Notes on epilithic and epigeic lichens from granite and gneiss outcrops in mountains of Makedonia, Greece, with emphasis on northern species

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Notes on epilithic and epigeic lichens from granite and gneiss outcrops in mountains of Makedonia, Greece, with emphasis on northern species

Abstract

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The epilithic and epigeic lichen flora of eight localities with granite and gneiss outcrops in the mountains of Makedonia, N Greece has been investigated. Of the 46 taxa reported, seven species are new to Greece, viz.: *Brodoa oroarctica*, *Candelariella coralliza*, *Cetraria ericetorum*, *Lecanora swartzii*, *Parmelia serrana*, *Pseudephebe pubescens* and *Ramalina strepsilis*. One species is new to the Greek mainland (*Umbilicaria polyphylla*) and four species are new to the region of Makedonia (*Bryoria chalybeiformis*, *Melanelia disjuncta*, *Polychidium muscicola* and *Xanthoparmelia loxodes*). Altitudinal range and abundance are briefly discussed for a number of species.

Additional key words: Arctic-Alpine lichens, crystalline acidic rocks, Mediterranean-montane lichens

Introduction

Lichenological investigations of Greece has a long history resulting in a total of 1296 taxa (Abbott 2009). Since then the number has been raised by nine (Sipman & Ahti 2011), four (Sipman 2012), 27 (Christensen & Alstrup 2013), 13 (Christensen 2014) and seven (this paper) bringing the total number up to 1356. Considering the varied geology and topography and the number of vegetation zones present, this number is certainly far too low.

Historically lichenological papers have mainly focussed on floristic data, reporting the presence of species from different areas (e.g. Zahlbruckner 1906; more references in Abbott 2009). Only few papers deal with the lichen flora of specific substrates or biotopes (e.g. Steiner 1893; Krause & Klement 1962). During the last three or four decades a number of papers have focussed on recording lichen floras of different substrates. Zoller & al. (1977) recorded the epigeic and epiphytic lichens and mosses in woodlands in the mountains of N Greece. Christensen (1989, 1994a–b, 1995b, 2000, 2007, 2014); Mucina & al. (2000); Pirintsos & al. (1993, 1995, 1998) and Riga-Karandinos (2000) reported on epiphytic lichens from a number of trees and shrubs. Epigeic lichens were treated by Papp & al. (1999) and Christensen & Alstrup (2013). In contrast, the lichen floras of different bedrocks have only been treated in a few papers (Christensen & Alstrup 2013; Sipman & Raus 1999).

Except for Mt Olymbos (e.g. Hayek 1928; Szatala 1959; Christensen 1995a), the high mountains of the Greek mainland are under-collected compared to the lowlands and the islands, and Kriti in particular. In the lowlands and the islands and on Mt Olymbos hard limestone (including dolomite and marble) is the predominant bedrock. Limestone lichens are, therefore, relatively well represented in the total list of Greek lichens (Abbott 2009). Serpentinite and acidic crystalline rocks, which are found as intrusions in the limestone rocks of the higher mountains and some islands, have not been much studied lichenologically (Krause & Klement 1962; Christensen & Alstrup 2013). This applies particularly to the plutonic and metamorphic rocks of the high mountains.

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In a study on lichens of different rock types Christensen & Alstrup (2013) reported a number of species with northern distribution patterns, many of which were not previously published for Greece, e.g. *Cornicularia normoerica*, *Dermatocarpon intestiniforme*, *Melanelia stygia*, *Rhizocarpon eupetraeoides*, *R. ferax*, *Rhizoplaca chrysoleuca*, *R. melanophthalma* and *Sporastadia testudinea*. Such an array of species indicates that rock outcrops elsewhere in the high mountains of Greece might harbour Arctic-Alpine species and that they are in fact more widely distributed than publications so far show.

A field trip to mountains with known outcrops of acidic plutonic and acidic metamorphic rocks was conducted to test this hypothesis. In the field, collecting focus was on the northern element of the macrolichen flora. Crustose lichens were only occasionally collected, as were macrolichens with other distribution patterns. The results are presented below.

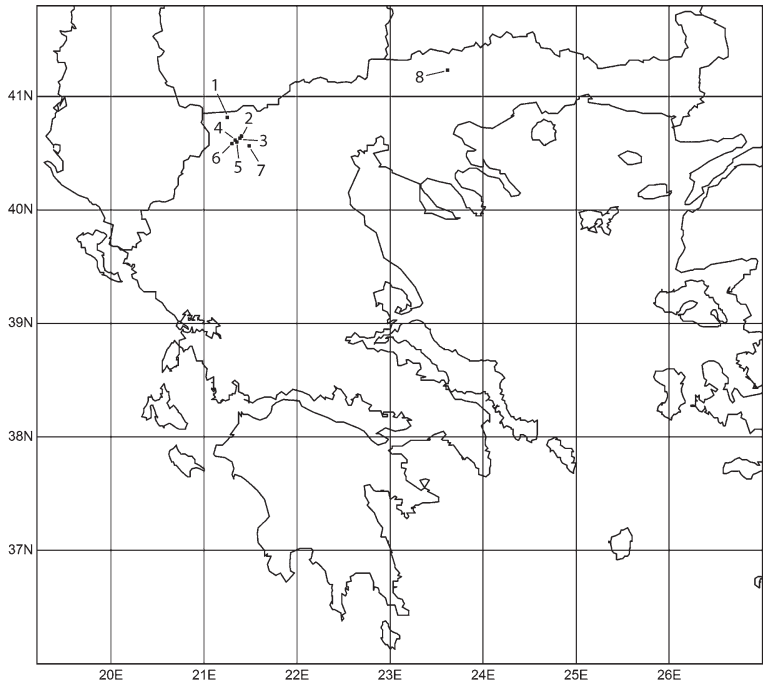

Fig. 1. Greece with the position of the localities in W Makedonia (1–7) and E Makedonia (8).

Material and methods

During one week in September 2013 seven localities in W Makedonia known to have outcrops of granite and gneiss were visited – locality no. 8 in the list below is a supplement to Christensen & Alstrup (2013) with only one species, *Bryoria chalybeiformis*, reported (Fig. 1). The locality numbers are given in the species list in brackets, preceding the corresponding collection numbers. Latitudes and longitudes of the localities are map readings.

To distinguish between the Greek region of Makedonia and the Former Yugoslavian Republic of Macedonia (F.Y.R.O.M.) the former is referred to as Makedonia and the latter as Macedonia.

Names of provinces and larger landscapes follow The Times Atlas of the World (1990). Geographical names for Makedonia follow "Macedonia, 1: 200 000". ROAD Editions, Athens Jul 2010 and "Freytag-Berndt Autokarte, Griechenland, 1: 600 000". Freytag-Berndt u. Artaria, Wien. In the field the nomos maps of the Ethniki Statistiki Ypiresia tis Ellados (National Statistical Office of Greece) no 22: Nomos Kastorias, 1983 and no 46: Nomos Florinis, 1972 were used and some of the names of mountains and summits are only to be found in these maps. Finally the forest map "ΔΑΣΑΡΧΕΙΟΝ, ΣΕΡΡΩΝ" ΔΑΣΟΠΟΝΙΚΟΣ ΧΑΡΤΗΣ ΔΗΜ. ΔΑΣΟΥΣ "ΛΑΪΛΙΑ" 1: 20 000" was used for the Vrondous mountains.

The nomenclature is largely in accordance with Abbott (2009). When other names are used, those used by Abbott (2009) are given in synonymy. Whenever specimens are labelled with older synonyms, those are also given.

The Greek distribution of the species was checked against the Greek checklist (Abbott 2009) and Christensen & Alstrup (2013). Asterisks are used to denote new to Greece (***), new to the mainland of Greece (**), or new to Makedonia (*).

The specimens are deposited in the Natural History Museum of Denmark, Botanical Garden & Museum (C), in the Botanical Museum in Berlin-Dahlem (B) and in the author's private herbarium.

List of localities

Nomos Florinas

1. S slope of Mt Varnous (Βαρνούς), c. 14 km W of Florina, just above the village Pisoderi, 40°49'N, 21°15'E, 1450 m. – Open *Juniperus communis* thicket in opening in *Fagus* woodland, S slope, incline 35°. – Bedrock augen gneiss. – On large boulders of gneiss. – 14 Sep 2013.

2. Mt Verno (Βέρνο), c. 1 km S of the summit Vitsi (Βίτσι), at the monument, 40°39'N, 21°24'E, 1775 m. – Granite outcrops in dry montane grassland. – 13 Sep 2013.

3. Mt Verno, c. 3.5 km S of the summit Vitsi, N slope of the summit "1862", 40°38'N, 21°23'E, 1750–1800 m. – Granite outcrops in montane grassland on W slope, incline 20°. – 17 Sep 2013. – Fig. 2 & 3.

Nomos Kastorias

4. SW slope of Mt Verno, c. 12.5 km NE of Kastoria, c. 1 km SE of the village Oxia, SW slope of the summit "1653", 40°37'N, 21°20'E, 1250 m. – Granite outcrops in

Fig. 2. Granite outcrops in montane grassland at 1750–1800 m on Mt Vitsi (loc. 3). Note the population of *Cornicularia normoerica* in the foreground (many of the dark patches, which also include specimens of *Umbilicaria deusta* and *U. polyphylla*).

montane grassland in large opening in *Fagus* woodland. – 17 Sep 2013.

5. Mt Verno, c. 12 km NE of Kastoria, c. 1 km SE of the village Oxia, just N of the side road to the village Polykeraso, 40°36'N, 21°21'E, 1400 m. – Dry montane grassland in large opening in *Fagus* woodland. – On granite boulder and on the ground in patches of granite gravel. – 13 Sep 2013.

6. Mt Verno, SE slope of the summit "1505", c. 8 km NNE of Kastoria, NW of the village Tichio, along the Chloi-Vysinea road, 40°35'N, 21°18'E, 750 m. – Sun-exposed SSE slope along road in *Quercus* woodland. – Weathered granite outcrops in *Juniperus communis* thicket. – 13 Sep 2013.

7. SE slope of Mt Verbista (Βερμπίστα), at the S part of the Verno range, c. 17.5 km ENE of Kastoria, c. 1.5 km NNE of the village Klisoura, 40°34'N, 21°29'E, 1200 m. – Outcrops of augen gneiss in montane grassland on SSW slope, incline 35°, in large opening in *Quercus* woodland. – On S-facing gneiss rocks. – 16 Sep 2013.

Nomos Serron

8. Vrondous (Βροντούς) Mts, Mt Lailia (Λαϊλιά), SW slope of the summit "Ali Baba" (Αλή Μπαμπά), c. 17 km N of Serres, forest lot "II 8β", at the mountain refuge, 41°14'N, 23°37'E, 1530–1550 m. – *Pinus sylvestris* woodland, partly of scattered old tall trees, partly of dense thickets of younger 7–8-m-tall trees, on SW-facing slope. – Bedrock granite. – 14 Sep 1987. – This is the same as loc. 27 of Christensen & Alstrup (2013).

Results

List of taxa

***Epilithic* species**

****Brodoa oroarctica* (Krog) Goward – On top and on N and E sides of granite boulders and granite rock outcrops. (2) *14766*; (3) *14873a*, *14874*, *14875*. – "An Arctic-Alpine, northern boreal, circumpolar species" being "saxicolous on highly exposed siliceous … rocks in Alpine areas or tundra heaths ..." (Thell & Westberg 2011).

**Bryoria chalybeiformis* (L.) Brodo & D. Hawksw. – On N and E sides of granite rock outcrops. (3) *14871*; (4) *14851*; (8) *4448*. – Distinguished from *B. fuscescens* (Gyeln.) Brodo & D. Hawksw. by its uneven branches and the substrate (Myllys & al. 2011). The sole previous record for Greece, from Thessalia, was regarded as doubtful by Abbott (2009) due to the species having a distinctly northern distribution. However, in light of the recent reports of a relatively large number of species in the mountains of Greece with a northern affinity (Christensen & Svane 2009; Christensen & Alstrup 2013; and this paper) this argument is hardly valid.

Buellia badia (Fr.) A. Massal. – On decomposed lichens on W and E sides of granite outcrops. (4) *14847*, *14848*, *14850*.

Caloplaca pelodella (Nyl.) Hasse (*C. conglomerata* (Bagl.) Jatta) – On weathered granite outcrop on SSE slope. (6) with *Xanthoparmelia tinctina 14732*. On the Greek mainland this species is only known from two localities in Makedonia: Mt Vourinos (Christensen 2000) and Mt Avgo (Christensen & Alstrup 2013).

Caloplaca saxicola (Hoffm.) Nordin – On N side below overhanging part of large gneiss boulder. (1) *14781*, *14782a*. The two previous records for Makedonia are from the W part: Mt Avgo and Mt Triklarion (Christensen & Alstrup 2013).

****Candelariella coralliza* (Nyl.) H. Magn. – On weathered granite outcrop on SSE slope. (6) with *Xanthoparmelia tinctina 14732*. – Arctic-Mediterranean montane (Wirth 1995). In the Balkans apparently only reported from Macedonia (Murati 1992; Rohrer & al. 2012).

Candelariella vitellina (Hoffm.) Müll. Arg. – On N side of granite boulder. (5) *14757*.

Cornicularia normoerica (Gunn.) Du Rietz – On W side of large gneiss boulder and on N, W and S sides of granite boulders and granite outcrops. (1) *14777*; (2) *14769*; (3) *14863*, *14864*; (5) *14752*, *14754*. – Known

from a single locality in the Vrondous Mts in E Makedonia at 1530–1625 m (Christensen & Alstrup 2013). Of the sites with acidic crystalline rocks studied during the field trip in 2013 the species occurred on all the rock outcrops above 1400 m. It often occurred in abundance (Fig. 2).

Hypogymnia farinacea Zopf – On W side of granite rocks. (2) *14767*.

Hypogymnia physodes (L.) Nyl. – On vertical N side of large gneiss boulder. (1) *14786*. – Epilithic occurrences of this normally epiphytic species are relatively rare.

Lasallia pustulata (L.) Mérat – On top and W side of large gneiss boulder and on top, NE, S and E sides of granite rock outcrops. (1) *14776*, *14779*, *14788*; (3) *14870*; (4) *14845*, *14849*; (6) *14736*.

Lecanora bolcana (Pollini) Poelt – On granite rock outcrops and on pebbles on the ground in patches of granite gravel. (4) *14854*; (5) *14764*; (6) with *Xanthoparmelia tinctina 14732*.

****Lecanora swartzii* (Ach.) Ach. – Below overhanging part of S-facing gneiss rock. (7) with *Pleopsidium chlorophanum 14835*. – This species is (Arctic-) boreal to Mediterranean montane (Wirth 1995). In the Balkans it has been published from Bulgaria (Mayrhofer & al. 2005) and Macedonia (Mayrhofer & al. 2013).

Lecidella carpathica Körb. – On weathered granite outcrop on SSE slope. (6) with *Xanthoparmelia tinctina 14732*.

**Melanelia disjuncta* (Erichsen) Essl. – On NE side of large gneiss boulder. (1) *14784*. – Known from two records, from Attiki (Attica) and Evvia, respectively (Abbott 2009).

Melanelixia fuliginosa (Fr. ex Duby) O. Blanco & al. (*Melanelia fuliginosa* (Fr. ex Duby) Essl.) – Below overhanging part of NW side of granite outcrop. (4) with *Xanthoparmelia tinctina 14860*.

Parmelia saxatilis (L.) Ach. – On NE side of granite boulder shaded by *Juniperus*. (6) *14735*.

****Parmelia serrana* A. Crespo & al. – On N and E sides of boulders and outcrops of gneiss and granite. (1) *14785*; (4) *14846*; (5) *14755*. – *Parmelia ernstiae*, *P. saxatilis* and *P. serrana* are rather similar species. They share a number of characters, which they express to different degrees; they are therefore distinguished by a combination of characters, most of which are not exclusive to any of the species (Thell & al. 2011). Specimens with rather broad and overlapping marginal lobes, branched as well as simple rhizinae, marginal isidia in addition to laminal isidia (the latter mainly on ridges in peripheral parts but may also cover large patches of the central part of the thallus), no or occasionally little pruina, upper surface ± foveolate and no lobules or rarely with lobules developed from isidia in the older part of the thallus are here referred to *P. serrana*. "The world distribution is poorly known and it is hitherto known from southern, central and western Europe and the Canary Islands. The Atlantic preference is less pronounced compared with *P. ernstiae*" (Thell & al. 2011).

Fig. 3. At 1750–1800 m the upper limit of the *Fagus* woodland with its sharp margin is clearly a result of the upper part of the woodland having been cut and the area subsequently subjected to grazing, resulting in montane grassland. On the granite outcrop in the foreground a community mainly of *Umbilicaria cylindrica* and *U. polyphylla* is present. Mt Vitsi (loc. 3).

Parmelina tiliacea (Hoffm.) Hale – On S side and top of gneiss boulders and outcrops. (1) *14780*, *14789*; (7) *14836*.

Pertusaria albescens (Huds.) M. Choisy & Werner – On NW side of gneiss rock. (7) *14838*. – Epilithic records of this mainly epiphytic species constitute only a minor portion of the many records cited by Abbott (2009).

Physcia dubia (Hoffm.) Lettau – On N side below overhanging part of large gneiss boulder. (1) *14782*. – This species is only known from one record for Makedonia and one for Thessalia (Christensen 2000; Christensen & Svane 2009).

Physcia tenella (Scop.) DC. – On top of granite boulder. (5) *14762*.

Pleopsidium flavum (Bellardi) Körb. – On NE side of gneiss boulder and below overhanging part of S-facing gneiss rock. (1) *14784a*; (7) *14835*. – Known from Kriti and from easternmost Makedonia (Kavala) (Abbott 2009). It is an Arctic to Alpine, subcontinental species (Wirth 1995).

**Polychidium muscicola* (Sw.) Gray – On moss on SW side of large gneiss boulder. (1) *14778*. – Previously known only from one find in Thessalia (Abbott 2009).

****Pseudephebe pubescens* (L.) M. Choisy – On E side of granite rock outcrop. (3) *14871a*. – This species has an Arctic-(montane)Alpine distribution (Wirth 1995). In the Balkans it has been published from Bulgaria (Mayrhofer & al. 2005) and Macedonia (Mayrhofer & al. 2013).

Pseudevernia furfuracea (L.) Zopf – On N side of granite boulder. (5) *14761*. – This mainly epiphytic species is widespread in Greece (Abbott 2009).

Ramalina capitata (Ach.) Nyl. – On top and W side of granite boulders. (2) *14768*; (5) *14751*. – Known from the Aegean island Naxos, Ipiros and E Makedonia (Abbott 2009; Christensen & Alstrup 2013).

****Ramalina strepsilis* (Ach.) Zahlbr. – On top of granite rock outcrops. (3) *14866*; (4) *14853*. – *Ramalina strepsilis* is sometimes included in *R. capitata* (Santesson 2011) or is treated as a variety of that taxon (Nimis & Poelt 1987). In order to bring attention to the morphological variation in the present material of the *R. capitata* complex, and as the taxonomy seems not to be finally settled, the taxa are here treated at the species level. Thus, *R. strepsilis* is distinguished from *R. capitata* by the labriform soralia along the margin of the lobes in addition to the capitiform soralia apically on the lobes (*R. capitata* in this sense only has the latter type of soralia). As this taxon is often treated as being conspecific with *R. capitata*, the geographical distribution is not clear. *Ramalina strepsilis* has, however, been reported several times from Macedonia (Mayrhofer & al. 2013).

Umbilicaria cylindrica (L.) Delise – On top of granite rock outcrop. (3) *14865*.

Umbilicaria deusta (L.) Baumg. – On N, E and W sides of granite boulders and outcrops. (2) *14770*; (3) *14869*, *14872*. – The one previous record for Makedonia is from the Vrondous Mts E of Thessaloniki (Christensen & Alstrup 2013).

***Umbilicaria polyphylla* (L.) Baumg. – On S side of granite rock outcrop. (3) *14868*. – Hitherto only known from the Aegean island Samothraki (Abbott 2009).

Xanthoparmelia conspersa (Ehrh. ex Ach.) Hale – On top of granite outcrop and on base of E side of granite boulder. (4)*14852*; (5)*14760*.

**Xanthoparmelia loxodes* (Nyl.) O. Blanco & al. (*Neofuscelia loxodes* (Nyl.) Essl.) – On top of large granite boulder. (1) *14791*, *14792*. – Known from the Aegean islands Aegina, Kriti, Lesvos and Kos and from Peloponnisos (Abbott 2009).

Xanthoparmelia pulla (Ach.) O. Blanco & al. (*Neofuscelia pulla* (Ach.) Essl.) – On granite outcrop at ground level in patches of granite gravel and on N and almost vertical W sides of granite boulders. (5) *14750*, *14753*, *14756*; (6) *14734*.

Xanthoparmelia stenophylla (Ach.) Ahti & D. Hawksw. – On top of large gneiss boulder. (1) *14790*.

Xanthoparmelia tinctina (Maheu & A. Gillet) Hale – Below overhanging part of NW side of granite outcrop and on weathered granite outcrop on SSE slope. (4) *14860*; (6) *14732*.

Epigeic species

Cetraria aculeata (Schreb.) Fr. – On the ground among gneiss boulders and granite outcrops and on the ground in patches of granite gravel. (1) *14793*; (4) *14859*, *14862*; (5) *14737*, *14742*.

****Cetraria ericetorum* Opiz – On the ground among granite outcrops and on the ground in patches of granite gravel. (4) *14856*; (5) *14744*. – In Europe it is distributed from the Arctic to the temperate zone, common in the Nordic countries and the Alps, scattered in E Europe and the Balkans, reaching Bulgaria (Kärnefelt 1979: Fig. 42, Mayrhofer & al. 2005). In the Balkans it is also reported from Slovenia (Mayrhofer 2006), Bosnia and Herzegovina (Bilovitz & Mayrhofer 2011), Montenegro (Kneževic & Mayrhofer 2009) and Macedonia (Mayrhofer & al. 2012, 2013).

Cetraria islandica (L.) Ach. subsp. *islandica* – On the ground among granite outcrops and on the ground in patches of granite gravel. (4) *14861*; (5) *14741*.

Cladonia cervicornis (Ach.) Flot. subsp. *cervicornis* – On shallow soil on granite outcrop and on the ground in patches of granite gravel. (5) *14745*, *14763*. – Only one previous record for Makedonia: Mt Cholomondas of Chalkidiki (Abbott 2009).

Cladonia foliacea (Huds.) Willd. – On the ground among granite outcrops and on the ground in patches of granite gravel. (4) *14855*; (5) *14747*; (6) *14733*.

Cladonia furcata (Huds.) Schrad. – On the ground among granite outcrops and on the ground in patches of granite gravel. (4) with *Cetraria aculeata 14862*; (5) *14743*.

Cladonia rangiformis Hoffm. – On the ground among granite outcrops. (4) *14858*.

Diploschistes scruposus (Schreb.) Norman var. *scruposus* – On the ground in patches of granite gravel. (5) *14748*. – Only two previous records for Makedonia, both from Halkidiki (Abbott 2009).

Leptogium pulvinatum (Hoffm.) Otálora var. *pulvinatum* – On litter. (6) *14731*. – For Makedonia this taxon is only reported from two localities on Mt Olymbos (Szatala 1959).

Peltigera rufescens (Weiss) Humb. – On the ground among outcrops of gneiss and granite and on the ground in patches of granite gravel. (1) *14794*; (4) *14857*; (5) *14738*.

Discussion

At Mt Verno, the principal sampling area, including localities 2–6, the vegetation zone of the deciduous oaks, the *Quercetalia pubescentis*, range from 700–1000 m. From 850–1700 m the dominant tree species is *Fagus sylvatica* of the *Fagetalia* zone (Fotiadis & al. 2005). In both zones the woodlands have been cleared over large expanses giving room for montane grasslands used for the grazing of livestock (Fig. 3). The lichens were sampled on granite and gneiss outcrops and boulders in these grasslands (loc. 2, 3, 4, 5, 7, Fig. 2). On Mt Varnous (loc. 1) and on Mt Verbista (loc. 7) the zonation is similar. At loc. 1 and 6 the lichens were collected on gneiss outcrops and boulders in

Juniperus communis thickets. The environment of the localities is open, exposed to wind and sun (the grasslands, Fig. 2), or semi-open (the *Juniperus* thickets). *Juniperus communis* thickets are indicative of former grazing areas – at least it is the case in N Europe outside fell-heaths and other natural vegetation types. Thus, with the exception of the outcrops and boulders, the biotopes are anthropogenic in origin (Fig. 3).

Christensen & Svane (2009) reported a number of species with northern affinities from mountains of N Greece. Later Christensen & Alstrup (2013) published species lists from different rock types from a number of sites in the mountains of N Greece. They found that crystalline rocks at high altitude harbour a number of species with boreal to Arctic and Alpine distribution. Allowing for the few study sites in the present study, this seems to confirm a connection between crystalline rocks, high altitude and a host of species with a northern distribution type. The outcrops and boulders of granite and gneiss included in the present study were found at altitudes between 750 m and 1800 m. The three *Umbilicaria* species (*U. cylindrica*, *U. deusta* and *U. polyphylla*) occurred only above 1750 m, while *Lasallia pustulata* was found as low as 750 m. *Cetraria ericetorum* and *C. islandica* were not found below 1250 m, while *C. aculeata* was found as low as 950 m (it occurs as low as sea level – Linda in Arcadia 2013). *Bryoria chalybeiformis* was found above 1250 m. *Cornicularia normoerica* occurred above 1400 m. *Pseudephebe pubescens* was found above 1750 m. *Ramalina capitata* was found above 1400 m and *R. strepsilis* above 1250 m. *Brodoa oroarctica* occurred above 1750 m. *Lecanora swartzii* occurred at 1200 m.

The distribution of the above-mentioned species along the altitude gradient represented by the seven (eight) localities of the present study seems to mirror the geographical distribution of the species: The species found in the highest levels are those with the most pronounced bias toward north in their distribution patterns.

Of the two localities above 1750 m the *Umbilicaria* species occurred on one (*U. cylindrica*, *U. polyphylla*) or both (*U. deusta*) suggesting that the three species probably are very common on acidic rocks at this altitude. *Lasallia pustulata* was found at all altitudes in four of the seven localities and seems, therefore, to be rather common. *Cornicularia normoerica* was found at all four localities above 1400 m. It must be very common on acidic rocks at this altitude. The three *Cetraria* species are very sensitive to the high grazing intensity of these montane grasslands. They were found as fragmented cushions or as detached lobes patchily in the grass swards. The species were, therefore, not an obvious element in the grassland and could easily have been overseen in some of the localities, as time did not allow for intensive searching. *Bryoria chalybeiformis* was found at two of the five localities above 1250 m (or three of the six, if loc. 8 is included). It is, therefore, likely to be rather common on acidic rocks at this altitude. The ornithocoprophilous character of *Ramalina capitata* and *R. strepsilis* makes it difficult to evaluate their occurrences. Together they occur at four of the seven localities. The presence of *Brodoa oroarctica* at the two very highest localities underlines its Arctic-Alpine affinity. It may be relatively rare. The same applies to *Pseudephebe pubescens*, which was found at one of these two localities (above 1750 m).

The findings of this small study, with emphasis on macrolichens from a small number of sites, may indicate that the northern element of the Greek lichen flora is much more abundant than suggested from previous publications. Macrolichens of acidic crystalline rocks of the high mountains are certainly under-collected in Greece. This applies even more to crustose lichens.

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