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PHYTOGEOGRAPHY AND ECOLOGICAL EVALUATION OF THE FLORA AND VEGETATION OF MT PARNITHA (ATTICA, GREECE)

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Mt Parnitha is located in Sterea Ellas (Central Greece) and is the highest mountain in the vicinity of Athens. Its wild vascular flora comprises 1096 taxa belonging to 90 families, of which 122 taxa and four families are reported here for the first time. The endemic element comprises 92 Greek, 42 Balkan and 18 Italian–Balkan–Anatolian taxa. Four Greek and three Balkan endemics are new records for the mountain. The predominance of the Mediterranean element (63.6%) and the therophytes (37.6%) underlines the Mediterranean character of the mountain's flora. The endemic elements of Mt Parnitha are presented, their protection status is mentioned and the phytogeographical affinity with neighbouring mountains is examined. Three vegetation zones and 17 habitat types within them have been identified, and those facing threats are indicated. Although the mountain is a National Park, several factors influence its flora and vegetation, the most important being its proximity to Athens.

Keywords. Athens, conservation, endemism, Greece, habitat types, National Park, species protection.

INTRODUCTION

Mt Parnitha (or Mt Parnis), the highest of the four mountains surrounding the Attica basin, lies 30 km NW of central Athens and is the only one still to have a forest of the endemic Greek fir *Abies cephalonica**.

Parnitha is situated between 38°05′–38°15′N and 23°31′–23°51′E, in the phytogeographical area of Sterea Ellas (Central Greece, Fig. 1). The orientation of the mountain is E–W. The highest peaks are Karavola (1413 m), Ornio (1350 m), Avgo (1201 m) and Kyra (1160 m), all situated in the southern part of the mountain. Geologically, Mt Parnitha is part of the zone of East Greece (Nezis, 1983) and the substrates are sedimentary and metamorphic rocks. The main substrates are limestones and marbles, followed by schists (which appear in the valleys), and some flysch. The arrangement of the rocks favours the existence of springs, 46 in total, which flow continuously and form several streams and small ponds.

The climate of the mountain differs substantially from the climate of the Attica plain, especially in regard to air temperature and precipitation. The air temperature

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*Taxon author names are given in the text only if they do not appear in either Table 4 or Appendix 1.

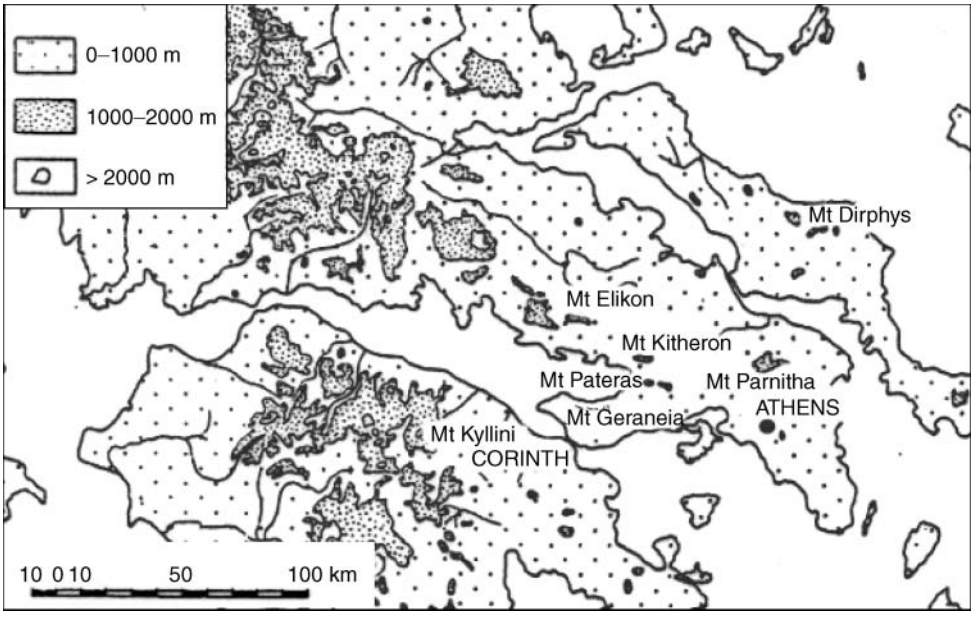

FIG. 1. Topographical map of Greece showing the location of Mt Parnitha and neighbouring mountains (Mts Geraneia, Pateras, Kitheron, Elikon, Dirphys, Kyllini) referred to in this study.

decreases 0.77°C in the winter and 0.8°C in the summer for every 100 m in height. The average precipitation on Parnitha for the period 1945–1970 was 789.3 mm, while in central Athens precipitation was 414.3 mm (Amorgianiotis, 1997). Bioclimatically, Parnitha belongs to the subhumid zone with cold winters (Emberger, 1945) and the climate is characterized as Meso-Mediterranean for altitudes of 700–1100 m, and Sub-Mediterranean for the highest peaks of the mountain.

Mt Parnitha has suffered great human pressure since ancient times, the impact of which is visible in the condition of the fir forest today. Grazing, woodcutting, agriculture, hunting and fires are the main factors causing degradation of its natural ecosystems. In 1961 the entire mountain (~ 20,000 hectares) was declared a National Park and most of these activities were prohibited in its core zone. The core zone of the Park comprises the high peaks of Parnitha, an area of c.3800 hectares, and most of that area is covered with fir forest. The military and telecommunication facilities, mountain refuges, hotel Xenia, casino-hotel Mont Parnes and the Kantalidi spring have been excluded from the core zone. Around the core lies the peripheral or buffer zone, which includes the rest of the mountain.

Many botanists have studied the flora of Mt Parnitha, including Heldreich, Mattfeld, Orphanidis and Tountas. However, the first extensive research was carried out by Diapoulis (1952), who published a list of c.800 taxa. Other important studies were made by Halácsy (1900–1904, 1908a, 1908b), Strid (1986) and Strid & Tan (1991, 1997, 2002).

Although the mountain is considered well studied its proximity to a large city, its National Park status, and the lack of a complete catalogue of its endemic taxa all stimulated our interest in conducting more thorough floristic research. Additionally, the degradation of the fir forest and the great extent of observed fir dieback are noteworthy. It must also be pointed out that Mt Parnitha belongs to the 'Natura 2000' Network, a network of sites hosting valuable habitats and species established by the European Union through Directive 92/43/EEC. The Network functions at local, national and European levels and aims to contribute to the preservation of biodiversity through the conservation of natural habitats and wild fauna and flora within the territory of the Member States of the European Union (Dafis *et al.*, 1996). In Greece 296 sites have been included in the Natura 2000 Network and in 2003 Management Authorities were established for 26 of them, including Mt Parnitha.

Materials and Methods

This study is based on collections and field observations carried out from 1999 to 2003 within the framework of the first author's Bachelor thesis and then during her MSc thesis (Aplada, 2003) prepared at the Botanical Institute of the University of Patras.

Plant specimens were collected mainly from the core zone of the National Park but also from the buffer zone. Data were also obtained from herbarium specimens held in the Forest Service of Parnitha (FSP) and identified by the authors (collected by G. Amorgianiotis, P. Zampoukas, G. Douvris, B. Gouma, Y. Koutsoukos, N. Pangas, D. Papadopoulos, E. Aggelidi and C. Müller), as well as from the above-mentioned literature sources.

Vegetation sampling was carried out in a variety of biotopes within the different vegetation zones of the core of the National Park. Herbarium specimens are deposited at the Botanical Museum of the University of Patras (UPA).

Species identification was achieved using Tutin *et al.* (1964–1980, 1993), Strid (1986) and Strid & Tan (1991, 1997, 2002). Nomenclature follows Greuter *et al.* (1984–1989), Strid (1986), Strid & Tan (1991, 1997, 2002) and Tutin *et al.* (1964–1980, 1983). The life-form categories follow Raunkiaer's system (1934), while Pignatti's (1982) classification was used for the chorological analysis.

To determine phytogeographical affinities to Mt Parnitha, taxa with limited distributions, i.e. Italy, Balkan Peninsula and Anatolia (hereafter referred to as Italian–Balkan–Anatolian endemics), were taken into account. The phytogeographical subdivisions by Strid (1986) were followed.

For the vegetation survey the Braun-Blanquet approach (Braun-Blanquet, 1964; Westhoff & Van der Maarel, 1978) was used. The programs TURBOVEG (Hennekens, 1999), TWINSPAN and DECORANA (Hill, 1979a, 1979b) were used to manage data and determine the vegetation units (Kent & Coker, 1992). All habitat types mentioned are classified according to Dafis *et al.* (2001) and the European Commission (2003).

For the inventory of environmental changes due to human activities, aerial photographs (Hellenic Military Geographical Service, 1986, 1992) were analysed.

The topographical map (Fig. 2) shows the collection and sampling localities.

RESULTS

I. Flora

The vascular flora of Mt Parnitha comprises 1096 native taxa, 122 of which are reported here for the first time (Appendix 1). Three Balkan endemics (*Centaurea triumfetti* subsp. *cana*, *Thymus teucrioides* and *Ophrys ferrum-equinum*) and four Greek endemics (*Anchusella variegata*, *Chondrilla ramosissima*, *Nigella arvensis* subsp. *aristata* and *Satureja hellenica*) are new records for the mountain. There is also a report of *Ophrys scolopax* subsp. *heldreichii*, which is possibly a Greek endemic. Two of the new records, *Ophrys tenthredinifera* and *Orchis coriophora* subsp. *fragrans*, are protected by CITES.

The 1096 taxa belong to 456 genera and 90 families. Within the National Park alone our research confirmed 698 taxa, belonging to 355 genera and 85 families.

During our research emphasis was given to the flora of the core area of the National Park, where we identified 632 taxa. Another 66 taxa were found in the buffer zone alone.

Compositae, *Leguminosae* and *Gramineae* are the largest families and account for almost one third of the total flora (30.1%). *Caryophyllaceae*, *Labiatae*, *Cruciferae* and *Liliaceae* are also well represented, the *Liliaceae* by 53 taxa.

The life-form spectrum (Fig. 3) shows that therophytes dominate (37.6%), followed by hemicryptophytes (28.1%) and geophytes (14.9%). Chamaephytes (10.9%), phanerophytes (8.4%) and hydrophytes (0.1%) are represented by fewer plants.

According to their general distribution, the area's taxa can be classified into nine main chorological groups (Table 1). The endemic group (Greek, Balkan and Italian–Balkan–Anatolian endemics) represents 13.9% of the total flora with 152 taxa. Phytogeographically this is the most important group and is discussed separately. The Mediterranean elements are dominant (63.6%) with 696 taxa and more than one third of these taxa (238) belong to the Eurymediterranean elements. The other elements are represented in lower proportions.

Endemism

The chorological spectrum of the endemic taxa recorded from Mt Parnitha is presented in Table 2. Based on distribution the endemic taxa fall into one of three categories.

Generally, the endemic taxa of Parnitha grow in thriving populations, especially those growing on limestone. They are abundant on the high peaks in the core zone of

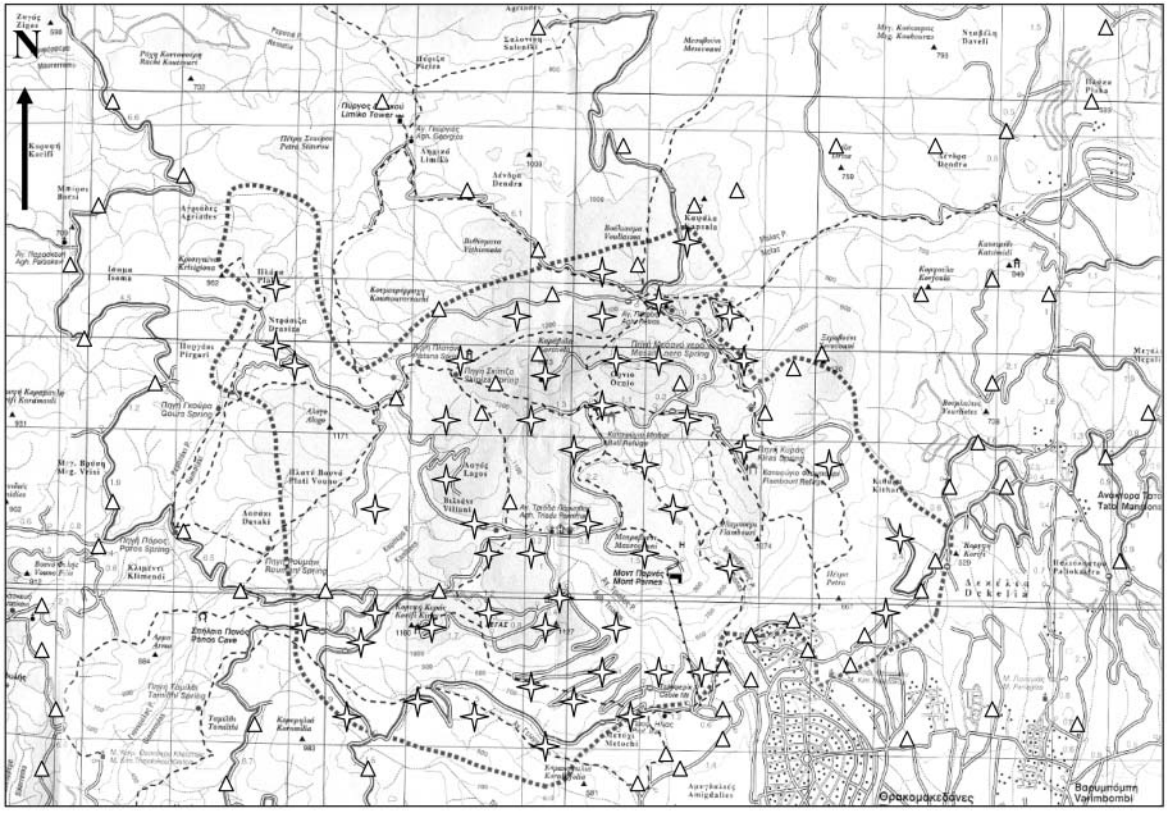

FIG. 2. Topographical map of the study area. The thick dotted line indicates the core of the National Park of Parnitha, the stars (✧) indicate the vegetation sampling locations and the triangles (Δ) the plant sampling locations.

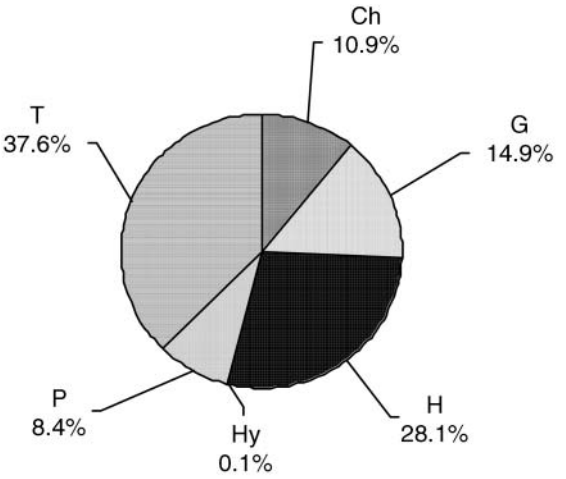

FIG. 3. Life-form spectrum of the vascular flora of Mt Parnitha: Ch, chamaephytes; G, geophytes; H, hemicryptophytes; Hy, hydrophytes; P, phanerophytes; T, therophytes.

TABLE 1. Chorological groups of the vascular flora of Mt Parnitha

Chorological group	%
Sub- and Cosmopolitan	5.1
Sub- and Tropical	1.0
Palaeotemperate	7.8
Eurasiatic	7.8
Boreal	1.8
European	4.8
African-American	0.4
Mediterranean	63.6
Wide Mediterranean area	7.7

the Park. For example in a relatively small area (0.2 ha) on Kyra summit we counted 30 endemic taxa. In the core zone of the National Park we confirmed the presence of 70 Greek endemic taxa. According to the available data only two taxa, *Campanula celsii* subsp. *parnesia* and *Silene oligantha* subsp. *parnesia*, are considered endemic to Mt Parnitha and their populations are well established, especially in the core zone.

The basic reference sources for comparative data on Greek endemics are: *The Mountain Flora of Greece* (Strid, 1986; Strid & Tan, 1991), *Flora Hellenica* vols 1 and 2 (Strid & Tan, 1997, 2002), *Endemic plants of Greece. The Peloponnese* (Tan & Iatrou, 2001) and the electronic database of the endemic plants of Greece, '*Chloris*' (Georgiou *et al.*, 2002).

Until this present survey, 92 Greek, 42 Balkan and 18 Italian–Balkan–Anatolian endemics were known from Mt Parnitha (Table 2).

TABLE 2. Chorological spectrum of the endemic taxa

Category	No. of taxa	%
Greek	92	60.53
Balkan	36	23.68
S – Balkan	4	2.63
SW – Balkan	2	1.32
Balkan Total	42	27.63
Aegean – Anat.	2	1.32
Balkan – Anat.	12	7.88
Balkan – It.	2	1.32
Balkan – Tu.	1	0.66
S – Balkan – It.	1	0.66
Italian–Balkan–Anatolian Total	18	11.84
Total	152	100

Of the 92 Greek endemics we recorded, 22 are restricted to Sterea Ellas, 36 to Sterea Ellas and other regions of the W Aegean or Peloponnisos or both, while the remaining 34 are widely distributed in various phytogeographical areas (Table 3).

The protection status of the Greek endemic taxa growing on Mt Parnitha, as well as their evaluation status in the Natura 2000 project, is shown in Table 4. It should be noted that the taxa discussed here follow the old IUCN Red List System (IUCN, 1997) because there has not yet been an update for them in the new system. Only two taxa are listed in the old system and it is noteworthy that *Amelanchier parviflora* Boiss. subsp. *chelmea* (Halácsy) Zielìnski, previously reported as Data Deficient (IUCN, 1997), does not exist in the Red List Assessment of 2006 (IUCN, 2006). Future work should make assessments of all species based on the modern categories from 2001 (IUCN, 2001).

TABLE 3. Categories of the Greek endemic taxa of Mt Parnitha, according to the phytogeographical areas of Greece

Category	No. of endemic taxa on Mt Parnitha	%
Endemic to Sterea Ellas	22	23.91
Endemic to Sterea Ellas and W Aegean	14	15.22
Endemic to Sterea Ellas and Peloponnisos	6	6.52
Endemic to Sterea Ellas, W Aegean and Peloponnisos	16	17.39
Endemic widely expanded	34	36.96
Total	92	100

TABLE 4. The Greek endemic taxa of Mt Parnitha and their protection status

No.	Taxon	Protection status	Natura 2000
	Pinaceae		
1	*Abies cephalonica* Loudon	LR (IUCN)	B
	Boraginaceae		
2	*Alkanna graeca* Boiss. & Spruner subsp. *baeotica* (A.DC.) Nyman	–	B
3	*Anchusella variegata* (L.) Bigazzi, E.Nardi & Selvi	–	B
4	*Onosma kaheirei* Teppner	–	B
	Campanulaceae		
5	*Campanula celsii* A.DC. subsp. *parnesia* Phitos	–	B
6	*Campanula drabifolia* Sm.	–	B
	Caryophyllaceae		
7	*Arenaria guicciardii* Heldr.	P.D.	B
8	*Bolanthus graecus* (Schreb.) Barkoudah	–	B
9	*Cerastium brachypetalum* Pers. subsp. *atheniense* (Lonsing) P.D.Sell & Whitehead	–	–
10	*Cerastium candidissimum* Correns	–	B
11	*Dianthus biflorus* Sibth. & Sm.	–	B
12	*Dianthus diffusus* Sibth. & Sm.*	–	–
13	*Dianthus serratifolius* Sibth. & Sm. subsp. *serratifolius*	–	D
14	*Paronychia albanica* Chaudhri subsp. *graeca* Chaudhri	–	D
15	*Petrorhagia ochroleuca* (Sibth. & Sm.) P.W.Ball & Heywood	–	B
16	*Silene corinthiaca* Boiss.	–	B
17	*Silene gigantea* L. subsp. *hellenica* Greuter	–	–
18	*Silene italica* (L.) Pers. subsp. *peloponnesiaca* Greuter	–	–
19	*Silene oligantha* Boiss. & Heldr. subsp. *parnesia* Greuter	–	B
20	*Silene spinescens* Sibth. & Sm.	P.D.	B
21	*Silene vulgaris* (Moench) Garcke subsp. *megalosperma* (Sart. ex Heldr.) Hayek	–	–
	Cistaceae		
22	*Helianthemum hymettium* Boiss. & Heldr.	P.D.	B
	Compositae		
23	*Anthemis parnesia* Boiss. & Heldr.*	–	–
24	*Anthemis peregrina* L. subsp. *heracleotica* Boiss. & Heldr.	–	–
25	*Centaurea achaia* Boiss. & Heldr.	P.D.	B
26	*Centaurea affinis* Friv. subsp. *laconiae* Prodan	–	B
27	*Centaurea attica* Nyman subsp. *attica*	P.D.	B

TABLE 4. (*Cont'd*).

No.	Taxon	Protection status	Natura 2000
28	*Centaurea attica* Nyman subsp. *pentelica* (Hausskn.) Dostal	P.D.	B
29	*Centaurea iberica* Trevir. ex Spreng. subsp. *holzmanniana* (Boiss.) Dostal	–	–
30	*Centaurea orphanidea* Heldr. & Sart. ex Boiss.	–	B
31	*Centaurea raphanina* Sibth. & Sm. subsp. *mixta* (DC.) Runemark	–	B
32	*Chondrilla ramosissima* Sibth. & Sm.	–	B
33	*Cirsium heldreichii* Halácsy	P.D.	–
34	*Crepis hellenica* Kamari subsp. *hellenica*	–	B
35	*Crepis incana* Sibth. & Sm.	–	B
36	*Hieracium heldreichii* Boiss.	–	B
37	*Inula verbascifolia* Hausskn. subsp. *methanea* (Hausskn.) Tutin	–	B
38	*Inula verbascifolia* Hausskn. subsp. *parnassica* (Boiss. & Heldr.) Tutin	–	B
39	*Leontodon graecus* Boiss. & Heldr.	P.D.	B
40	*Ptilostemon gnaphaloides* (Cyr.) Soják subsp. *pseudofruticosus* (Pamp.) Greuter	–	B
41	*Scorzonera crocifolia* Sibth. & Sm.	P.D.	B
	Crassulaceae		
42	*Sedum laconicum* Boiss. & Heldr. subsp. *laconicum*	–	–
	Cruciferae		
43	*Alyssum simulans* Runemark ex Hartvig	–	–
44	*Erysimum atticum* Heldr. & Sart.	–	B
45	*Erysimum boryanum* Boiss.	–	–
46	*Erysimum graecum* Boiss. & Heldr.	–	B
47	*Hesperis laciniata* All. subsp. *secundiflora* (Boiss. & Spruner) Breistr.	–	–
48	*Thlaspi bulbosum* Spruner	P.D.	B
	Dipsacaceae		
49	*Cephalaria setulifera* Boiss. & Heldr.	–	B
50	*Lomelosia hymettia* (Boiss. & Spruner) Greuter & Burdet	–	B
51	*Pterocephalus perennis* Coulter subsp. *perennis*	–	B
	Euphorbiaceae		
52	*Euphorbia deflexa* Sibth. & Sm.	–	B
	Labiatae		
53	*Nepeta argolica* Bory & Chaub. subsp. *argolica*	–	B
54	*Satureja hellenica* Heldr. ex Halácsy	–	–
55	*Scutellaria rupestris* Boiss & Heldr. subsp. *parnassica* (Boiss.) Greuter & Burdet	P.D.	B

TABLE 4. (*Cont'd*).

No.	Taxon	Protection status	Natura 2000
56	*Sideritis raeseri* Boiss & Heldr. subsp. *attica* (Heldr.) Papanic. & Kokkini	–	B
57	*Stachys graeca* Boiss. & Heldr.	–	–
58	*Stachys spruneri* Boiss.	P.D.	B
	Leguminosae		
59	*Astragalus hellenicus* Boiss.	–	B
60	*Ebenus sibthorpii* DC.	–	B
61	*Melilotus graecus* (Boiss. & Spruner) Lassen	–	B
62	*Onobrychis ebenoides* Boiss. & Spruner	P.D.	B
63	*Vicia pinetorum* Boiss. & Spruner	P.D.	B
	Linaceae		
64	*Linum leucanthum* Boiss. & Spruner	–	B
	Orobanchaceae		
65	*Orobanche baumanniorum* Greuter	–	B
	Paeoniaceae		
66	*Paeonia mascula* (L.) Mill. subsp. *hellenica* Tzanoud.*	–	B
	Polygalaceae		
67	*Polygala nicaeensis* Koch subsp. *tomentella* (Boiss.) Chodat	–	B
	Ranunculaceae		
68	*Consolida tenuissima* Soó	–	B
69	*Nigella arvensis* L. subsp. *aristata* (Sibth. & Sm.) Nyman	–	–
	Rosaceae		
70	*Amelanchier parviflora* Boiss. subsp. *chelmea* (Halácsy) Zielìnski	R (RDB), DD (IUCN)	B
	Rubiaceae		
71	*Asperula baenitzii* Heldr. ex Boiss.	V (RDB), P.D.	–
72	*Asperula pulvinaris* Heldr. ex Boiss.	P.D.	B
73	*Asperula rigidula* Halácsy	P.D.	B
74	*Galium melanantherum* Boiss.	–	B
	Scrophulariaceae		
75	*Odontites linkii* Heldr. & Sart. subsp. *linkii*	–	B
76	*Verbascum boissieri* Post	–	B
77	*Verbascum delphicum* Boiss. & Heldr.	P.D.	B
78	*Veronica glauca* Sibth. & Sm. subsp. *glauca*	–	D
79	*Veronica glauca* Sibth. & Sm. subsp. *peloponnesiaca* (Boiss. & Orph.) Maire & Petit.	–	D
80	*Veronica sartoriana* Boiss. & Heldr.	–	B

TABLE 4. (*Cont'd*).

No.	Taxon	Protection status	Natura 2000
	Umbelliferae		
81	*Geocaryum parnassicum* (Boiss. & Heldr.) L.Engstrand	–	B
82	*Johrenia distans* (Griseb.) Halácsy	P.D.	B
83	*Trinia guicciardii* (Boiss. & Heldr.) Drude	–	B
	Gramineae		
84	*Helictotrichon convolutum* (Presl) Henrard subsp. *heldreichii* (Parl.) Gervais	–	B
	Iridaceae		
85	*Crocus laevigatus* Bory & Chaub.	–	B
86	*Crocus sieberi* J.Gay subsp. *atticus* (Boiss. & Orph.) B.Matthew	–	B
	Liliaceae		
87	*Colchicum lingulatum* Boiss. & Spruner subsp. *lingulatum*	–	–
88	*Fritillaria graeca* Boiss. & Spruner	–	B
89	*Fritillaria graeca* Boiss. & Spruner var. *guicciardii* (Heldr. & Sart.) Boiss.	–	B
90	*Fritillaria obliqua* Ker Gawl. subsp. *obliqua*	V (RDB), P.D.	B
91	*Muscari pulchellum* Heldr. & Sart.	–	B
92	*Ornithogalum atticum* Boiss. & Orph. ex Boiss.	–	B

Abbreviations:

IUCN: *Red List of Threatened Plants* (IUCN, 1997), with the following classification system:

LR: Lower Risk – the species population does need management, but is very close to being 'Vulnerable'.

V: Vulnerable – the species population is threatened.

R: Rare – the species population is rare, but not threatened.

DD: Data Deficient – the species is possibly threatened, but there is not enough data to assign the species in a certain category.

RDB: *Red Data Book of Rare and Threatened Plants of Greece* (Phitos *et al.*, 1995).

P.D.: Presidential Decree 67/1981, about the protection of the native flora and wild fauna of Greece.

Natura 2000 (Dafis *et al.*, 1996): the database created after the Directive 43/1992, where the plants were evaluated as:

B: Greek endemics.

D: Balkan endemics and other rare species.

* *Dianthus diffusus* and *Paeonia mascula* subsp. *hellenica* are reported in Strid & Tan (1997, 2002) as *possible* endemics. The taxonomic status of *Anthemis parnesia* (syn: *A. auriculata* var. *parnesia*) is uncertain.

The affinity of the endemic flora of Mt Parnitha with neighbouring mountains and adjacent phytogeographical areas was also studied, based on corresponding floristic studies (Table 5). These mountains were Geraneia (1351 m; Konstantinidis, 1997), Pateras (1131 m; Konstantinidis, 1997), Kitheron (1409 m; Konstantinidis, 1997)

TABLE 5. Number of Greek endemics for each mountain (in bold on diagonal line), number of endemics in common between mountains (below diagonal line) and Sörensen index (above diagonal line)

S.I. / Taxa	Parnitha	Geraneia	Pateras	Kitheron	Elikon	Dirphys	Kyllini
Parnitha	**92**	0.398648	0.405904	0.395604	0.326531	0.322097	0.238596
Geraneia	59	**86**	0.410646	0.386100	0.356275	0.291498	0.227106
Pateras	55	54	**69**	0.418033	0.330189	0.275229	0.204918
Kitheron	54	50	51	**73**	0.336363	0.307692	0.226563
Elikon	40	44	35	37	**73**	0.256881	0.261194
Dirphys	43	36	30	36	28	**89**	0.218978
Kyllini	34	31	25	29	35	30	**125**

and Elikon (1748 m; Kokmotos, 1999), all situated in Sterea Ellas, Mt Dirphys (1743 m; Trigas, 2003) in Evvia, and Mt Kyllini (2376 m; Dimopoulos, 1993) in Peloponnisos. For this study we used the Sörensen index (Sörensen, 1948), a measure of overall similarity in species composition.

In Table 5, the bold numbers show the number of endemics on each mountain included in this study. The numbers below the diagonal show the number of endemic taxa in common for each combination of mountains and the numbers above the diagonal show the Sörensen index.

Table 5 shows that Geraneia shares the greatest number of endemic taxa with Mt Parnitha, followed by Mts Pateras and Kitheron. However, the Sörensen index is larger between Mts Parnitha and Pateras followed by Parnitha and Geraneia.

The largest Sörensen index is that between Mts Pateras and Kitheron (common endemics: 51), followed by that between Mts Pateras and Geraneia (common endemics: 54).

II. Vegetation

We identified three vegetation zones on Mt Parnitha.

The first vegetation zone extends from 400 to c.1000 m and is dominated by *Pinus halepensis* Mill. forests, *Quercus coccifera* L., *Pistacia lentiscus* L., *Arbutus unedo* L. and *A. andrachne* L. formations, and phryganic ecosystems. In the upper limits of this zone, *Pinus halepensis* creates a mixed forest with *Abies cephalonica*.

The second zone extends from c.1000 m on the southern slopes of the mountain (and from 600–700 m on the northern ones) to 1400 m and is dominated by *Abies cephalonica* forest. *Juniperus oxycedrus* L. subsp. *oxycedrus* stands also occur and on the plateaus some grassland species grow. It is notable that due to reforestation conducted from 1950 to 1970 the *Abies cephalonica* forest is not pure and in several places is mixed with *Pinus nigra* J.F.Arnold, a taxon not native to the study area.

The third vegetation zone is observed on the highest mountain summits. This zone is vestigial and consists of spiny, caespitose and cushion-like bushes, together with

several endemic and rare species of the high mountains. This vegetation type probably originated from the reduction of the *Abies* forest in these areas and as such is not an authentic subalpine zone.

The vegetation types identified in Mt Parnitha are shown in Table 6. Nomenclature follows the Natura 2000 Codes (Dafis *et al.*, 2001; European Commission, 2003).

Discussion

A large number of plant taxa growing on Mt Parnitha are protected by Greek and international law. Five taxa occurring on the mountain are included in the Red Data Book of Greece (Phitos *et al.*, 1995), namely *Asperula baenitzii* (Vulnerable), *Fritillaria obliqua* subsp. *obliqua* (Vulnerable), × *Malosorbus florentina* (Zuccagni) Browicz (Vulnerable), *Tulipa undulatifolia* Boiss. (Vulnerable) and *Amelanchier parviflora* subsp. *chelmea* (Rare). Seventy taxa were designated as Greek Endemics (Category B), and 12 as Balkan Endemics and Other Important Taxa (Category D), according to Appendix V of the Natura 2000 project (Dafis *et al.*, 1996). However, the classification made by the Natura 2000 project is no longer valid for some species. Two taxa previously reported as Greek endemics are now regarded as Balkan endemics [*Aethionema saxatile* (L.) R.Br. subsp. *graecum* (Boiss. & Spruner) Hayek and *Malcolmia graeca* Boiss. & Spruner subsp. *hydraea* (Heldr. & Hal.) Stork] (Strid & Tan, 2002). Additionally, four taxa previously classified under Category D of Appendix V are now Greek endemics (*Veronica glauca* subsp. *glauca*, *V. glauca* subsp. *peloponnesiaca*, *Dianthus serratifolius* subsp. *serratifolius* and *Paronychia albanica* subsp. *graeca*) (Strid & Tan, 1991, 1997), as shown in Table 4. It is also notable that the two local endemics on Mt Parnitha (*Campanula celsii* subsp. *parnesia* and *Silene oligantha* subsp. *parnesia*) currently have no protection status.

Twenty-seven of the 1096 taxa identified on the mountain are protected by CITES, including two of the new records reported here (*Ophrys tenthredinifera* and *Orchis coriophora* subsp. *fragrans*).

Moreover, some rare taxa are found within the Park, such as *Paeonia mascula* subsp. *hellenica*, *Salvia ringens* Sm., *Salvia argentea* L. and *Asperula baenitzii*. They have suffered from major habitat degradation and, from our personal field observations, their numbers are declining. Also, *Trinia guicciardii* (Boiss. & Heldr.) Drude (reported by Strid & Tan, 1991) and *Amelanchier parviflora* subsp. *chelmea* (reported by Phitos *et al.*, 1995) have not been found on Parnitha for quite some time and it is essential to make a more concerted effort to ascertain whether they still occur there or not.

It is important that most of the endemic flora is well preserved, as is often the case with montane endemics and chasmophytes. However, the ecosystems on Parnitha are greatly influenced by humans, especially in the foothills of the mountain where there is suburban encroachment. Many of the sites where Halácsy and others collected in Athens are now under concrete.

TABLE 6. Syntaxonomic units of the vegetation of Mt Parnitha

Habitat type: Description	Class	Order	Alliance	Natura 2000 Code	Community
Sarcopoterium spinosum Phrygana	CISTO-MICROMERIETEA	Cisto-Micromerietalia	Coridothymion	5420	*Sarcopoterium spinosum–Coridothymus capitatus*
Sarcopoterium spinosum Phrygana	CISTO-MICROMERIETEA	Cisto-Micromerietalia	Coridothymion	5420	*Phlomis fruticosa–Euphorbia acanthothamnos*
Eastern Mediterranean Garrigues	QUERCETEA ILICIS	Quercetalia ilicis	Pistacio-Rhamnion	5340	*Quercus coccifera*
Olea and *Ceratonia* forests	QUERCETEA ILICIS	Quercetalia ilicis	Quercion ilicis	9320	*Quercus coccifera*
Quercus ilex and *Q. rotundifolia*	QUERCETEA ILICIS	Quercetalia ilicis	Quercion ilicis	9340	*Arbutus andrachne–Quercus ilex*
Quercus ilex and *Q. rotundifolia*	QUERCETEA ILICIS	Quercetalia ilicis	Quercion ilicis	9340	*Erica arborea–Arbutus unedo*
Mediterranean pine forests with endemic Mesogean pines	QUERCETEA ILICIS	Quercetalia ilicis	Oleo-Ceratonion	9540	*Pinus halepensis*
Mediterranean pine forests with endemic Mesogean pines	QUERCETEA ILICIS	Quercetalia ilicis	Quercion ilicis	9540	*Pinus halepensis*
Calcareous rocky slopes with chasmophytic vegetation	ASPLENIETEA TRICHOMANIS	Onosmetalia frutescentis	Campanulion versicoloris	8216	*Inula parnassica–Ptilostemon chamaepeuce*
Calcareous rocky slopes with chasmophytic vegetation	ASPLENIETEA TRICHOMANIS	Onosmetalia frutescentis	Campanulion versicoloris	8216	*Inula parnassica*

TABLE 6. (*Cont'd*).

Habitat type: Description	Class	Order	Alliance	Natura 2000 Code	Community
Greek fir forest (*Abies cephalonica*)	QUERCETEA ILICIS	Quercetalia ilicis	Quercion ilicis	951B	*Helictotrichon convolutum–Abies cephalonica*
Greek fir forest (*Abies cephalonica*)	QUERCETEA PUBESCENTIS	Quercetalia pubescentis	Abietion cephalonicae	951B	*Abies cephalonica*
Greek fir forest (*Abies cephalonica*)	QUERCETEA PUBESCENTIS	Quercetalia pubescentis	Abietion cephalonicae	951B	*Abies cephalonica–Lilium chalcedonicum*
Arborescent matorral with *Juniperus* spp.	QUERCETEA PUBESCENTIS	Quercetalia pubescentis	Abietion cephalonicae	5211	*Juniperus oxycedrus*
Greek *Quercus pubescens* woods	QUERCO-FAGETEA	Quercetalia pubescentis	Ostryo-Carpinion orientalis	924A	*Quercus pubescens*
Helleno-Balkanic sylvatic *Astragalus* hedgehog heaths	DAPHNO-FESTUCETEA	Daphno-Festucetalia	?	4090	*Astragalus angustifolius*
Oriental plane woods (*Platanion orientalis*)	NERIO-TAMARICETEA	Platanetalia orientalis	Platanion orientalis	92C0	*Platanus orientalis*

Among the habitat types recognized the phrygana (5420) is in good condition and is found in large populations, especially on the south side of the Park's core. Maquis vegetation (5340, 9320 and 9340) is also well established, especially in the buffer zone where previous forest fires have promoted the growth of broad-leaved shrubs. The *Pinus* forest (9540) was once quite healthy and only those sections previously exploited for resin appear to be in decay. However, during the years 2002–2005, colonies of the insect species *Marchalina hellenica* Gennadius and *Thaumetopaea pityocampa* Schiff have caused serious damage, especially in the south side of the Park's core. The chamaephytes growing on the calcicole rocks of Mt Parnitha (8216) do not seem to be in any immediate danger. In addition, the oriental plane woods (92C0) and *Quercus* forests (924A), although not well represented on Mt Parnitha, do appear to be in good condition.

The habitats that face problems are the fir forest (951B), the *Juniperus* formations (5211) and the *Astragalus* formations (4090) on the summits of Parnitha. Great human pressure on those areas (military, radio-television and telecommunication facilities, casino-hotel Mont Parnes) does not allow normal growth of these formations. Two vegetation units within the fir forest, the *Helictotrichon convolutum–Abies cephalonica* and the *Abies cephalonica–Lilium chalcedonicum*, are not common and they are possibly in danger.

Some factors influencing the flora and vegetation of Mt Parnitha are:

1 The number of visitors, which is very high. According to Amorgianiotis (1997) the mountain receives almost 270,000 visitors annually. The recreation areas created here are not adequate for this number of visitors.

2 The telecommunication, radio-television and military facilities located on the mountain's summits, which have caused great damage. Several taxa that once grew on these peaks, such as *Astragalus angustifolius* Lam., *Smyrnium orphanidis* Boiss., *Sideritis raeseri* subsp. *attica*, *Asperula baenitzii* and *Trinia guicciardii*, are now absent and these sites are covered by waste and debris.

3 The steadily increasing population of red deer (*Cervus elaphus* L.) on the mountain. According to Papika (2002) the last remaining Greek population of red deer is estimated to be 400 individuals. However, the forest cannot sustain such a number. The deer uproot small trees and various plants and damage the bark of older trees. Due to this damage a population management programme is being designed by the Park authorities. In addition, in 1961 a small population of Cretan Ibex (*Caprus aegagrus* subsp. *cretica*) was introduced to the mountain. The status of this population and the consequences for the mountain ecosystems is currently unknown, but the introduction of Cretan Ibex to small islands off northern Crete that hold endemic plants proved to be a disaster for these islands' ecosystems.

4 An epidemic of bark-eating insects which appeared in 1961 within the fir forest of Mt Parnitha. This epidemic has still not been treated effectively. Together

with other harmful factors, it has caused the drying out of thousands of fir trees over the last 45 years (Tsopelas, 2002).

Under Park regulations only scientific research is permitted in the core zone. However, vehicles circulate freely in many parts of this area and five large recreation areas have been established within the core. Management and supervision within the Park is very difficult and many problems have to be solved to achieve substantial protection of the mountain ecosystem. The Management Authority for Mt Parnitha, established in 2003 but activated only in 2006, is responsible, with other bodies, for the effective conservation action which needs to be taken on the mountain.

It is obvious that the mountain has a very important role in the sustainability of Attica's natural environment due to its proximity to Athens. At the same time, it provides a significant opportunity for environmental education and the development of ecological awareness for the population of Athens and the surrounding area.

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APPENDIX 1

List of new plant records

ABBREVIATIONS AND SYMBOLS USED

= Greek endemics
* = Balkan endemics
! = herbarium specimens examined by the authors
FSP = Forest Service of Parnitha
UPA = University of Patras

Life-forms

Therophytes (T)

Tcaesp	T. caespitose
Trept	T. reptant
Tscap	T. scapose

Geophytes (G)

Gbulb	G. bulbous
Grhiz	G. rhizomatous

Hemicryptophytes (H)

Hcaesp	H. caespitose
Hscap	H. scapose
Hros	H. rosulate
Hbienn	H. biennial
Hrept	H. reptant

Chamaephytes (Ch)

Chsuffr	Ch. suffruticose
Chrept	Ch. reptant
Chfrut	Ch. fruticose
Chsucc	Ch. succulent

Nano-phanerophytes (NP)

NPcaesp	NP. shrubby

Phanerophytes (P)

Pcaesp	P. shrubby
Pscap	P. arborescent

Chorological groups

Endemic (only in Greece)
Balkan (only in Greece and one or more countries of the Balkan)
Mediterranean taxa (*Medit.*)
Stenomediterranean (*Stenomedit.*)
E Stenomediterranean (*E-Stenomedit.*)
NE Stenomediterranean (*NE-Stenomedit.*)
E Mediterranean (*E-Medit.*)
S Mediterranean (*S-Medit.*)
NE Mediterranean (*NE-Medit.*)
CE Mediterranean (*CE-Medit.*)
Eurymediterranean (*Eurymedit.*)

Widely distributed taxa:

Mediterranean-Turanian (*Medit.-Turan.*)
E Mediterranean-Turanian (*E-Medit.-Turan.*)
Eurymediterranean-Turanian (*Eurymedit.-Turan.*)
Stenomediterranean-Turanian (*Stenomedit.-Turan.*)
Stenomediterranean-Macaronese (*Stenomedit.-Macaronese*)
Stenomediterranean – Oriental (*Stenomedit.-Orient.*)

Stenomediterranean – W Asiatic (*Stenomedit.-W-Asiat.*)
Stenomediterranean – SW Asiatic (*Stenomedit.-SW-Asiat.*)
NE Mediterranean – Pontian (*NE-Medit.-Pont.*)
S European – Pontian (*S-Europ.-Pont*.)
Palaeotemperate (*Palaeotemp*.)
W Palaeotemperate (*W-Palaeotemp*.)
Sub- and Cosmopolitan (*Subcosmop.*, *Cosmop.*)
European (*Europ*.)
SE European (*SE-Europ*.)
European-Caucasian (*Europ.-Caucas*.)
European-Siberian (*Eurosib*.)
Eurasiatic (*Eurasiat*.)
SW Asiatic (*SW-Asiat*.)
Circumboreal (*Circumbor*.)
Artico-Alpine (*Artico-Alp*.)
North-American (*Nordamer*.)
South-American (*S-Amer*.)

PTERIDOPHYTA

Polypodiaceae

1. *Asplenium adiantum-nigrum* L.: Hros, Palaeotemp.; FSP!
2. *Pteridium aquilinum* (L.) Kuhn: Grhiz, Cosmop.; FSP!

ANGIOSPERMAE

DICOTYLEDONES

Acanthaceae

3. *Acanthus spinosus* L.: Hscap, E-Stenomedit.; UPA!

Aceraceae

4. *Acer monspessulanum* L.: Pcaesp, Stenomedit.; UPA!

Amaranthaceae

5. *Amaranthus albus* L.: Tscap, Nordamer.; UPA!

Apocynaceae

6. *Vinca major* L.: Chrept, Eurymedit.; UPA!

Asclepiadaceae

7. *Cionura erecta* (L.) Griseb.: Hscap, E-Medit.; UPA!

Boraginaceae

8. # *Anchusella variegata* (L.) Bigazzi, E.Nardi & Selvi [syn: *Anchusa variegata*]: Tscap, Endemic; UPA!
9. *Borago officinalis* L.: Tscap, Eurymedit.; UPA!
10. *Cerinthe major* L.: Tscap, Stenomedit.; FSP!
11. *Cerinthe retorta* Sibth. & Sm.: Tscap, E-Stenomedit.; UPA!
12. *Cynoglossum creticum* Mill.: Hscap, Eurymedit.; UPA!
13. *Neatostema apulum* (L.) I.M.Johnson: Tscap, Stenomedit.; UPA!

Caprifoliaceae

14. *Sambucus ebulus* L.: Hscap, Eurymedit.; UPA!

Caryophyllaceae

15. *Cerastium pumilum* Curtis: Tscap, Eurymedit.; UPA!

Chenopodiaceae

16. *Chenopodium vulvaria* L.: Tscap, Eurymedit.; UPA!

Cistaceae

17. *Helianthemum canum* (L.) Baumg. cf. subsp. *canum*: Chsuffr, Europ.-Caucas.; UPA!

Compositae

18. *Asteriscus spinosus* (L.) Less. [syn: *Pallenis spinosa*]: Hscap, Eurymedit.; UPA!
19. *Bellis annua* L.: Tscap, Eurymedit.; UPA!
20. *Centaurea calcitrapa* L.: Hbienn, Eurymedit.; UPA!
21. * *Centaurea triumfetti* All. subsp. *cana* (Sibth. & Sm.) Dostal: Hscap, Balkan; UPA!
22. # *Chondrilla ramosissima* Sm.: Hscap, Endemic; UPA!
23. *Chrysanthemum coronarium* L.: Tscap, Eurymedit.; UPA!
24. *Conyza canadensis* (L.) Cronquist: Tscap, Cosmop.; UPA!
25. *Filago pyramidata* L.: Tscap, Eurymedit.; UPA!
26. *Lapsana communis* L.: Tscap, Palaeotemp.; FSP!
27. *Matricaria recutita* L. [syn: *M. chamomilla*]: Tscap, Subcosmop.; UPA!
28. *Notobasis syriaca* (L.) Cass.: Tscap, Eurymedit.; UPA!
29. *Onopordum illyricum* L.: Hscap, Stenomedit.; UPA!
30. *Phagnalon graecum* Boiss.: Chsuffr, NE-Medit.; UPA!
31. *Scolymus hispanicus* L.: Hscap, Eurymedit.; UPA!
32. *Senecio vulgaris* L.: Tscap, Cosmop.; UPA!
33. *Silybum marianum* (L.) Gaertn.: Hscap, Medit.-Turan.; UPA!
34. *Tragopogon hybridus* L.: Tscap, Stenomedit.; UPA!

Convolvulaceae

35. *Convolvulus arvensis* L.: Grhiz, Subcosmop.; UPA!
36. *Convolvulus oleifolius* Desr.: Chfrut, NE-Stenomedit.; UPA!

Crassulaceae

37. *Sedum* cf. *acre* L.: Chsucc, Europ.-Caucas.; UPA!
38. *Sedum annuum* L.: Tscap, Artico.-Alp. (Europ.); UPA!

Cruciferae

39. *Bunias erucago*: Tscap, Eurymedit.; UPA!
40. *Eruca vesicaria* (L.) Cav. subsp. *sativa* (Miller) Thell. [syn: *E. sativa*]: Tscap, Medit.-Turan.; UPA!
41. *Matthiola longipetala* (Vent.) DC. subsp. *bicornis* (Sm.) P.W.Ball: Chsuffr, E-Medit.; UPA!
42. *Sisymbrium officinale* (L.) Scop.: Tscap, Subcosmop.; UPA!

Dipsacaceae

43. *Pterocephalus plumosus* (L.) Coulter [syn: *P. papposus*]: Tscap, E-Medit.-Turan.; UPA!

Euphorbiaceae

44. *Euphorbia helioscopia* L.: Tscap, Cosmop.; UPA!

Juglandaceae

45. *Juglans regia* L.: Pscap, SW-Asiat.; UPA!

Labiatae

46. *Lamium amplexicaule* L.: Tscap, Palaeotemp.; UPA!
47. *Mentha* cf. *arvensis* L.: Hscap, Eurasiat.; UPA!
48. *Mentha microphylla* Koch: Hscap, E-Medit.; FSP!
49. *Mentha suaveolens* Ehrh.: Hscap, Eurymedit.; UPA!
50. *Origanum vulgare* L.: Hscap, Eurasiat.; UPA!
51. *Salvia officinalis* L.: Chsuffr, Stenomedit.-Orient.; FSP!
52. # *Satureja hellenica* Heldr. ex Halácsy: Chsuffr, Endemic; UPA!
53. *Sideritis montana* L.: Tscap, Medit.-Turan.; UPA!
54. * *Thymus teucrioides* Boiss. & Spruner: Chsuffr, Balkan; FSP!

Leguminosae
55. *Ceratonia siliqua* L.: Pcaesp, S-Medit.; UPA!
56. *Medicago arborea* L.: Pcaesp, NE-Medit.; UPA!
57. *Ononis spinosa* L. subsp. *antiquorum* (L.) Arcang.: Chsuffr, Eurymedit.; FSP!
58. *Trifolium campestre* Schreb.: Tscap, W-Palaeotemp.; UPA!
59. *Vicia lutea* L.: Tscap, Eurymedit.; FSP!
60. *Vicia* cf. *peregrina* L.: Tscap, Medit.-Turan.; UPA!

Lythraceae
61. *Lythrum junceum* Banks & Sol.: Hscap, Stenomedit.-Macaronese; FSP!

Malvaceae
62. *Malope malacoides* L.: Tscap, Stenomedit.-W-Asiat.; FSP!

Onagraceae
63. *Epilobium angustifolium* L.: Hscap, Circumbor.; FSP!
64. *Epilobium parviflorum* Schreb.: Hscap, Palaeotemp.; FSP!
65. *Epilobium tetragonum* L.: Hscap, Palaeotemp.; FSP!

Platanaceae
66. *Platanus orientalis* L.: Pscap, E-Medit.; UPA!

Polygonaceae
67. *Polygonum aviculare* L.: Trept, Cosmop.; UPA!

Portulacaceae
68. *Portulaca oleracea* L.: Tscap, Subcosmop.; UPA!

Primulaceae
69. *Anagalis arvensis* L.: Trept, Subcosmop.; FSP!
70. *Asterolinon linum-stellatum* (L.) Dudy: Tscap, Eurymedit.; UPA!

Ranunculaceae
71. *Consolida ajacis* (L.) Schur: Tscap, Eurymedit.; UPA!
72. # *Nigella arvensis* L. subsp. *aristata* (Sibth. & Sm.) Nyman: Tscap, Endemic; UPA!

Resedaceae
73. *Reseda lutea* L.: Hscap, Palaeotemp.; FSP!

Rosaceae
74. *Fragaria vesca* L.: Hrept, Eurosib. (Cosmop.); UPA!
75. *Potentilla recta* L.: Hscap, NE-Medit.-Pont.; UPA!
76. *Prunus mahaleb* L.: Pcaesp, S-Europ.-Pont.; FSP!
77. *Prunus spinosa* L.: NPcaesp, Europ.-Caucas.; UPA!
78. *Rubus sanctus* Schreb.: Pcaesp, Palaeotemp.; UPA!
79. *Rubus ulmifolius* Schott: NP, Eurymedit.; UPA!
80. *Sorbus aria* (L.) Crantz: Pcaesp, Palaeotemp.; UPA!

Rubiaceae
81. *Galium lucidum* All.: Hscap, Eurymedit.; UPA!
82. *Galium murale* (L.) All.: Hscap, Eurymedit.; UPA!
83. *Galium setaceum* Lam.: Tscap, Stenomedit.-SW-Asiat.; UPA!
84. *Sherardia arvensis* L.: Tscap, Subcosmop.; UPA!
85. *Valantia hispida* L.: Tscap, Eurymedit.; UPA!

Salicaceae
86. *Populus alba* L.: Pscap, Palaeotemp.; UPA!

Scrophulariaceae
87. *Bellardia trixago* (L.) All.: Tscap, Eurymedit.; UPA!
88. *Scrophularia canina* L.: Chsuffr, SE-Europ.; FSP!
89. *Verbascum blattaria* L.: Tscap, Palaeotemp. (Cosmop.); UPA!
90. *Veronica cymbalaria* Bodard: Trept, Eurymedit.; UPA!
91. *Veronica hederifolia* L.: Trept, Eurasiat.; UPA!
92. *Veronica persica* Poiret: Trept, Palaeotemp.; UPA!

Solanaceae
93. *Solanum eleagnifolium* Cav.: Hscap, S-Amer.; UPA!
94. *Solanum nigrum* L. s.l.: Tscap, Cosmop.; UPA!

Umbelliferae
95. *Caucalis platycarpos* L.: Tscap, Eurymedit.-Turan.; FSP!
96. *Daucus carota* L.: Hscap, Subcosmop.; UPA!
97. *Daucus guttatus* Sm.: Tscap, E-Medit.; UPA!
98. *Orlaya daucoides* (L.) Greuter: Tscap, Eurymedit.; UPA!
99. *Pimpinella tragium* Vill.: Chsuffr, Medit.-Turan.; FSP!
100. *Scandix pecten-veneris* L.: Tscap, Palaeotemp.; UPA!
101. *Tordylium apulum* L.: Tscap, Stenomedit.; UPA!
102. *Torilis leptophylla* (L.) Reichenb.: Tscap, Medit.-Turan.; FSP!
103. *Torilis nodosa* (L.) Gaertn.: Tscap, Eurymedit.-Turan.; UPA!

Urticaceae
104. *Parietaria lusitanica* L.: Trept, Eurymedit.; UPA!

Valerianaceae
105. *Valerianella locusta* (L.) Laterr.: Tscap, Eurymedit.; UPA!
106. *Valerianella vesicaria* (L.) Moench: Tscap, Stenomedit.-Turan.; UPA!

MONOCOTYLEDONES

Araceae
107. *Arum italicum* Mill.: Grhiz, Stenomedit.; UPA!

Gramineae
108. *Carex distachya* Desf.: Hcaesp, Stenomedit.; FSP!
109. *Dasypyrum villosum* (L.) Candargy: Tcaesp, Eurymedit.-Turan.; UPA!
110. *Stipa pennata* L. subsp. *pulcherrima* (C.Koch) Freitag: Hcaesp, SE-Europ.; UPA!

Liliaceae
111. *Allium guttatum* Steven subsp. *sardoum* (Moris) Stearn: Gbulb, Stenomedit.; FSP!
112. *Allium hirtovaginatum* Kunth: Gbulb, Eurymedit.; UPA!
113. *Allium roseum* L.: Gbulb, Stenomedit.; UPA!
114. *Asphodelus fistulosus* L.: Hscap, Eurymedit.; UPA!
115. *Muscari commutatum* Guss.: Gbulb, CE-Medit.; UPA!
116. *Ornithogallum umbellatum* L.: Gbulb, Eurymedit.; UPA!

Orchidaceae
117. * *Ophrys ferrum-equinum* Desf.: Gbulb, Balkan; UPA!
118. *Ophrys fusca* Link subsp. *iricolor* (Desf.) O.Schwarz: Gbulb, Stenomedit.; UPA!
119. *Ophrys lutea* Cavanilles subsp. *minor* (Guss.) O. & E. Danesch: Gbulb, Stenomedit.; UPA!
120. # *Ophrys* cf. *scolopax* Cav. subsp. *heldreichii* (Schltr.) E.Nelson: Gbulb, Endemic?; UPA!
121. *Ophrys tenthredinifera* Willd.: Gbulb, E-Medit.; UPA!
122. *Orchis coriophora* L. subsp. *fragrans* (Pollini) Boiss.: Gbulb, Eurymedit.; UPA!