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The Floristic Diversity of Serpentine in Greece 1. An Inventory of the Aliki Area (Sterea Ellas, Central Greece)

By

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With 3 figures

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Summary

CONSTANTINIDIS Th. 2004. The floristic diversity of serpentine in Greece 1. An inventory of the Aliki area (Sterea Ellas, Central Greece). – Phyton (Horn, Austria) 44 (1): 45–67, 3 figures. – English with German summary.

The serpentine flora is often related with interesting biological phenomena and is therefore worthy of close inspection. Although serpentine outcrops do exist in Greece, detailed floristic work concentrated on them is still lacking. Aliki is a coastal serpentine area consisting mostly of low hills and a shallow lagoon that remained, up to now, floristically unexplored. It has a size of ca. 11 km^2 and its flora is composed of 326 plant taxa (pteridophytes and spermatophytes), some of them with taxonomic or phytogeographic interest. Precise data of all the collection localities in Aliki is given in detail. The taxonomic status of *Bufonia euboica*, previously only known from Evvia island, is reconsidered and the species is reduced to a variety: *Bufonia stricta* (SM.) GÜRKE subsp. *stricta* var. *euboica* (PHITOS & KAMARI) CONSTANTINIDIS comb. & stat. nov. Dwarf forms of *Consolida hellespontica* (BOISS.) CHATER are taxonomically annotated. Notes on distribution are made for two species of *Dianthus*: *D. haematocalyx* BOISS. & HELDR. and *D. serratifolius* SM. *Trifolium sylvaticum* GÉRARD is reported for the first time in Sterea Ellas and southern half of Greek mainland. The serpentine of Aliki, although of limited occurrence, is responsible for the creation or maintenance of local serpentine endemic taxa. It is concluded that

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even small serpentine outcrops in Greece may deserve careful searching and particular botanical attention.

Zusammenfassung

CONSTANTINIDIS Th. 2004. Floristische Diversität auf Serpentin in Griechenland 1. Eine Bestandsaufnahme des Aliki-Gebietes (Sterea Ellas, Zentral-Griechenland). – Phyton (Horn, Austria) 44 (1): 45–67, 3 Abbildungen. – Englisch mit deutscher Zusammenfassung.

Serpentinflora ist oft mit interessanten, biologischen Phänomenen verbunden und daher einer näheren Untersuchung wert. Obwohl es große Serpentinstöcke in Griechenland gibt, fehlen diesbezügliche, detaillierte Studien. Aliki ist ein küstennahes Serpentingebiet, das hauptsächlich aus Hügeln sowie einer flache Lagune besteht und bisher floristisch unerforscht geblieben ist. Es hat eine Fläche von ca. 11 km^2 und die Flora umfaßt 326 Taxa an Pteridophyten und Spermatophyten. Einige davon sind taxonomisch oder pflanzengeographisch bemerkenswert. Für alle Aufsammlungen werden die genauen Fundorte angegeben. Der taxonomische Status von *Bufonia euboica*, bisher nur von Euböa bekannt, wird überprüft und die Art als Varietät eingestuft: *Bufonia stricta* (SM.) GÜRKE subsp. *stricta* var. *euboica* (PHITOS & KAMARI) CONSTANTINIDIS comb. & stat. nov. Zwergformen von *Consolida hellespontica* (BOISS.) CHATER werden diskutiert. Für *Dianthus haematocalyx* BOISS. & HELDR. und *D. serratifolius* SM. werden Angaben zur Verbreitung gemacht. *Trifolium sylvaticum* GÉRARD wurde erstmals in Sterea Ellas und in der südlichen Hälfte des griechischen Festlandes gefunden. Im kleinen Serpentingebiet von Aliki sind doch lokale Endemiten entstanden oder erhalten geblieben. Auch kleine Serpentingebiete in Griechenland verdienen sorgfältige, detallierte, botanische Erforschung.

1. Introduction

The plant life of serpentine rocks and soils has attracted considerable interest worldwide because it is related with several important biological phenomena. Among them, endemism at various taxonomic levels, fragmentary distributions, heavy metal hyperaccumulation by certain plants, changes of vegetation structure, etc. (BROOKS 1987, ROBERTS & PROCTOR 1992, BROOKS 1998). Botanists usually have the impression that serpentine outcrops, often patchy and discontinuous in distribution, look bare and inhospitable and α-diversity of plant taxa should therefore be low. This need not necessarily be true (PROCTOR & WOODEL 1975, CARLSTRÖM 1986). Estimation of β-diversity may even prove to be high, as compared to other geological substrates of more continuous distribution (HARRISON & INOUYE 2002).

In Greece, the distribution of serpentine areas is scattered but mostly concentrated in the NW and central parts of the mainland (Fig. 1). Important occurrences are also found on the islands of Evvia, Lesvos, Samothraki, and to a lesser extent Rodos, Tinos, Skiros and Crete. With respect to altitude, serpentine may be found from sea level up to the top of Mt. Smolikas at 2,637 m. Surface size of serpentine areas also varies and areas less

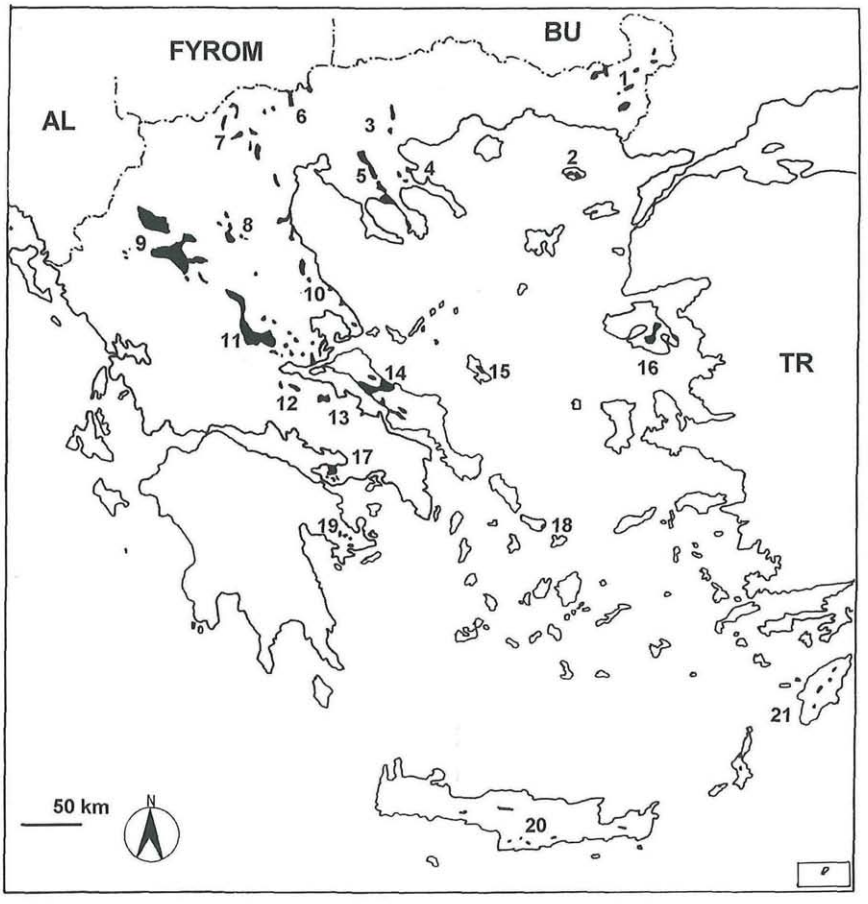

Fig. 1. Important occurrences of ultramafic rock types in Greece. Areas of considerable size are shown in the mainland, while even small ultramafic outcrops are indicated on islands. 1: Rodopi mountains and Evros, 2: Samothraki island, 3: Nigrita, 4: Stratoni, 5: West Chalkidiki, 6: Skra and Evzoni, 7: Edessa, 8: Vourinos mountain, 9: North Pindos mountains, 10: Kato Olimbos and Mavrovouni mountains, 11: Domokos area and Othris mountain, 12: Kallidromon mountain, 13: Chlomon mountain, 14: Evvia island, 15: Skiros island, 16: Lesvos island, 17: Gerania mountain, 18: Tinos island, 19: Argolida, 20: Kriti island, 21: Rodos island.

than 10 km^2 generally are not shown on the map of Fig. 1. However, these should never be considered as floristically unimportant localities; the present paper that deals with such an area points to the contrary.

Discontinuities and uneven distributions commonly observed among serpentine and adjacent-areas biota are reminiscent of islands and offer a promising field for further research on 'insular' biogeographic patterns

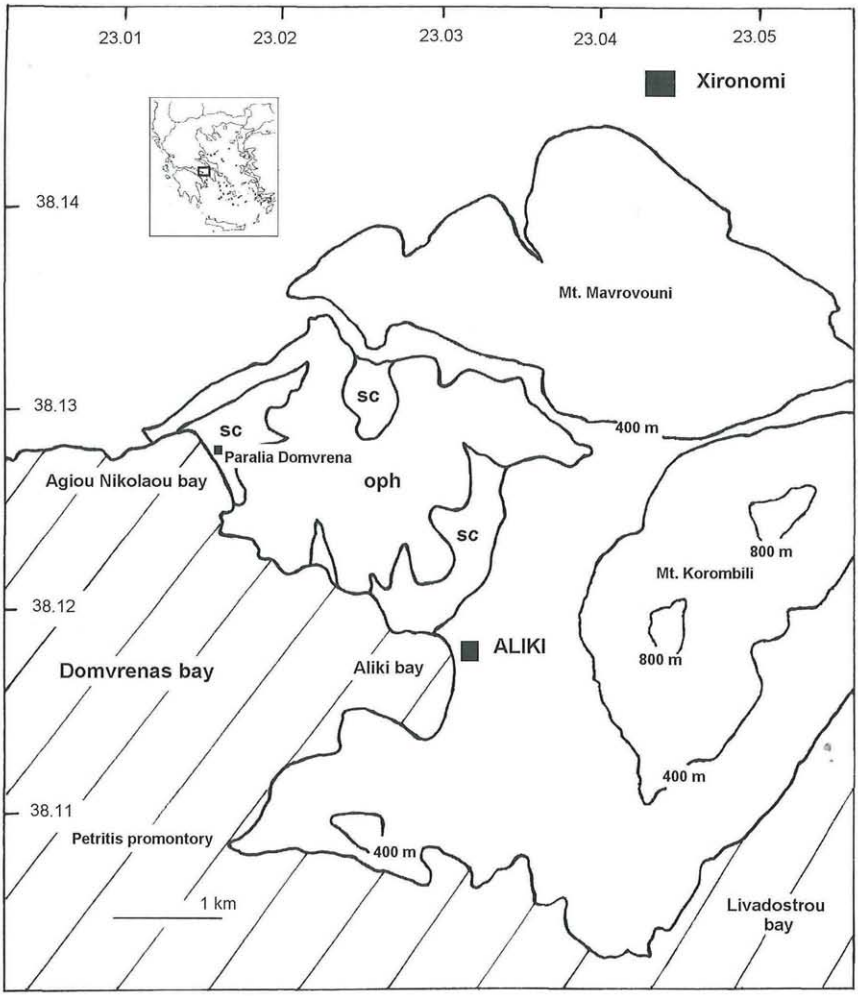

Fig. 2. Geomorphological map of Aliki area. Isohypses at 400 and 800 m are indicated. The serpentine area of Aliki is defined (oph); sc refers to scree and talus cones most of which include abundant serpentine material.

and biodiversity (KRUCKEBERG 1991, CHIARUCCI & DE DOMINICIS 2001). Yet, detailed floristic work on various serpentine areas of Greece is insufficient or totally lacking and the 'insular' character of those areas may be difficult to be tested. Further, α-diversity of plant taxa in serpentine areas of Greece is still not known.

Aliki is a coastal area of Sterea Ellas (Central Greece) consisting of mild to steep hill slopes not exceeding the altitude of 350 m and also of a

flat part at sea level, close to a lagoon. Salt might have been exploited from the lagoon by local people in the past, but the process has now been abandoned. In Aliki, serpentine covers a total area of ca. 11 km^2 (Fig. 2). Neighbouring rock types belong to the limestone-dolomite and schist-chert formations. The geological age of serpentine is estimated at around 160–170 million years (upper Dogger/middle Malm, I.G.M.E. 1984). Recent scree and talus cones close to the lagoon consist mostly of unconsolidated serpentine material, and have been included in the research area. Waste places with rubbish, mostly along roads in Aliki settlement, support a weedy and unstable flora. This has not been included in our study, unless if some of the plants have, even temporarily, colonized serpentine areas.

2. Material and Methods

The serpentine area of Aliki was visited repeatedly from 1998 to 2002. Specimens were collected in all different habitats during spring, early summer and autumn. Collection localities were recorded and coordinates were taken using a Garmin Etrex GPS. Vouchers are kept in the Herbarium of the University of Patras (UPA), the Herbarium of the Agricultural University of Athens (ACA) and partly the Botanical Garden and Museum of Berlin-Dahlem (B, certain duplicates of *Gramineae*). Additional material of *Consolida* (including the types of *C. arenaria* and *C. samia*) was received on loan from the Botanical Museum, University of Lund (LD). Nomenclature follows Flora Hellenica vol. 1 (Strid & Tan 1997), Med-Checklist vols. 1,3,4 (Greuter & al. 1984, 1986, 1989) with some deviations, especially in *Labiatae*. In many cases Flora Europaea (Tutin & al. 1968–1980, 1993) is also consulted. The abbreviation Const. refers to Th. Constantinidis and Iliad. to A. Iliadis. The numbers following plant names are collection numbers of the author.

3. Collection Localities and List of Taxa

Collection sites are arranged in chronological order, with some overlapping in case of successive visits in the same locality. Families, genera and species are arranged alphabetically within large taxonomic units. Collection number and locality indication (in parentheses) follow each species or subspecies name. Greek endemic taxa are indicated by an asterisk (*) prior to species name. Following the Greek administrative divisions, all localities belong to Nomos Viotias, Eparchia Thivon.

3.1. Collection Localities

1. C. 6.5 km S of Xironomi village, along road to Aliki. An ophiolithic area W of the road. Slopes with phrygana and scatterd low shrubs. Alt. c. 380–450 m, 38°12′ N, 23°02′ E, 18. 04. 1998.
2. C. 6.6 km S of Xironomi village, along road to Aliki. An ophiolithic area W of the road. Slopes with phrygana and scattered low shrubs, stony places. Alt. c. 320–350 m, 38°12′ N, 23°02′ E, 22. 05. 1998.

3. Just W of Aliki settlement. Stony slopes and a small ravine N of the asphalt road. Phrygana with *Sarcopoterium spinosum, Calicotome villosa, Helichrysum barrelieri.* Ophiolithic substrate. Alt. c. 20–50 m, 38°12′ N, 23°02′ E, 22. 05. 1998.
4. Very close to the lagoon of Aliki settlement. Stony places by the sea, covered with *Sarcopoterium spinosum* and *Convolvulus oleifolius.* Ophiolithic substrate. Alt. c. 1–10 m, 38°11′ N, 23°02′ E, 22. 05. 1998.
5. C. 1 km W of Aliki settlement. Stony slopes and a dry streambed. Ophiolithic substrate and sandstone. Alt. c. 20–40 m, 38°12′ N, 23°02′ E, 22. 05. 1998.
6. The bay of Domvrena, E parts of Paralia Domvrena (Paralia Agious Nikolaous), c. 3.9 km NW Aliki settlement. Slopes facing the sea, phrygana and *Juniperus phoenicea* shrubs. Eroded ophiolithic substrate. Alt. c. 3–10 m, 38°12′ N, 23°01′ E, 08. 11. 1998, 09. 03. 1999 and 27. 04. 2002.
7. C. 1.7 km WSW Paralia Domvrena (Paralia Agios Nikolaos), along road to Aliki settlement. Hills with sparse vegetation, rocky slopes and scree. Eroded ophiolithic substrate. Alt. c. 3–60 m, 38°12′ N, 23°02′ E, 08. 11. 1998 and 9. 03. 1999.
8. Along a narrow belt between the lagoon of Aliki and the sea; coastal salty area and roadside. Ophiolithic substrate. Alt. c. 0–5 m, 38°11′ N, 23°02′ E, 08. 11. 1998 and 09. 03. 1999.
9. C. 2.7 km after Aliki settlement, along road to Xironomi. A place on the slope with probably some underground water. Ophiolithic substrate. Alt. c. 170 m, 38°12′ N, 23°03′ E, 08. 11. 1998.
10. Just W of Aliki settlement. Slopes with phrygana, roadsides; ophiolithic substrate. Alt. c. 10–30 m, 38°12′ N, 23°03′ E, 09. 03. 1999.
11. C. 1.7 km ESE Paralia Domvrena (Paralia Agiou Nikolaou), along road to Aliki. Hills with sparse vegetation, rocky slopes and scree. Eroded ophiolithic substrate. Alt. c. 3–60 m, 38°12′ N, 23°02′ E, 09. 03. 1999.
12. N of Paralia Domvrenas (Paralia Agiou Nikolaou), close to a chapel. Dry slopes and a ravine; ophiolithic substrate. Alt. c. 30–70 m, 38°13′ N, 23°02′ E, 17. 04. 1999.
13. The lagoon close to the settlement of Aliki. Coastal area; ophiolithic substrate. Alt. c. 0–2 m, 38°11′ N, 23°02′ E, 17. 04. 1999.
14. The lagoon of Aliki settlement and a low hill close to it. Phrygana with *Convolvulus oleifolius* and *Sarcopoterium spinosum.* Ophiolithic substrate. Alt. c. 1–10 m, 38°11′ N, 23°02′ E, 08. 05. 1999 & 18. 05. 2002.
15. E parts of Paralia Domvrenas (Paralia Agiou Nikolaou), W of Aliki settlement. Ophiolithic slopes with phrygana. Alt. c. 30–150 m, 38°13′ N, 23°02′ E, 08. 05. 1999.
16. E parts of Paralia Domvrenas (Paralia Agiou Nikolaou), W of Aliki settlement. Phrygana, open slopes and roadsides. Ophiolithic substrate. Alt. c. 5–40 m, 38°12′ N, 23°01′ E, 09. 05. 1999.
17. E parts of Paralia Domvrenas (Paralia Agiou Nikolaou), W of Aliki settlement. Hills covered with *Anthyllis hermanniae, Calicotome villosa, Sarcopoterium spinosum* and field margins. Ophiolithic substrate. Alt. c. 40–80 m, 38°12′ N, 23°01′ E, 09. 05. 1999.
18. C. 0.4 km along a secondary road that starts c. 7.8 km S of Xironomi on the way to Aliki settlement. Macchia with *Calicotome spinosa, Juniperus phoenicea, Quercus coccifera* & *Olea europaea.* A small ophiolithic outcrop. Alt. c. 140–180 m, 38°13′ N, 23°03′ E, 09. 05. 1999.

19. C. 0.5 km along a secondary road that starts c. 7.8 km S Xironomi village on the way to Aliki. A small ophiolithic outcrop. Macchia with *Quercus coccifera, Calicotome villosa, Juniperus phoenicea, Olea europaea,* etc. Alt. c. 140–180 m, 38°13′ N, 23°03′ E, 06. 06. 1999.
20. NW of Aliki, along the road to Paralia Domvrenas. A small ravine close to the chapel of Agios Nikolaos. Rather dense macchia with *Calicotome villosa, Quercus coccifera,* and *Juniperus phoenicea.* Alt. c. 40–80 m, 38°12′ N, 23°01′ E, 06. 06. 1999.
21. Around the lagoon of Aliki settlement. Muddy places, coastal area, stony places close to the lagoon and by the sea. Serpentine. Alt. c. 1–10 m, 38°11′ N, 23°02′ E, 27. 04. 2002.
22. The bay of Domvrena, W parts of Paralia Domvrena (Paralia Agious Nikolaous), c. 0.3-0.6 km from coastal settlement. A narrow serpentine belt facing the sea. Eroded serpentine. Alt. c. 2–10 m, 38°12′ N, 23°01′ E, 27. 04. 2002.
23. C. 6.9–7.0 km S of Xironomi village, along the road to Aliki. An ophiolithic area W of the road. Slopes with phrygana and low sparse shrubs, stony places and dry streambeds. Alt. c. 300–350 m, 38°12′ N, 23°02′ E, 18. 05. 2002.
24. The slopes above the western parts of Aliki settlement. Stony places and rocks with sparse vegetation consisting mostly of phrygana. Serpentine. Alt. c. 100–200 m, 38°11′ N, 23°02′ E, 18. 05. 2002.

3.2. List of Taxa

Pteridophyta

Polypodiaceae

Anogramma leptophylla: Const. 8487 (15).

Cheilanthes acrostica: Const. 7687 (2), Const. 7744 (3), Const. 8289 (7), Const. 8480 (15), Const. 10082 (23).

Cosentinia vellea: Const. 7701 (2).

Notholaena marantae subsp. *marantae*: Const. 7703 (2).

Selaginellaceae

Selaginella denticulata: Const. 8315 (6).

Gymnospermae

Cupressaceae

Juniperus phoenicea: Const. obs. (6), obs. (24).

Ephedraceae

Ephedra foeminea: Const. & Iliad. 8532 (18), Const. 10048 (6).

Angiospermae-Dicotyledoneae

Amaranthaceae

Amaranthus blitoides: Const. 8287 (6).

Anacardiaceae

Pistacia lentiscus: Const. obs. (6).

Pistacia terebinthus subsp. *terebinthus*: Const. obs. (6).

Aristolochiaceae

**Aristolochia microstoma*: Const. 10088 (23).

Boraginaceae

Anchusa undulata subsp. *hybrida*: Const. 8327 (6).

Alkanna tinctoria subsp. *tinctoria*: Const. 8339 (7).

Echium arenarium: Const. 10038 (21).

Heliotropium hirsutissimum: Const. 8301 (8).

Lithospermum sibthorpianum: Const. 7470 (1), 8346 (11).
Onosma frutescens: Const. 8427 (12).
Neatostema apulum: Const. 7456 (1).

Capparaceae

Capparis spinosa subsp. *rupestris*: Const. 8510 (14).

Caryophyllaceae

Arenaria leptoclados: Const. 8345 (11).
Arenaria serpyllifolia: Const. 8406 (12).
**Bufonia stricta* subsp. *stricta* var. *euboica*: Const. 7725 (4), 8290 (7). See chapter 4.2.
**Bufonia stricta* subsp. *stricta* var. *stricta*: Const. 7461 (1), 7714 (2), 8283 (6).
Cerastium brachypetalum subsp. *roeseri*: Const. 8307 (7), 8311 (7), 8407 (12).
Cerastium ramosissimum: Const. 7460 (1).
**Dianthus haematocalyx* subsp. *phitosianus*: Const. & Iliad. 8526 (16), Const. 10077 (23). See chapter 4.3.
**Dianthus serratifolius* subsp. *serratifolius*: Const. 7710 (2), Const. 7738 (3), Const. 10078 (23). See chapter 4.4.
Herniaria cinerea: Const. 8410 (12), 10029 (21).
Minuartia globulosa: Const. 7465 (1), 7733 (3).
Minuartia hybrida: Const. 8330 (7), 8393 (12).
Paronychia macrosepala: Const. 7692 (2), 7728 (4).
Petrorhagia dubia: Const. 7471 (1).
Petrorhagia illyrica subsp. *illyrica*: Const. 8553 (19).
Polycarpon tetraphyllum: Const. 8343 (11), 10028 (21).
Sagina maritima: Const. 8500 (14).
Silene behen: Const. 8501 (14).
Silene colorata: Const. 8350 (10).
**Silene corinthiaca*: Const. 7742 (3).
Silene gallica: Const. 7731 (4).
Silene nocturna: Const. 10108 (14).
Silene sedoides subsp. *sedoides*: Const. 10042 (21).
**Silene spinescens*: Const. 10031 (21).
Spergularia salina: Const. 8511 (14).
Stellaria pallida: Const. 8332 (7)
Velezia quadridentata: Const. 8477 (15). Rare and scattered in Greek mainland, although more widespread on Aegean islands (STRID 1997b).
Velezia rigida: Const. 7699 (2).

Chenopodiaceae

Atriplex halimus: Const. 8300 (8).
Atriplex portulacoides: Const. 8291 (8).
Beta vulgaris subsp. *macrocarpa*: Const. 10022 (21).
Very rare in Greek mainland, previously only known from localities of Attiki (see VALLIANATOU & al. 1994) and a few Aegean islands.
Beta vulgaris subsp. *maritima*: Const. 10013 (21).
Chenopodium murale: Const. 8364 (8), 10019 (21).
Salicornia europaea: Const. 8294 (8).
Salsola kali: Const. 10110 (14).
Salsola soda: Const. 8302 (8), 10109 (14).
Sueda vera: Const. 8296 (8).

Cistaceae

Cistus creticus subsp. *creticus*: Const. 10087 (23).
Fumana arabica: Const. 8351 (10).
Helianthemum salicifolium: Const. 8308 (7).
Tuberaria lipopetala: Const. 7474 (1).
The name is here used to comprise the cleistogamous, apetalous plants of the *Tuberaria guttata* complex, in accordance with GREUTER 1981. The name *Xolantha* RAF. replaces *Tuberaria* in some works (GALLEGO 1993).

Compositae

Aetheorhiza bulbosa subsp. *microcephala*: Const. 8431 (12).

Anacyclus clavatus: Const. 8462 (13).

**Anthemis peregrina* subsp. *guicciardii*: Const. 7749 (5), 8413 (12), 8467 (15), Const. & Iliad. 8515 (16).

Anthemis tomentosa: Const. 7721 (4).

Asteriscus spinosus: Const. & Iliad. 8533 (18, specimens attributed to *A. spinosus* s.l.), 8567 (20, specimens attributed to *A. spinosus* subsp. *spinosus*).

Atractylis cancellata: Const. 7720 (4).

Calendula arvensis: Const. 8322 (6).

Carlina graeca: Const. obs. (7).

**Centaurea pelia*: Const. 7708 (2).

**Centaurea raphanina* subsp. *mixta*: Const. 8484 (15).

Centaurea solstitialis subsp. *solstitialis*: Const. obs. (14).

Chondrilla juncea: Const. obs. (6).

Crepis commutata: Const. & Iliad. 8518 (16).

Crepis dioscoridis: Const. 7711 (2), obs. (6), 8564 (20).

Crupina crupinastrum: Const. & Iliad. 8531 (16).

Dittrichia graveolens: Const. 8299 (8).

Dittrichia viscosa: Const. obs. (9).

Filago arvensis: Const. 7702 (2), 8489 (15).

Filago gallica: Const. 8469 (15).

Filago pyramidata: Const. 8411 (12), 8472 (15), 10089 (23).

Hedypnois cretica s.l.: Const. 8422 & 8434 (12).

Helichrysum barrelieri: Const. obs. (3).

Hypochoeris achyrophorus: Const. 8419 (12).

Hypochoeris radicata: Const. 7735 (3).

**Inula verbascifolia* subsp. *methanea*: Const. 7755 (5).

Lactuca serriola: Const. 10102 (14).

**Leontodon graecus*: Const. 7446 (1), 8453 (12).

Notobasis syriaca: Const. obs. (9), Const. 10033 (21).

Phagnalon graecum: Const. 10098 (24).

Picnomon acarna: Const. obs. (9).

Picris pauciflora: Const. 7451 (1), 8446 (12), 8507 (14).

Reichardia picroides: Const. obs. (6), 8295 (8).

**Scorzonera crocifolia*: Const. 7704 (2), 8463 (15).

Scorzonera mollis subsp. *mollis*: Const. 7449 (1), 10090 (23)

The plants of Const. 7449 are subscapigerous, with densely undulate leaf margins, thus approaching subsp. *swowitzii*, a taxon not found in Greece or Europe. Const. 10090 clearly belongs to subsp. *mollis*. The deviating habit of Const. 7449 should be attributed to nanism, a differentiation frequently observed in serpentine substrates.

Senecio leucanthemifolius cf. var. *vernalis*: Const. 8329 (11).

Unlike typical specimens of var. *vernalis*, our plants mostly have sinuate-dentate lower leaves. Stem leaves are not well developed but a few of them appear to be pinnatifid, as in the description given by ALEXANDER 1979.

Senecio vulgaris: Const. 8313 (7).

Silybum marianum: Const. obs. (14).

Steptorhamphus tuberosus: Const. 7712 (2).

Taraxacum sp. (sect. *Scariosa*): Const. 8297 (8).

Tragopogon sinuatus: Const. 7695 (2), 8402 (12).

Convolvulaceae

Convolvulus oleifolius: Const. 7709 (2), obs. (6), 10106 (14).

Convolvulus siculus subsp. *siculus*: Const. 7448 (1), 7700 (2).

Cuscuta palaestina subsp. *palaestina*: Const. 7688 (2), 10096 (24).

Crassulaceae

Sedum litoreum: Const. 8499 (14), 10012 (21).
Umbilicus rupestris: Const. 8481 (15).

Cruciferae

**Aethionema saxatile* subsp. *graecum*: Const. 7459 (1), 8338 (11), 8448 (12).
Alyssum simplex: Const. 8309 (6).
Alyssum strigosum subsp. *strigosum*: Const. 8306 (6), 10039 (21).
Biscutella didyma: Const. 8319 (6).
Clypeola jonthlaspi: Const. 8316 (6).
Erophila praecox: Const. 8318 (7).
Eruca vesicaria subsp. *sativa*: Const. 10053 (22).
Hirschfeldia incana: Const. 8569 (20).
Hornungia procumbens: Const. 8355 (8). The genera *Pritzelago* and *Hymenolobus* are not retained as distinct from *Hornungia* by APPEL & AL-SHEHBAZ 1997.
Iberis odorata: Const. 8563 (20).
Lepidium draba subsp. *draba* (= *Cardaria draba* subsp. *draba*, see AL-SHEHBAZ & al. 2002): Const. 10024 (21).
Malcolmia flexuosa subsp. *flexuosa*: Const. 8362 (8), 8502 (14).
**Malcolmia graeca* subsp. *hydraea*: Const. 7463 (1).
Matthiola longipetala subsp. *bicornis*: Const. 7466 (1), 10047 (6), 10059 (22).
Matthiola tricuspidata: Const. 8503 (14).
Sinapis arvensis: Const. 8416 (12), Const. & Iliad. 8514 (16).
Sisymbrium irio: Const. 8363 (8).
Sisymbrium orientale: Const. 8473 (15).

Dipsacaceae

Knautia integrifolia: Const. 7717 (2).
Lomelosia divaricata: Const. 8552 (19).

Euphorbiaceae

Euphorbia acanthothamnos: Const. 10092 (23).
Euphorbia helioscopia: Const. 8348 (10).
Euphorbia peplus: Const. 8347 (10).
Euphorbia taurinensis: Const. 8310 (6).
Mercurialis annua: Const. 8353 (8).

Fagaceae

Quercus coccifera: Const. obs. (7).

Frankeniaceae

Frankenia hirsuta: Const. 8292 (8).
Frankenia pulverulenta: Const. 8504 (14).

Gentianaceae

Blackstonia perfoliata subsp. *perfoliata*: Const. 8561 (20)
Centaurium tenuiflorum subsp. *tenuiflorum*: Const. 8562 (20).

Geraniaceae

Erodium cicutarium: Const. 8303 (6), 8450 (12).
Erodium malacoides: Const. 8321 (6), 10035 (21).
Erodium rotundifolium.: Const. 8400 (12).
Geranium molle subsp. *molle*: Const. 8340 (7).
Geranium purpureum: Const. 8399 (12).

Globulariaceae

Globularia alypum: Const. 8325 (6).

Guttiferae

Hypericum empetrifolium subsp. *empetrifolium*: Const. 7698 (2).

Labiatae

Acinos suaveolens: Const. 8455 (12).
Ballota acetabulosa: Const. obs. (7), 8488 (15).
Coridothymus capitatus: Const. obs. (6).
Lamium amplexicaule: Const. 8304 (6).
Micromeria juliana: Const. 8570 (20).

Prasium majus: Const. 10080 (23).
Salvia viridis: Const. 8442 (12), Const. & Iliad. 8530 (17).
Stachys cretica subsp. *cretica*: Const. 7689 (2), Const. & Iliad. 8524 (16).
Sideritis curvidens: Const. 7469 (1).
Teucrium capitatum: Const. 10081 (23).
Teucrium divaricatum subsp. *divaricatum*: Const. 8478 (15).
Ziziphora capitata: Const. 8405 (12).

Leguminosae

Anthyllis hermanniae: Const. obs. (6).
Astragalus hamosus: Const. 8426 (12).
Astragalus sinaicus: Const. 8408, 8460 (12), 10037 (21), 10057 (22).
Astragalus spruneri: Const. & Iliad. 8536 (18).
Astragalus stella: Const. 10058 (22).
Calicotome villosa: Const. obs. (6).
Ceratonia siliqua: Const. obs. (9).
Coronilla scorpioides: Const. 8452 (12).
**Ebenus sibthorpii*: Const. 10091 (23).
Hippocrepis ciliata: Const. 8440 (12), 10056 (22).
Hymenocarpos circinnatus: Const. 8436 (12).
Lathyrus saxatilis: Const. 8334 (7).
Lotus edulis: Const. 8361 (8), 10032 (21).
Lotus ornithopodioides: Const. 8439 (12).
Lotus peregrinus: Const. 10046 (6).
Medicago disciformis: Const. 8458 (12).
Medicago lupulina: Const. 8331 (7), 8420 (12).
Medicago minima: Const. 8424 (12).
Medicago monspeliaca: Const. 8349 (10).
Medicago polymorpha: Const. 10020 (21).
Medicago rigidula: Const. 8425 (12), 8509 (14).
Medicago truncatula: Const. 8457 (12).
**Melilotus graecus*: Const. 8432 (12).
Melilotus indicus: Const. 10016 (21).
Melilotus neapolitanus: Const. 8474 (15).
Onobrychis aequidentata: Const. & Iliad. 8534 (18).
Onobrychis caput-galli: Const. 8451 (12), Const. & Iliad. 8537 (18).
Ononis ornithopodioides: Const. 8379 (12).
Ononis pubescens: Const. 8443 (12).
Ononis reclinata: Const. 8421 (12), 10041 (21).
Trifolium arvense: Const. 7455 (1).
Trifolium campestre: Const. 7458 (1), 8418 (12).
Trifolium infamia-ponertii: Const. 7453 (1).
Trifolium lucanicum: Const. 10018 (21).
Trifolium scabrum: Const. 7457 (1).
Trifolium spumosum: Const. 10027 (21).
Trifolium stellatum: Const. 8428 (12).
Trifolium sylvaticum: Const. 7468 (1). A rare species of scattered distribution in Greece. See chapter 4.5.
Trigonella spicata: Const. & Iliad. 8535 (18), Const. 10054 (22).
Trigonella spruneriana: Const. 10045 (6), 8459 (12).
Tripodion tetraphyllum: Const. 10051 (22).

Linaceae

Linum nodiflorum: Const. 8464 (15).
Linum strictum: Const. 7475 (1), 8441 (12).

Malvaceae

Althaea hirsuta: Const. & Iliad. 8529 (17).
Malva parviflora: Const. 7753 (5), 8341 (7), 10030 (21).

Moraceae

Ficus carica: Const. 8557 (20), 10086 (23).

Myrtaceae

Myrtus communis subsp. *communis*: Const. obs. (9).

Oleaceae

Olea europaea subsp. *europaea* var. *sylvestris*: Const. obs. (6), obs. (9).

Phillyrea latifolia: Const. obs. (6), obs. (9).

Orobanchaceae

Orobanche pubescens: Const. 10049 (22).

Oxalidaceae

Oxalis pes-caprae: Const. obs. (8).

Papaveraceae

Glaucium corniculatum: Const. 8403 (12).

Glaucium flavum: Const. obs. (7).

Hypecoum imberbe: Const. 8335 (7).

Papaver apulum: Const. & Iliad. 8525 (16), Const. 10036 & 10043 (21).

Papaver rhoeas: Const. obs. (6).

Plantaginaceae

Plantago afra: Const. 8395 (12).

Plantago albicans: Const. 10052 (22).

Plantago amplexicaulis subsp. *amplexicaulis*: Const. 8398 (12), 10055 (22).

Plantago bellardii: Const. 7452 (1), 8394 (12).

Plantago coronopus: Const. 8505 (14).

Plantago lagopus: Const. 8344 (7), 8423 (12).

Plantago weldenii subsp. *weldenii*: Const. 10103 (14)

Plumbaginaceae

Limonium echioides: Const. & Iliad. 8527 (16), Const. 10099 (24).

Limonium narbonense: Const. 8293 (8), 10107 (14).

Limonium sinuatum: Const. 7736 (3), 10104 (14).

Limonium cf. *virgatum*: Const. 8354 (8).

Polygonaceae

Rumex bucephalophorus subsp. *aegaeus*: Const. 7450 (1), 8317 (6).

Primulaceae

Anagallis arvensis: Const. 8357 (8), 8412 (12).

Asterolinon linum-stellatum: Const. 8312 (6).

Cyclamen graecum: Const. 8284 (6), obs. (7).

Ranunculaceae

Anemone coronaria: Const. 8360 (8).

Clematis cirrhosa: Const. obs. (9).

Consolida hellespontica s.l.: Const. 7739 (3), 7754 (5).
See chapter 4.1.

**Nigella arvensis* subsp. *aristata*: Const. 7715 (2), 8566 (20).

Rosaceae

Rubus sanctus aggr.: Const. 8571 (20).

Sarcopoterium spinosum: Const. obs. (6).

Rubiaceae

Crucianella latifolia: Const. 7694 (2), 8565 (20).

**Galium capitatum*: Const. 7732 (4), 10093 (23).

Galium murale: Const. 8438 (12).

Galium setaceum: Const. 8414 (12), 8468 (14).

Galium tricornutum: Const. & Iliad. 8528 (17).

Sherardia arvensis: Const. 8305 (6).

Valantia hispida: Const. 7447 (1), 8336 (11).

Santalaceae

Osyris alba: Const. 10094 (23).

Thesium bergeri: Const. 7467 (1), 7746 (3).

Scrophulariaceae

Linaria simplex: Const. 8314 (6), 10040 (21).
Misopates orontium: Const. 8394 (12).
**Verbascum boissieri*: Const. 7741 (3).
Veronica cymbalaria: Const. 8337 (11).

Theligonaceae

Theligonum cynocrambe: Const. obs. (10).

Umbelliferae

Ammi majus: Const. 10101 (14).
Bupleurum gracile: Const. 8471 (15).
Bupleurum trichopodum: Const. 7462 (1).
Daucus guttatus subsp. *guttatus*: Const. 7752 (5), Const. & Iliad. 8516 (16).
Daucus involucratus: Const. 7690 (2), 8447 (12).
Eryngium campestre: Const. 10100 (24).
**Johrenia distans*: Const. 8479 (15).
Lagoecia cuminoides: Const. 8417 (12).
Malabaila aurea: Const. 7740 (3), Const. 8470 (15).
Orlaya daucoides: Const. 8430 (12).
Scaligeria napiformis: Const. 7705 (2), obs. (6).
Torilis leptophylla: Const. 8429 (12).
Torilis nodosa: Const. 10084 (23).

Urticaceae

Parietaria cretica: Const. 7734 (3), 8328 (11).
Urtica membranacea: Const. 8342 (11).

Valerianaceae

Centranthus calcitrapa subsp. *calcitrapa*: Const. 7726 (4), 8359 (8).
Valeriana italica: Const. 8486 (15).
Valerianella discoidea: Const. 8435, 8437, 8461 (12).

Verbenaceae

Vitex agnus-castus: Const. obs. (9).

Angiospermae – Monocotyledonae

Araceae

Arisarum vulgare subsp. *vulgare*: Const. 8357 (8).

Cyperaceae

Carex distachya: Const. 8326, 10044 (6).
Scirpoides holoschoenus: Const. 8572 (20).

Gramineae

Aegilops caudata: Const. 7713 (2), 8491 (15).
Aegilops comosa subsp. *comosa*: Const. 10085 (23).
Aegilops cylindrica: Const. 8554 (19).
Aegilops geniculata: Const. 8498 (14).
Aegilops triuncialis: Const. 8496 (14).
Aira elegantissima: Const. 8475 (15).
Avena barbata subsp. *barbata*: Const. & Iliad. 8523 (16).
Avena sterilis subsp. *sterilis*: Const. 8494 (14).
Briza humilis: Const. 7464 (1).
Bromus fasciculatus: Const. 8449 (12).
Bromus intermedius: Const. & Iliad. 8519 (16).
Bromus madritensis s.l.: Const. 8445 (12), 8466 (15).
Bromus rubens: Const. 7473 (1), 8333 (*B.* cf. *rubens*, 7).
Catapodium rigidum subsp. *rigidum*: Const. & Iliad. 8522 (16).
Cynodon dactylon: Const. 8568 (20).
Dactylis glomerata subsp. *hispanica*: Const. 7691 (2).
Dasypyrum villosum: Const. 10021 (21).
Elytrigia intermedia: Const. 10105 (14).
Festuca jeanpertii subsp. *jeanpertii*: Const. 7696 (2), 8483 (15).
Hordeum leporinum: Const. 8495 (14).
Hyparrhenia hirta: Const. 7707 (2), 8288 (7), 8492 (15).
Gastridium phleoides: Const. & Iliad. 8517 (16), Const. 10083 (23).
Lagurus ovatus s.l.: Const. 8456 (12).

Lolium rigidum subsp. *rigidum*: Const. 8497 (14), 8513 (14), 8490 (15), 10017 (21).
Melica ciliata subsp. *ciliata*: Const. 8485 (15).
Melica minuta: Const. 10097 (24).
Micropyrum tenellum: Const. 8465 (15).
Parapholis incurva: Const. 8512 (14).
Phalaris minor: Const. & Iliad. 8520 (16), Const. 10015 (21).
Phragmites australis: Const. 10014 (21).
Piptatherum coerulescens: Const. 7472 (1), 7686 (2), 8409 (12), 10095 (23).
Piptatherum miliaceum subsp. *miliaceum*: Const. 10023 (21).
Poa infirma: Const. 10034 (21)
Polypogon monspeliensis: Const. 8560 (20).
Psilurus incurvus: Const. 7445 (1).
Rostraria cristata: Const. & Iliad. 8521 (16).
Stipa capensis: Const. 7476 (1), 7718 (2), 8415 (12), 8508 (14), 10025 (21).
Stipa holosericea: Const. 8482 (15).
Taeniatherum caput-medusae subsp. *crinitum*: Const. 10079 (23).
Trachynia distachya: Const. 8396 (12).
Vulpia ciliata subsp. *ciliata*: Const. 10026 (21).

Iridaceae

Crocus cancellatus subsp. *mazziaricus*: Const. 8285 (6).

Juncaceae

Juncus heldreichianus subsp. *heldreichianus*: Const. 8298 (8), 8401 (12).

Liliaceae

Allium cf. *flavum* subsp. *tauricum*: Const. 7697 (2), 7737 (3), 8559 (20). The specimens need further study. The plants have filiform leaves with sheaths scabridulous along the veins, rather lax inflorescence, pedicels c. 6–20 mm long, perianth segments c. 4 mm, yellowish–brownish, filaments c. 4.5–6 mm exerting perianth, ovary shortly stalked. Their identification is provisional.
Allium guttatum subsp. *tenorei*: Const. 8558 (20).
Allium sphaerocephalon subsp. *sphaerocephalon*: Const. 8555 (20).
Allium subhirsutum: Const. 8454 (12).
Asparagus aphyllus subsp. *orientalis*: Const. 8493 (15).
Asphodelus fistulosus: Const. 8506 (14).
**Bellevalia hyacinthoides*: Const. 8324 (6).
Colchicum cupanii: Const. 8286 (6).
Gagea graeca: Const. 8433 (12).
Muscari commutatum: Const. ? (8).
Muscari comosum: Const. 8404 (12).
Muscari neglectum: Const. 8320 (6).
Ornithogalum collinum: Const. 8323 (6).
Ornithogalum narbonense: Const. 8476 (15).
Smilax aspera: Const. obs. (9).
Urginea maritima: Const. obs. (6), Const. obs. (7).

Orchidaceae

Ophrys oestrifera subsp. *oestrifera*: Const. 10050 (6).

4. Comments to Selected Species

4.1. *Consolida hellespontica* s.l.

While collecting in Aliki area, some interesting plants of a *Consolida* species were found. These plants form scattered populations on serpentine, clearly preferring the specialized biotope provided by bare scree, pebble and a mixture of gravel and sand, from almost sea level up to c. 150 m.

They sometimes constitute the only species growing in these habitats, or may grow together with short-lived, early flowering annuals. The plants have a dwarf habit and clearly belong to *Consolida* sect. *Longibracteolatae,* which is represented in Greece by three species: *C. hellespontica* (BOISS.) CHATER, *C. samia* P. H. DAVIS and *C. arenaria* CARLSTRÖM. Of these, only *C. samia* and *C. arenaria* are dwarf plants with particular ecological preferences, while *C. hellespontica* is a taller, often segetal (in Turkey) species.

Upon examination, the populations of Aliki were temporarily attributed to *C. arenaria*, previously only known from coastal sands of Rodos island (CARLSTRÖM 1987) and recently found in Limnos (TAN & al. 2002). The unusual distribution of the species would then be of particular phytogeographic interest. Although parallel to the distribution patterns of *Ebenus sibthorpii* DC. and *Linum virgultorum* PLANCHON, it would consist an even more specialized case of a disjunct distribution between SE Sterea Ellas and the islands of Rodos and Limnos. However, in 2002 another population of a dwarf *Consolida* species was discovered in a coastal area of Sterea Ellas, which made the whole situation somewhat more complicated. The locality of the population is as follows: Nomos Fokidos, Eparchia Parnassidos. The bay of St. Pangkalos (Agios Pangkalos). The area E of the sandy beach. Sandstone with sparse *Pistacia lentiscus, Coridothymus capitatus,* and *Juniperus phoenicea* scrub. Alt. 5–30 m., 38°17′, 22°34′, 06. 05. 2002, CONSTANTINIDIS & Evergetis 10075 (ACA). The new population has a dwarf habit, a blue rather than violet flower colour, a relatively short spur and the indumentum of *C. hellespontica.* This new population could not be identified as *C. arenaria* but perfectly matches dwarf forms of *C. hellespontica*, or, if we follow the same morphological criteria used to distinguish *C. arenaria* and *C. samia* (DAVIS 1965, CARLSTRÖM 1984), it should represent a new, undescribed species.

Refraining from describing new taxa if not absolutely necessary, the occurrence of dwarf *Consolida* forms clearly related to the insular stenoendemics *C. arenaria* and *C. samia* in Greek mainland necessitates a reevaluation of the group's taxonomy. Similar forms should be looked for in areas of SW Turkey, but they may have a very local distribution. Dwarf populations of *Consolida* sect. *Longibracteolatae* are localized, and sometimes threatened taxa showing ecotypic specialization. Unless a more thorough investigation of these forms sheds light to their taxonomy, I prefer to use the name *C. hellespontica* in a wider sense and the populations of Sterea Ellas are classified here.

4.2. *Bufonia stricta*

In 1992 a new species of *Bufonia* was described from the island of Evvia, i.e. *Bufonia euboica* PHITOS & KAMARI. The species, according to the

description (PHITOS & KAMARI 1992), does not show remarkable taxonomic differences in single characters from *B. stricta* (SM.) GÜRKE subsp. *stricta*, but it presents a very distinct growth form with its many tall, erect stems. Moreover, the species grows on serpentine at almost sea level, a habitat not previously known for any *B. stricta* subsp. *stricta* population. Since its original discovery close to the village of Limni, no other locality of *B. euboica* has been reported.

At altitudes between 5 and 350 m in Aliki several specimens of *Bufonia* were collected or seen. Some of the plants have exactly the same habit as *B. euboica* (numerous stems >15 cm) and should be classified under this species, others look like typical forms of *B. stricta* subsp. *stricta* (stems generally <10 cm). The typical plants belonging to either of the two taxa are connected with a series of intermediates whose clear assignment to any of the two species is difficult. Closer observation revealed that density and height of tufts produced by the plants are controlled by the surrounding ecological conditions and probably also the age of the plants. Plants of considerable age at field or road margins strongly resemble *B. euboica* (PHITOS & KAMARI 20415 holotype and isotypes, UPA!). Typical *B. stricta* subsp. *stricta* may grow a few meters away, in more xeric, gravelly conditions. Young plants (determined as such by lower stem and root circumference and/or degree of infructescence) in Aliki are unlike any typical form of *B. euboica*.

Additional material of a perennial *Bufonia* found on serpentine at the higher altitudes (c. 900 m) of Mt. Gerania has been considered as *B. stricta* subsp. *stricta* (CONSTANTINIDIS 1997). The plants generally have taller stems than similar plants grown on limestone at the same altitude and mountain massif. A population found at c. 450 m on Mt. Gerania has stems as long as *B. euboica* (8–18 cm), but it does not form thick tufts, a probable indication that both geological substrate and low altitude may be responsible for the different growth form of *B. euboica*.

These recent findings convince that the different habit of *B. euboica*, actually the only character useful to differentiate it from *B. stricta* subsp. *stricta*, is nothing more than a variable ecotypic adaptation induced by low altitude, the serpentine substrate (serpentinomorphism) and perhaps the plant's age. In the absence of any other discriminating morphological characters, the species level for *B. euboica* is not justified. Taking into consideration the sympatric occurrence of both forms in Aliki and the existence of intermediate populations on the serpentine of Mt. Gerania, variety status for *B. euboica* seems to be more appropriate. The proposal ***Bufonia stricta* subsp. *stricta* var. *euboica* (PHITOS & KAMARI) CONSTANTINIDIS, comb. & stat. nov.,** (Basionym: *Bufonia euboica* PHITOS & KAMARI in Willdenowia 22:81, 1992)

is therefore made to include the weakly differentiated lowland variants of *B. stricta* with tall, tufted stems, currently only known from the serpentine of Evvia island and Aliki.

4.3. *Dianthus haematocalyx*

Aliki is the *locus classicus* for *Dianthus haematocalyx* BOISS. & HELDR. subsp. *phitosianus* CONSTANTINIDIS. This lowland taxon, only known from Aliki and the lower serpentine slopes of Mt. Gerania on the opposite side of the Corinthian Gulf (CONSTANTINIDIS 1999), is considered as an obligatory serpentine endemic. In 1999, when the species was described, only one collection from Mt. Gerania was known (coll. MAROULIS and KOKMOTOS s.n., UPA!). This gathering, although undoubtedly belonging to subsp. *phitosianus*, is somewhat fragmentary and the petals are shriveled, not allowing proper colour determination. After 1999, a more intense investigation of the lower parts of Mt. Gerania revealed four additional populations of this rare taxon and permitted an interesting observation: all populations of *D. haematocalyx* subsp. *phitosianus* on Mt. Gerania have lemon-yellow upper petal surface, in contrast to the typical form of Aliki, which bears petals of pink upper surface with darker veins. A yellow petal colour is unusual for any Greek *Dianthus* species. An analogous case has been described in *D. cinnamomeus* SM. of Kiklades islands, where the diploid subsp. *cinnamomeus* has white or pale pink upper limb, while the tetraploid and more robust subsp. *naxensis* RUNEMARK has lemon-yellow limb (STRID 1997a). The chromosome number of the Gerania populations of *D. haematocalyx* is not known yet but if they consist a different subspecies, then *D. haematocalyx* subsp. *phitosianus*, a diploid taxon with $2n = 30$, may well be exclusively confined to a few localities of Aliki serpentine.

4.4. *Dianthus serratifolius*

The finding of *Dianthus serratifolius* SM. subsp. *serratifolius* in Aliki was surprising. This taxon is reported as a mountain species, generally not found below 600 m (STRID 1997a). Recent data extend its distribution not only to the mountains of SE Sterea Ellas but also to Mts. Panachaiko and Erimanthos of NW Peloponnisos (MAROULIS & al. 2002). An old report of *D. serratifolius* β. *abbreviatus* HELDR. in sched. (HALÁCSY 1901), which may refer to *D. serratifolius* subsp. *abbreviatus* (HALÁCSY) STRID from Sounion, i.e. close to sea level, has not been included in the distribution maps of the species (STRID 1997a). Our records from Aliki fully document that *Dianthus serratifolius* subsp. *serratifolius* may occur at very low altitude, since it was observed or collected as low as 10 m above sea level. In Aliki this taxon grows on serpentine, not on limestone as all other records indicate, in bare gravel, roadsides, steep torrent banks and among phrygana, at an altitude of 10 up to 350 m.

4.5. *Trifolium sylvaticum*

Trifolium sylvaticum GÉRARD, a calcifuge species with a widespread distribution, is uncommon in Greece. Previous records of it include the island of Psara (GREUTER 1976), Kriti (LASSEN 1999), Karpathos (RECHINGER 1943 as *T. smyrnaeum* BOISS.), and the north-eastern parts of Greece (Kassandra peninsula, RECHINGER 1943 as *T. smyrnaeum*; Samothraki island, STOJANOV & KITANOV 1944 as *T. lagopus* POURR.; Nomos Evrou, LASSEN & STRID, pers. comm.). In Aliki it was found only once, in a very small population. This collection was determined by P. LASSEN (Lund) and constitutes the first report of this species in Sterea Ellas and southern half of Greek mainland.

5. Discussion

The serpentine area of Aliki has not been previously examined floristically, the sole exception being the report of a new subspecies of *Dianthus* and the few species accompanying it (CONSTANTINIDIS 1999). Therefore, almost all the taxa presented in the floristic list are considered as new records and to our knowledge, constitute the first complete inventory entirely devoted to a serpentine area in Greece. CARLSTRÖM 1987 also provided extensive floristic records from the ultramafic areas of Rodos island but the reconstruction of their floristic diversity necessitates the combined use of her species list, indication of substrate and distribution maps. Even so, for some common species unequivocal attribution may still be unresolved.

Some taxonomic and distribution notes on Aliki plants are found in the floristic list. Certain taxa need, however, a more thorough annotation, which is provided above. A total number of 326 taxa was collected or observed. The majority of them are weeds, halophytes and common elements of phrygana and degraded macchia. *Gramineae* (41 taxa), *Leguminosae* (41 taxa) and *Compositae* (40 taxa) are the richest families. *Orchidaceae* is represented by only one taxon, despite the fact that habitats suitable for orchids have been observed in Aliki. A certain number of taxa are only found in small (50–200 individuals) or very small (<50 individuals) populations and therefore need careful searching to be spotted.

A few taxa found in Aliki, viz. *Notholaena marantae* (L.) DESV. subsp. *marantae*, *Cerastium ramosissimum* BOISS., *Dianthus haematocalyx* subsp. *phitosianus*, *Micropyrum tenellum* (L.) LINK characterize serpentine areas in Greece. These may be obligatory serpentine endemics or only present a special preference for serpentine. They do not contribute much to the flora of Aliki (c. 1.2%).

Besides interesting plant species and unusual altitudinal or geographic distributions, diversity of plant species growing on serpentine is

another point that needs attention. It is often considered that serpentine areas worldwide support a poor, although rich in endemics flora (e.g. WHITTAKER 1954, PROCTOR & COLE 1992, MENEZES DE SEQUEIRA & PINTO DA SILVA 1992) but this may not necessarily be true in all cases (CARLSTRÖM 1986). To consider high or low α-diversity of plant taxa in Aliki, comparisons with other similar areas in Greece are necessary. Unfortunately, only few exhaustive floristic reports are known from the Greek mainland and these mostly refer to mountains or densely populated urban areas, both unsuitable for comparison with Aliki. Contrary to that, the floristic structure of many Greek islands and islets is well known. Given the low altitude and coastal location of Aliki area and the 'insular' character of its serpentine (always sharply separated from neighbouring limestone or schist), an attempt to compare the overall number of taxa (species and subspecies) found in Aliki with that of various islands of similar size is presented in Fig. 3. To facilitate the comparison, islands not smaller than 1/3 Aliki's surface area and up to three times as large as Aliki were selected (Table 1). The diagram of Fig. 3 does not highlight any unusual low taxa number for Aliki serpentine and therefore, its flora should not be characterized as poor. Instead, Inoussa island, Inousses island group and Yiaros appear to have a comparatively poor flora. This may be the re-

Table 1
Surface area and number of taxa (Pteridophyta and Spermatophyta) of selected Greek islands compared to Aliki. N° refers to the dot numbers of Fig. 3.

N°	Island or Area	Reference	Surface area (km^2)	Number of taxa (species + subspecies)
1	Koufonisi	BERGMEIER & al. 2001	3.9	273
2	Pharmakonisi	PANITSA & TZANOUDAKIS 1998	3.9	201
3	Chrisi	BERGMEIER & al. 2001	4.6	275
4	Giali	BROFAS & al. 2001	4.6	241
5	Dionysades (total island group)	BERGMEIER & DIMOPOULOS 2001	5.2	277
6	Arki	PANITSA & TZANOUDAKIS 2001	6.7	259
7	Yioura	KAMARI & al. 1988	11.0	400
8	Aliki	present paper	11.0	326
9	Agathonisi	PANITSA & TZANOUDAKIS 1998	13.4	328
10	Inoussa	PANITSA & al. 1994	14.7	172
11	Lipsos	PANITSA & TZANOUDAKIS 2001	15.9	471
12	Yiaros	TZANOUDAKIS 1981	18.0	234
13	Inousses (total island group)	PANITSA & al. 1994	18.1	270
14	Kira Panagia	SNOGERUP & al. 1991	25.0	438
15	Paxi	GEORGIADIS & al. 1986	25.5	435
16	Chalki	CARLSTRÖM 1987	28.0	392
17	Agios Evstratios	SNOGERUP & SNOGERUP 1991	30.0	438
18	Gavdos	BERGMEIER & al. 1997	32.0	470

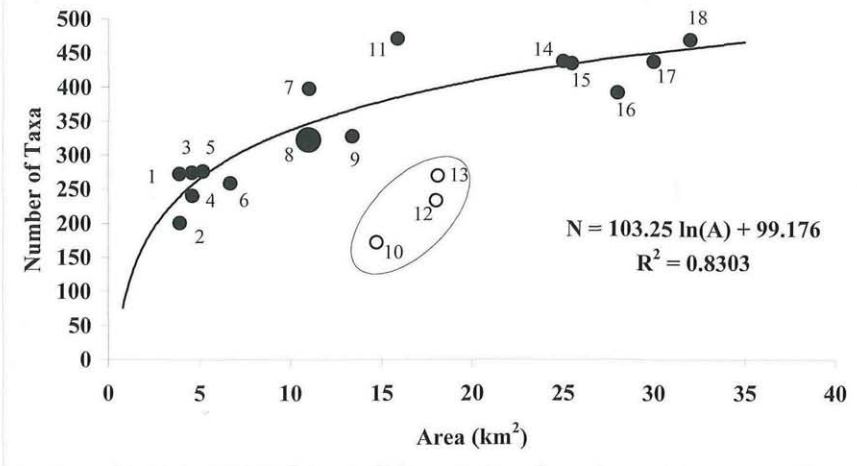

Fig. 3. Scatter plot of taxa (N) and surface area (A) of 17 selected islands in Greece compared to Aliki. The number of each dot refers to Table 1. Aliki area (No 8) is marked by an enlarged dot. The logarithmic equation N = 103.25ln(A) + 99.176 indicates an anomalous position for islands 10, 12 and 13. Coefficient of determination $R^2 = 0.8303$.

sult of either habitat homogeneity and degradation or insufficiency of floristic data collected so far (or any apparent combination of these two parameters).

The percentage of endemism was also calculated for Aliki, estimated as the number of Greek endemic species to the total flora of the area (*Bufonia stricta* subsp. *stricta* was counted only once). This resulted in 6.5%, which is only half the percentage recorded for Peloponnisos (c. 12%, TAN & IATROU 2001) but considerably higher the number estimated in certain other island areas of larger size (e.g. 1.6% for Arki and Lipsi island group, PANITSA & TZANOUDAKIS 2001).

To conclude, the serpentine area of Aliki, although of limited extension, afforded a new subspecies of *Dianthus* and several other taxa interesting from a taxonomic or chorological point of view. Compared to its size, Aliki does not support a poor flora, at least with respect to Greek islands of comparable size. This is in accordance with the observation of CARLSTRÖM 1987 in the Aegean Sea, where the number of species found on the serpentine and non-serpentine areas of the Marmaris peninsula (Turkey) were almost equal.

The example of Aliki indicates that even small serpentine areas should not be neglected from a floristic point of view. It is expected that further investigations of serpentine areas in Greece will be rewarded with many more new findings.

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