP-[isolated]-V. zuccariniiP-[isolated]-V. euboeaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephaloniccaIs. Kephallinia	Nepeta argolica subsp. dirphya	S	N. argolica subsp. argolica	NE Peloponnisos, E Sterea Ellas
N. argolica subsp. vourinensisN GreeceQuercus trojana subsp. euboica?SQ. trojana subsp. trojanaS Italy, Balkan Peninsula, AnatoliaScutellaria goulimyiSS. albida s.l.N Italy to IranSenecio eubaeusSS. macedonicusBalkan PeninsulaSideritis euboeaSS. syriacaItaly to AnatoliaSilene dirphyaSS. saxifragaS EuropeS. oligantha subsp. pseudoradicosaSS. oligantha subsp. oligantha y aphentuliumMt OlimbosVerbascum euboicum-V. epixanthinum y aphentuliumPeloponnisos, Sterea Ellas, N & S Pindos, Evvia V. aphentuliumV. zuccariniiP-[isolated]-V. euboeaAV. reichenbachianaEurope, NW Africa, SW Asia V. euboeaK. Solatolia				
Quercus trojana subsp. euboica   ?S   Q. trojana subsp. trojana   S Italy, Balkan Peninsula, Anatolia     Scutellaria goulimyi   S   S. albida s.l.   N Italy to Iran     Senecio eubaeus   S   S. albida s.l.   N Italy to Iran     Sideritis euboea   S   S. swiaca   Balkan Peninsula     Sideritis euboea   S   S. swiaca   Italy to Anatolia     Silene dirphya   S   S. swifraga   S Europe     S. oligantha subsp. pseudoradicosa   S   S. oligantha subsp. oligantha   Mt Olimbos     Verbascum euboicum   –   V. epixanthinum   Peloponnisos, Sterea Ellas, N & S Pindos, Evvia     V. zuccarinii   P   – [isolated]   –     V. euboea   A   V. reichenbachiana   Europe, NW Africa, SW Asia     V. euboea   A   V. cephalninica   Is. Kephallinia				N Greece
Scutellaria goulimyi   S   S. albida s.l.   N Italy to Iran     Senecio eubaeus   S   S. macedonicus   Balkan Peninsula     Sideritis euboea   S. s. castagneanus   Turkey, W & S Anatolia, Crimea and Amanus     Sideritis euboea   S. s. syriaca   Italy to Anatolia, Crimea and Amanus     Silene dirphya   S   S. saxifraga   S Europe     S. oligantha subsp. pseudoradicosa   S   S. oligantha subsp. parnesia   Mt Olimbos     Verbascum euboicum   –   V. epixanthinum   Peloponnisos, Sterea Ellas, N & S Pindos, Evvia     V. zuccarinii   P   –   [isolated]   –     Viola dirphya   A   V. reichenbachiana   Europe, NW Africa, SW Asia     V. euboea   A   V. cephalonica   Is. Kephallinia	Ouercus trojana subsp. euboica	28		
Senecio eubaeus S S. macedonicus S. castagneanus Balkan Peninsula Turkey, W & S. Anatolia   Sideritis euboea S S. syriaca S. syriaca Italy to Anatolia, Crimea and Amanus Balkan Peninsula   Silene dirphya S S. saxifraga Seurope   S. oligantha subsp. pseudoradicosa S S. oligantha subsp. oligantha S. oligantha subsp. parnesia Mt Olimbos   Verbascum euboicum – V. epixanthinum V. aphentulium Peloponnisos, Sterea Ellas, N & S Pindos, Evvia V. aphentulium   V. zuccarinii P – [isolated] –   V. euboea A V. reichenbachiana Europe, NW Africa, SW Asia V. athois Mt Athos				
Sideritis euboea S. castagneanus Turkey, W & S. Anatolia   Sideritis euboea S. S. syriaca Italy to Anatolia, Crimea and Amanus   Silene dirphya S. S. casteri Balkan Peninsula   Silene dirphya S. S. sxifraga S Europe   S. oligantha subsp. pseudoradicosa S. S. oligantha subsp. oligantha S. oligantha subsp. parnesia Mt Olimbos   Verbascum euboicum - V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia V. aphentulium   V. zuccarinii P - [isolated] -   V. euboea A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea K. schenbachiana Europe, NW Africa, SW Asia				
Sideritis euboea S S. syriaca Italy to Anatolia, Crimea and Amanus   Silene dirphya S S. caeseri Balkan Peninsula   Silene dirphya S S. saxifraga S Europe   S. oligantha subsp. pseudoradicosa S S. oligantha subsp. oligantha Mt Olimbos   Verbascum euboicum - V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia	Senecto eubueus	5		
Silene dirphya S. raeseri Balkan Peninsula   Silene dirphya S S. saxifraga S Europe   S. oligantha subsp. pseudoradicosa S S. oligantha subsp. oligantha Mt Olimbos   S. oligantha subsp. pseudoradicosa S S. oligantha subsp. oligantha Mt Olimbos   Verbascum euboicum - V. epixanthinium Peloponnisos, Sterea Ellas, N & S Pindos, Evvia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia   V. athois Mt Athos Kt Athos	Sidenitie and an	c		
Silene dirphya S S. saxifraga S Europe   S. oligantha subsp. pseudoradicosa S S. oligantha subsp. oligantha Mt Olimbos   Verbascum euboicum - S S. oligantha subsp. parnesia Mt Parnis   Verbascum euboicum - V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephallonica Is. Kephallinia   V. athois Mt Athos Kt Athos Kt Athos	Staeritis euboea	5		
S. oligantha subsp. pseudoradicosa   S   S. oligantha subsp. oligantha   Mt Olimbos     Verbascum euboicum   S. oligantha subsp. parnesia   Mt Parnis     Verbascum euboicum   -   V. epixanthinum   Peloponnisos, Sterea Ellas, N & S Pindos, Evvia     V. zuccarinii   P   -   [isolated]   -     Viola dirphya   A   V. reichenbachiana   Europe, NW Africa, SW Asia     V. euboea   A   V. cephallonica   Is. Kephallinia     V. athois   Mt Olimbos   Mt Olimbos	C:1 I: I	C		
S. oligantha subsp. parnesia Mt Parnis   Verbascum euboicum - V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia   V. autois Mt totios Mt totios Mt totios				
Verbascum euboicum - V. epixanthinum Peloponnisos, Sterea Ellas, N & S Pindos, Evvia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachina Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia   V. athois Mt Athos Kephallinia	S. oligantha subsp. pseudoradicosa	S		
V. zuccarinii P - E Thessalia   V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia   V. athois Mt Athos Kathos				
V. zuccarinii P - [isolated] -   Viola dirphya A V. reichenbachiana Europe, NW Africa, SW Asia   V. euboea A V. cephalonica Is. Kephallinia   V. autois Mt Athos Mt Athos	Verbascum euboicum	-		Peloponnisos, Sterea Ellas, N & S Pindos, Evvia
Viola dirphyaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephalonicaIs. KephalliniaV. athoisMt Athos			V. aphentulium	E Thessalia
Viola dirphyaAV. reichenbachianaEurope, NW Africa, SW AsiaV. euboeaAV. cephalonicaIs. KephalliniaV. athoisMt Athos	V. zuccarinii	Р	– [isolated]	_
V. euboea A V. cephalonica Is. Kephalinia V. athois Mt Athos		Α		Europe, NW Africa, SW Asia
V. athois Mt Athos				
		- *		
			V. graeca aggr.	Continental Greece

may have permitted the conservation and survival of some relicts, which have become extinct in adjacent, non-ophiolitic regions.

The serpentinophytes of Evvia show intense phytogeographical connections with the neighbouring ophiolitic regions of adjacent continental Greece. Several serpentine endemics are distributed to the serpentine areas of northern Evvia, eastern Sterea Ellas and/or eastern Central Greece (e.g. *Allium euboicum, Daphne euboica, Ferulago serpentinica, Onosma euboica, Scorzonera serpentinica*). The phytogeographical connection with the extensive ophiolitic regions of N Greece is evidently weaker.

Besides ophiolitic substrate the presence of marble and cipolin strips within the extensive schist areas of S Evvia is as well a case of ecological isolation concerning *Inula subfloccosa* and *Stachys euboica* (the latter, considered endemic to S Evvia, has recently been discovered in the Meteora area of Thessaly, according to Kamari & al. 2003).

#### 3. Classification of the endemics after cytotaxonomic critera

Favarger & Contandriopoulos (1961) systematized the cytotaxonomic study of endemic taxa and their vicarious congeners in order to better understand their evolutionary history and distinguish "passive" endemism of palaeo- and patroendemics from "active" endemism of schizo- and apoendemics. Our karyological data allow such a classification for 27 of the 39 local endemic taxa of Evvia (Table 2). The majority represents schizoendemics (80.8 %) while the categories of apoendemics (11.5 %) and palaeoendemics 7.7 %) follow by distance (patroendemics absent). The dominance of schizoendemics and apoendemics in the endemic flora of Evvia shows that endemism has originated in Evvia mainly in an "active" way. The cytotaxonomic classification of the endemic plants of Peloponnisos (Iatrou 1986) gained similar results (palaeoendemics 7.8 %, patroendemics 0.0 %, schizoendemics 86.3 %, apoendemics 5.9 %).

In Evvia, the category of palaeoendemics is represented by Alyssum euboeum and Verbascum zuccarinii. As compared to other Aegean areas rich in palaeoendemics (e.g. the S Aegean area; Greuter 1972, 1975), this is only a very small number, possibly caused by the relatively recent isolation of Evvia from continental Greece, and the immigration and successful competition of northern taxa during the glacial periods. Palaeooendemics are ancient taxa showing little variation and a distribution often of a relictual type, corresponding to the remains of a once larger area (Cardona & Contandriopoulos 1979). V. zuccarinii belongs to this category as its population presents low morphological diversity and is taxonomically isolated, without close relatives in the Balkan Peninsula and Anatolia, its closest relative being V. pyramidatum M.Bieb. from the Caucasus. A. euboeum is a possibly palaeoendemic species well adapted to the harsh environmental conditions of the ophiolitic rocks and is locally common, although scattered and restricted in distribution. Its morphological variability is remarkable and seems to depend, to some extent, on different composition of the ophiolitic rocks it colonizes. It has no close relatives in Alyssum sect. Odontarrhena (C. A. Mey.) W. D. J. Koch in the Balkans, and an Anatolian origin seems more probable for this species, supported by morphological similarities with A. condensatum Boiss. & Hausskn. s.l. from Anatolia, Syria, Lebanon and N Iraq.

Patroendemics constitute, together with palaeoendemics, the ancient element of a flora. Despite the existence of some patroendemics in the Aegean there is none among the local endemic taxa of Evvia that can safely be classified as such using cytotaxonomic criteria. Patroendemics were also not reported in the endemic flora of Peloponnisos (Iatrou 1986).

With 21 taxa, schizoendemics form the largest group in the endemic flora of Evvia. Some of them are taxa of recent origin and their evolution is still in progress. Others, similarly to palaeoendemics, have an old origin.

Allium karistanum and Minuartia dirphya are considered to be schizoendemic taxa of an old origin (relictual schizoendemics), and probably Hypericum fragile, Sideritis euboea, Asperula euboea and Centaurea ebenoides are also to be included in this category. Allium karistanum, together with A. callidictyon, A. peroninianum, A. greuteri and A. pentadactyli, form a group of species with a remarkable disjunction over the Mediterranean (see distribution map in Brullo &

al. 1997). Their ecological preferences and some of their morphological features indicate that they are probably relics of a xerothermic flora linked with the Messinian period (5-6 m.y. B.P.) when the Mediterranean climate was uniformly xeric and these geophytes probably had a wide distribution (Brullo & al. 1997). The geographical distribution of Minuartia dirphya and its corresponding species, *M. wettsteinii* and *M. parnonia* is less scattered (Trigas & Iatrou 2005). This pattern indicates that the origin of these species goes back at least to Pliocene, characterising them as palaeo-schizoendemics. Hypericum fragile belongs to Hypericum sect. Taeniocarpium Jaub. & Spach which has a wide distribution range throughout Europe eastwards to Israel and E Siberia. The representatives of this section in Greece, H. fragile and H. taygeteum, have very restricted distribution ranges, indicating a relictual status. Sideritis euboea and S. raeseri, although distributed in neighbouring areas (Fig. 2), show morphological differences that indicate long isolation. S. syriaca subsp. syriaca, endemic to Crete, appears to be the closest relative of S. euboea at least morphologically. The distribution ranges of both latter species also indicate an old origin. The species related to Centaurea ebenoides (Table 2) are distributed in the central part of the Balkan Peninsula, hence it has probably a northern origin. However, striking morphological differences of *C. ebenoides* from its corresponding species indicate long isolation.

Schizoendemics the corresponding taxa of which are distributed in closely neighbouring areas are supposed to have a relatively recent origin (neoschizoendemics). Their morphological differentiation is usually weak and they are often classified at subspecific level. The majority of the endemics of Evvia belong here (*Allium calamarophilon, A. runemarkii, Armeria johnsenii, Campanula celsii* subsp. carystea, C. constantini, C. cymaea, C. goulimyi, Centaurea euboica, Inula subfloccosa, Nepeta argolica subsp. dirphya, Scutellaria goulimyi, Senecio eubaeus, Silene oligantha subsp. pseudoradicosa, Quercus trojana subsp. euboica and Silene dirphya). Their corresponding taxa (Table 2) usually have restricted distribution ranges. The subspecific differentiation of Centaurea euboica subsp. euboica and C. euboica subsp. intermedia, both growing on serpentine in N Evvia, was presumably triggered by fragmentation of the ophiolitic areas of N Evvia by intercalary calcareous rocks and by differences in their chemical composition.

The category of apoendemics includes *Centaurea mantoudii*, *Viola dirphya* and *Viola euboea*. *C. mantoudii* is an auto- or allotetraploid (2n = 4x = 36; Georgiadis 1980, Trigas 2003) and it seems to originate from the diploid *C. pelia* (2n = 2x = 18) that spreads widely in areas adjacent to the range of *C. mantoudii*. *V. dirphya* is also tetraploid (2n = 4x = 40; Tiniakou 1991), probably originating from the widely distributed diploid *V. reichenbachiana* (2n = 2x = 20; Livaniou-Tiniakou 1991) via auto- or allopolyploidy. Both taxa can be considered neopolyploids, according to Favarger (1975) and Greilhuber & Ehrendorfer (1988), with their relative diploid taxa distributed in closely neighbouring areas. *V. euboea* is tetraploid (2n = 4x = 40; Erben 1985), of an allopolyploid origin (Erben 1996), and its ancestral taxa are very difficult to identify within the extremely difficult complex of *Viola* sect. *Melanium*. It seems to be a mesopolyploid according to Favarger (1975; see also Table 2).

#### 4. Origin and geographic affinities of the endemic flora of Evvia

The allocation of the regional endemics of Evvia to the present distribution ranges of their related taxa may elucidate their origin and geographic affinities, grouped into different categories.

The first, and largest, category includes taxa that seem to have developed in either continental or insular (Aegean) Greece. The "continental" group includes *Allium calamarophilon, A. runemarkii, Asperula euboea, Bolanthus intermedius, Campanula celsii* subsp. *carystea, Centaurea ebenoides, C. euboica, C. mantoudii, Geocaryum euboicum, Hypericum fragile, Inula subfloccosa, Nepeta argolica* subsp. *dirphya, Senecio eubaeus, Silene oligantha* subsp. *pseudoradicosa, Viola euboea* and *Verbascum euboicum,* the "insular" group contains *Asperula suffruticosa, Campanula cymaea, C. constantini* and *C. goulimyi.* 

The second category includes endemic taxa that seem to originate from widely distributed taxa, some populations of which underwent speciation in Evvia. Alyssum densistellatum, Ammi topalii, Armeria johnsenii, Chaerophyllum euboeum, Quercus trojana subsp. euboica, Scutellaria

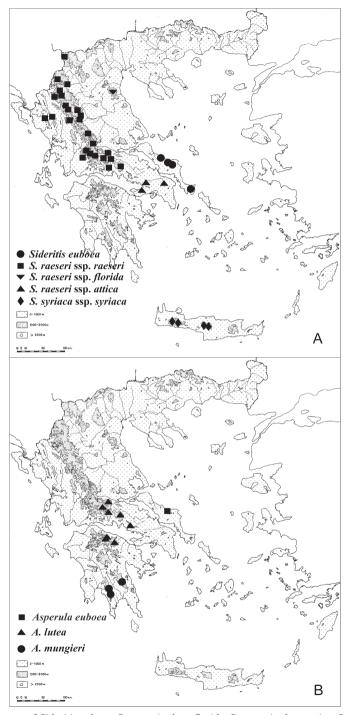


Fig. 2. A: Total range of *Sideritis euboea*, *S. raeseri* subsp. *florida*, *S. raeseri* subsp. *attica*, *S. syriaca* subsp. *syriaca* and distribution range of *S. raeseri* subsp. *raeseri* in Greece; B: total range of *Asperula euboea*, *A. lutea* and *A. mungieri*.

*goulimyi, Silene dirphya* and *Viola dirphya* belong here. In some cases (Fig. 3) the widely distributed related taxa expand to the north of Evvia. In all cases the endemic taxa show strong morphological similarities to their relatives and they should be considered of a relatively recent origin.

The third category includes taxa which originate E of Evvia, viz. in Anatolia or even further east, including *Asperula brachyphylla*, *A. ophiolithica*, *Cruciata taurica* subsp. *euboea* and probably *Alyssum euboeum*. These are old taxa usually well differentiated from their relatives, which seem to have arrived in Evvia via the central Aegean. The distribution of *A. brachyphylla* and its congeners is the only clear evidence for this migration route (see distribution map in Trigas & Iatrou 2003).

In the S Aegean area, especially in Crete, many eastern species are confined to high altitudes (Carlström 1987), reflecting the climatic conditions of the migration periods. Two insular endemics of Evvia of an eastern origin (*Asperula brachyphylla, Cruciata taurica* subsp. *euboea*) are confined to high altitudes, whereas *Asperula ophiolithica* and *Alyssum euboeum* (exclusively on serpentine in N Evvia) are lowland species the relatives of which are usually growing on lime-stone at moderate and high altitudes (up to 3000 m) in Anatolia. According to Brooks (1987), the serpentines of Evvia, found mostly at low altitude, support a flora that includes plants distributed, outside Evvia, further north or at higher altitudes. This disjunct distribution is a typical character of serpentine floras elsewhere, where competitive pressure restricts some plants either to the edaphically harsh environment of ultramafites, or to the climatically harsh environment of regions further north or at higher altitudes.

Finally, a fourth category is represented by *Allium karistanum* which, with its relative taxa, seem to constitute remnants of an old xerophytic flora widely distributed in the Mediterranean area during the Messinian.

## 5. Comments on selected taxa

#### Asperula euboea (Ehrend.) Trigas

The Asperula populations that grow on cliffs in central Evvia were originally described as a subspecies of A. lutea (A. lutea subsp. euboea Ehrend. in Rechinger 1961). Ehrendorfer & Krendl (1976) divided A. lutea into four subspecies distributed in S Greece, viz. A. lutea subsp. lutea (Sterea Ellas and N Peloponnisos), A. lutea subsp. euboea (endemic to central Evvia), A. lutea subsp. rigidula (E Sterea Ellas, Evvia, Peloponnisos) and A. lutea subsp. mungieri (endemic to Mts Taigetos and Parnon in S Peloponnisos), both the latter later recognized as independent species (Schönbeck-Temesy & Ehrendorfer 1991, Tan & Iatrou 2001). The Asperula populations of Central Evvia, too, belong to a clearly distinct species, A. euboea (Ehrend.) Trigas (Trigas 2003), which grows in a specialized habitat (i.e. shady vertical limestone cliffs) and differs from its relative taxa in habit and in several morphological characters. It seems to be more closely related to A. mungieri Boiss. & Heldr. than to A. lutea Sm. s. str., differing from the former by its dense caespitose habit, shorter stems, longer hyaline apex of leaves and dull yellow corolla (whitish, purple or brownish-purple in A. mungieri), and from the latter by its dense caespitose habit, longer, acicular, ± falcate leaves and a shorter inflorescence.

## Fumana pinatzii Rech. f.

*Fumana pinatzii* was described from Evvia (Rechinger 1956); according to the description, it does not show remarkable taxonomic differences in single characters from *F. arabica* (L.) Spach, a widespread species of the Mediterranean region, except the number of seeds in the capsule (6 instead of 12 in *F. arabica*).

In the locus classicus of *Fumana pinatzii* (the Limni area in N Evvia), we collected many specimens of the local *Fumana* populations growing abundantly in the ophiolitic areas. The study of these specimens, and their comparison with the type specimen, confirmed the absence of morphological differences between *F. pinatzii* and *F. arabica* from various places in Greece. The

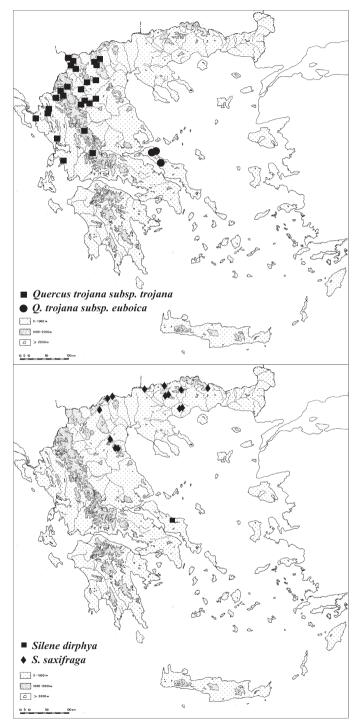


Fig. 3. A: Total range of *Quercus trojana* subsp. *euboica*, and distribution range of *Q. trojana* subsp. *trojana* in Greece; B: total range of *Silene dirphya* and distribution range of *S. saxifraga* in Greece.

specimens from N Evvia were found to contain 6, 9 or 12 seeds per capsule. No morphological differences linked with different number of seeds per capsule were found. According to Heywood (1968), specimens of *F. arabica* from the Kiklades islands have sometimes 6 seeds per capsule, while the number of seeds in *F. arabica* is (6-)8-12. The inclusion of *F. pinatzii* within the variation and as a synonym of *F. arabica* is therefore appropriate.

## Colchicum pinatziorum Rech. f.

The description of *Colchicum pinatziorum* (Rechinger 1961) was based on a specimen of Pinatzis collected on Mt Kandili in N Evvia, at an altitude of c. 1000 m. The species, according to the description and the type specimen seen, shows only slight taxonomic differences from *C. boissieri* Orph. which is distributed in Sterea Ellas, the island of Chios and W Anatolia (Tan & Iatrou 2001). The differences of Pinatzis's specimen from specimens of *C. boissieri* collected in Sterea Ellas are confined to the slightly more slender perianth segments and the smaller anthers (c. 2 mm long).

During a visit to Mt Kandili we found large populations of *Colchicum* growing in *Abies cephalonica* woodland at altitudes of 850 to 1050 m. The study of the specimens revealed a considerable variation in the size of the perianth segments (4-12 mm wide) and anthers (2.2-3.6 mm long). These measurements fit well (or only slightly extend beyond) the dimensions given for C. *boissieri*. We did not find any other morphological difference between the specimens of Mt Kandili and genuine *C. boissieri*. This is true also for the leaves, which originally were not described in *C. pinatziorum*. We therefore propose to sink *C. pinatziorum* into synonymy of the more widespread *C. boissieri*.

#### Crepis dioscoridis subsp. euboica Rech. f.

*Crepis dioscoridis* s.l. is a very polymorphic species distributed in SE Europe. Subspecies were described by Babcock (1947), but these were based on very limited material, and further information is required before their status can be confirmed (Sell 1976).

*Crepis dioscoridis* subsp. *euboica* was described by Rechinger (1961) from central Evvia and related by him to *C. dioscoridis* subsp. *tubiformis* (Halácsy) Babc. Specimens of *C. dioscoridis* s.l. collected by us in central Evvia do not show stable differences with specimens of *C. dioscoridis* s.l. collected in E Sterea Ellas. Size of leaves and length of stems clearly correspond with modifying ecological parameters of the habitat. Subspecific rank for the populations of *C. dioscoridis* from Evvia is therefore not justified.

#### **Concluding remarks**

Restricted distribution ranges, and the strong link to specific geological substrates are important characteristics of the endemic flora of Evvia. The abundance of schizoendemics and the presence of apoendemics emphasize the "active" evolution of endemic taxa on the island. The majority of the endemics belong to groups that seem to have differentiated in situ. Northern and eastern elements, although low in number, have further enriched the local endemic flora.

Endemics form a significant group of taxa for setting conservation priorities. The insular endemics of Evvia, many of them with extremely narrow distribution ranges, are subject to a number of serious threats. Almost 50 % of them are considered facing a high risk of extinction in the wild and therefore fulfill the criteria of inclusion in the categories of "Critically Endangered", "Endangered" or "Vulnerable", according to the IUCN Red List Categories and Criteria (IUCN 2001, Trigas 2003). Their conservation should be of priority in any future environmental plans in the area.

## Acknowledgement

The authors thank Dr Theophanis Constantinidis for his critical comments on the paper.

#### References

- Akeroyd, J. R. & Preston, C. D. 1987: Floristic notes from the Aegean region of Greece. Willdenowia 16: 349-372.
- Andel, T. H. van & Tzedakis, P. C. 1996: Palaeolithic landscapes of Europe and Environs, 150 000-25 000 years ago. – Quaternary Sci. Rev. 15: 481-500.[CrossRef]
- Babcock, E. B. 1947: The genus Crepis. II. Systematic treatment. Univ. Calif. Publ. Bot. 22.
- Boratyński, A., Browicz, K. & Zieliñski, J. 1988: Woody flora of Euboea (Evvoia). Arbor. Kórnickie **33:** 13-74.
- Brooks, R. R. 1987: Serpentine and its vegetation. A multidisciplinary approach. London & Sydney.
- Brullo, S., Guglielmo, A., Pavone, P., Salmeri, C. & Terrasi, M. C. 2003: Three new species of *Allium* sect. *Codonoprasum* from Greece. – Pl. Biosystems 137: 131-140.
- Pavone, P. & Salmeri, C. 1997: Allium karistanum (Liliaceae), a new species from Evvia (Greece). – Bocconea 5: 759-764.
- Cardona, M. A. & Contandriopoulos, J. 1979: Endemism and evolution in the islands of the western Mediterranean. Pp. 133-169 in: Bramwell, D. (ed.), Plants and islands. London.
- Carlström, A. 1987: A survey of the flora and phytogeography of Rhodos, Simi, Tilos and the Marmaris Peninsula (SE Greece, SW Turkey). PhD Thesis, Lund.
- Creutzburg, N. 1966: Die südägäische Inselbrücke. Bau und geologische Vergangenheit. Erdkunde **20:** 20-30.
- Dermitzakis, M. D. 1990: The evolution of the Aegeis during the Late Cenozoic. Geolog. Balcanica **20:** 3-16.
- Ehrendorfer, F. & Krendl, F. 1976: *Asperula* L. Pp. 4-14 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (ed.), Flora europaea **4.** Cambridge, etc.
- & Schönbeck-Temesy, E. 1975: Asperula ophiolithica Ehrend., spec. nov., ein Endemit der Insel Euboea. – Pl. Syst. Evol. 123: 153-156.[CrossRef]
- Erben, M. 1985: Cytotaxonomische Untersuchungen an südosteuropäischen *Viola*-Arten der Sektion *Melanium.* Mitt. Bot. Staatssamml. München **21**: 339-740.
- 1996: The significance of hybridization on the forming of species in the genus Viola. Bocconea 5: 113-118.
- Favarger, C. 1975: Cytotaxonomie et histoire de la flore orophile des Alpes et de quelques autres massifs montagneux d'Europe. Lejeunia, ser. 2, 77: 1-44.
- & Contandriopoulos, J. 1961: Essai sur l'endémisme. Ber. Schweiz. Bot. Ges. 71: 384-408.
- Georgiadis, Th. 1980: Contribution à l'étude cytogéographique du genre *Centaurea* L. (section *Acrolophus* (Cass.) DC.) en Grèce. Thesis, Aix-Marseille.
- Greilhuber, J. & Ehrendorfer, F. 1988: Karyological approaches to plant taxonomy. ISI Atl. Sci., Animal Pl. Sci. 1: 289-297.
- Greuter, W. 1970: Zur Paläogeographie und Florengeschichte der südlichen Ägäis. Feddes Repert. 81: 233-242.
- 1972: The relict element of the flora of Crete and its evolutionary significance. Pp. 161-177 in: Valentine, D. H. (ed.), Taxonomy, phytogeography and evolution. London.
- 1975: Historical phytogeography of the southern half of the Aegean area. Pp. 17-21 in: Jordanov, D., Bondev, I., Kozuharov, S., Kuzmanov, B., Palamarev, E. & Velcev, V. (ed.), Problems of Balkan flora and vegetation. Proceedings of the first international symposium on Balkan flora and vegetation, Varna, June 7-14, 1973. – Sofia.
- , Burdet, H. M. & Long, G. (ed.): 1984, 1986, 1989: Med-Checklist 1, 3, 4. Genève & Berlin.
- Heywood, V. H. 1968: *Fumana* (Dunal) Spach. Pp. 291-292 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M., Webb, D. A. (ed.), Flora europaea **2.** Cambridge, etc.
- Iatrou, G. 1986: Contribution to the study of the endemism of the flora of Peloponnisos. PhD Thesis, University of Patras, Greece [in Greek with an English summary].

- IUCN 2001: Red List Categories and Criteria, version 3.1. Gland & Cambridge.
- Kamari, G., Bareka, P., Constantinidis, P. & Phitos, D. 2003: Karyosystematic studies of plant taxa from the East Mediterranean region (Greece, Cyprus, Syria). – Phytol. Balcanica 9: 487-502.
- Künkele, S. & Paysan, K. 1981: OPTIMA-Projekt "Kartierung der mediterranen Orchideen": 3. Die Orchideenflora von Euboea (Griechenland). – Beih. Veröff. Naturschutz Landschaftspflege Baden-Württemberg 23.
- Kruckeberg, A. R. 1951: Intraspecific variability in the response of certain native plant species to serpentine soil. Amer. J. Bot. **38**: 408-419.[CrossRef]
- 1954: The ecology of serpentine soils. III. Plant species in relation to serpentine soils. Ecology 35: 267-274.
- 1967: Ecotypic response to ultramafic soils by some plant species of northwestern North America. – Brittonia 19: 133-151.[CrossRef]
- Livaniou-Tiniakou, A. 1991: Biosystematic study of the genus *Viola* sect. *Viola (Violaceae)* in Greece. PhD Thesis, University of Patras, Greece [in Greek with an English summary].
- Papanikolaou, K. & Kokkini, S. 1982: A new species of Armeria (Plumbaginaceae) from Euboea, Greece. – Willdenowia 12: 221-225.
- Phitos, D. 1960: Phytogeographical study of Central Evvia. PhD Thesis, University of Athens, Greece [in Greek with an English summary].
- 1964: Trilokuläre Campanula-Arten der Ägäis. Oesterr. Bot. Z. 111: 208-230.
- 1965: Die quinquelokulären Campanula-Arten. Oesterr. Bot. Z. 112: 449-498.[CrossRef]
- 1981: The genus *Bolanthus (Caryophyllaceae)* in Greece. Bot. Chron. 1: 35-45.
- & Georgiadis, T. 1981: A propos du groupe de *Centaurea achaia* Boiss. & Heldr. de la section Acrocentron (Cass.) DC. Bot. Chron. 1: 99-114.
- & Tzanoudakis, D. 1981: A new species of *Allium* from Euboea (Greece). Bot. Chron. 1: 11-13.
- Proctor, J. & Woodell, K. 1975: The ecology of serpentine soils. Pp. 255-366 in: Macfadyen, A. (ed.), Advances in ecological research 9. – London, etc.
- Rechinger, K. H. 1943: Flora Aegaea. Denksch. Akad. Wiss. Wien, Math.-Naturwiss. Kl. **105(1).** 1944: Flora Aegaea Supplementum. Phyton (Austria) **1:** 194-228.
- <u>1949: Grundzüge der Pflanzenverbreitung in der Ägäis I-III.</u> Vegetatio **2:** 55-119, 239-<u>308, 365-386.</u>
- 1956: Plantae novae ex insula Euboea. Anz. Österr. Akad. Wiss., Math. Naturwiss. Kl. 9: 95-103.
- 1961: Die Flora von Euboea. Bot. Jahrb. Syst. 80: 294-465.
- Schönbeck-Temesy, E. & Ehrendorfer, F. 1991: *Asperula* L. Pp. 281-300 in: Strid, A. & Kit Tan (ed.), Mountain Flora of Greece **2.** Edinburgh.
- Sell, P. D. 1976: Crepis L. Pp. 344-357 in: Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M. & Webb, D. A. (ed.), Flora europaea 4. – Cambridge, etc.
- Stevanović, V., Tan, K. & Iatrou, G. 2003: Distribution of the endemic Balkan flora on serpentine I. – obligate serpentine endemics. – Pl. Syst. Evol. 242: 149-170.
- Strid, A. (ed.) 1986: Mountain flora of Greece 1. Cambridge.
- & Tan, K. (ed.) 1991: Mountain flora of Greece 2. Edinburgh.
- & Tan, K. (ed.) 1997: Flora hellenica 1. Königstein.
- & Tan, K. (ed.) 2002: Flora hellenica 2. Ruggell.
- Tan, K. & Iatrou, G. (colour plates by Johnsen, B.) 2001: Endemic plants of Greece. The Peloponnese. Copenhagen.
- Tiniakou, A. 1991: Viola dirphya (Violaceae), a new species from Evvia island, Greece. Candollea **46:** 119-124.
- Trigas, P. 2003: Contribution to the study of the endemism of the flora of the island of Evvia. PhD Thesis, University of Patras, Greece [in Greek with an English summary].

- & Iatrou, G. 2000: Additions to the flora of Evvia (Greece). Bot. Chron. 13: 273-286.
- & Tzanoudakis, D. 2000: *Allium runemarkii (Liliaceae)*, a new species from the island of Evvia (W Aegean, Greece). – Nordic J. Bot. 20: 89-92.
- & Iatrou, G. 2003: *Asperula* (sect. *Cynanchicae*) *brachyphylla*, spec. nova (*Rubiaceae*) from the island of Evvia (Greece). Phyton (Austria) **43**: 29-37.
- & Iatrou, G. 2005: A new species of *Minuartia (Caryophyllaceae)* from the island of Evvia (Greece). Nordic J. Bot. 23: 415-425.
- Tutin, T. G., Heywood, V. H., Burges, N. A., Moore, D. M., Valentine, D. H., Walters, S. M., Webb, D. A. (ed.): 1968-80: Flora europaea 2-5. – Cambridge, etc.
- , Burges, N. A., Chater, A. O., Edmondson, J. R., Heywood, V. H., Moore, D. M., Valentine, D. H., Walters, S. M., Webb, D. A. (ed.) 1993: Flora europaea, ed. 2, 1. Cambridge, etc.

Addresses of the authors:

Panayiotis Trigas, National Agricultural Research Foundation (N.AG.RE.F.), Forest Research Institute, Terma Alkmanos str., 11528 Ilisia, Athens, Greece; e-mail: trigas@fria.gr

Gregoris Iatrou, Department of Biology, Division of Plant Biology, University of Patras, 26500 Patras, Greece; e-mail: iatrou@upatras.gr