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Lichens from thickets of Buxus, Carpinus and Juniperus on Mt Vourinos, Makedhonia, North Central Greece

Abstract


76 taxa of mainly epiphytic and epigeous lichens are reported from Mt Vourinos in Makedhonia, Greece. 12 taxa are new to Greece, viz. Buellia erubescens, B. insignis, Caloplaca cerina var. mascorum, C. necator, Cladonia meroclorophae var. novochlorophaea, Lecanora leptyrodes, Parmelia subargentifera, Physcia dubia, Ramalina fraxinea var. calicariformis, Rinodina conradi, R. septentrionalis and Scoliciosporum umbrinum var. corticola. Seven additional taxa are new to the Greek mainland, viz. Aspicilia cheresina var. justii, Caloplaca conglomerata, Candelariella reflexa, Cladonia symphycarpa, Parmelia pulla var. pokornyi, P. tinctina and Pertusaria rhodiensis. Ecological aspects are briefly discussed.

Introduction

Greece, with its varied topography and geology as well as great variation in climatic conditions, has a large number of biotopes and vascular plants, including woody species. It therefore harbours also a rich lichen flora and a high number of different epiphytic and epilithic lichen communities; the epigeous lichen vegetation is, in contrast, less developed due to the heavy grazing pressure in most areas. The relatively high number of papers dealing with Greek lichens (Christensen 1989) still gives only a glimpse of this richness, and the only synoptic papers, viz. Steiner (1898) and Szatala (in Rechinger 1943), are outdated. The Fagus, Pinus and Abies forests in the Greek mountains host lichen species and lichen communities that are threatened, if not extinct, in large parts of Central Europe (Sérusiaux 1989). Protection of these habitats has thus also European significance, since they may serve as potential centres for a re-expansion of the lichen vegetation when conditions in Central Europe ameliorate. For many parts of the Mediterranean area, lichen checklists have been made or are in preparation (Nimis 1998). The lack of a comprehensive up-to-date overview of the Greek lichen flora is a considerable draw-back in floristic studies. The present paper is therefore intended as a further contribution towards a thorough checklist of the Greek lichen flora.
Material and methods

The lichen material studied was collected by the author in the years 1989 and 1991. The numbers given are the author’s collection numbers. The epiphytic vegetation of twigs often consists of numerous small specimens of various taxa growing closely intermingled. In consequence, it was not possible to prepare separate samples for each taxon. Some therefore have no separate collection number and are referred to with the bracketed collection number of the numbered specimen with which it is joined. The specimens are deposited in the Botanical Museum of Copenhagen (C), in the Berlin herbarium (B) and in the author’s private herbarium.

Taxa new to Greece are marked with a double asterisk (**), taxa new to the Greek mainland with a single asterisk (*). The nomenclature follows Nimis (1993). Whenever possible, geographical names are quoted in accordance with The Times Atlas of the World 1990.

Mt Vourinos

Mt Vourinos is situated in SW Makedhonia, N Central Greece, between the towns of Grevena and Kozani, WNW of Mt Olimbos. Mt Vourinos (with an elevation of 1866 m according to Babalonas 1989 and of 1621 m according to the Ethniki Statistikí Ypiresía tis Ellados’ Nomos map no. 26 of 1963 with corrections 1972 and 1983) is an almost crescent-shaped range running nearly 30 km NW to S. The maximum width of the range is in the northern part and almost 8 km. Serpentine is the bedrock in most of the range (Babalonas 1989), which is one of the larger serpentinite outcrops in Greece (Brooks 1987: fig. 14.12). In the southern part ultrabasic dunite and peridotite (Babalonas 1988) and above the village of Metamorphosis on the eastern slope (locality III of this paper) hard limestone occur.

Mt Vourinos is situated at the border between the mesomediterranean and submediterranean climate, which in Greece generally is above 1800 m (UNESCO-FAO 1963). The former is characterised by 40-75 physiologically dry days during the dry season, the latter has less than 40 such days (UNESCO-FAO 1963). The climate of Mt Vourinos is submediterranean-continental with only moderate summer drought, the precipitation of the town of Kozani in the lowland north of Mt Vourinos is 710 mm annually (Babalonas 1988).

A map of the area and a list of the vascular plant flora of Mt Vourinos was published by Babalonas (1989). The vegetation on the S and W slopes consists of scattered thickets of Juniperus oxycedrus L. and Buxus sempervirens L. in a dry grass-herb vegetation, while the N and E slopes are covered with dense, heavily browsed thickets of Carpinus orientalis Mill. These vegetation types belong to the supramediterranean zone characterized by deciduous oaks (Quezel & Barbero 1985). The vegetation of the southern part of Mt Vourinos between 600 and 1100 m consists of Buxus shrubs and scattered stands of Quercus frainetto (Babalonas 1988).

Juniperus oxycedrus belongs to the shrub layer of Quercus frainetto forests (Babalonas 1988) and the Juniperus thickets are considered as remnants of degraded Quercus forests. The human influence on the vegetation of the mountain has been severe and probably long-lasting. Judged by the scattered Quercus trees on the S and W slopes and the scattered old Abies on the N slope, Quercus forests or mixed forests with Quercus must have been the natural vegetation there, whereas the N slope was possibly covered with Abies or Abies-Fagus forests.

The whole mountain is heavily grazed by sheep and goats and the Carpinus growth appears as a brush wood both due to browsing and to the fact that the bushes are cut back to feed the animals with twigs out of their reach. Most of the Carpinus plants are between 0.5 and 3 m, the Juniperus and Buxus shrubs about 1.5 m high. While the Carpinus brush wood is very dense, the Juniperus and Buxus thickets have large open areas between the shrubs or between clumps of shrubs. These areas are either serpentinite outcrops or very dry soil with drought and grazing resistant vascular plants (cf. Babalonas 1989).

The sampling sites

The lichens were collected at three sites on the main part of Mt Vourinos N of the village of Chromio:
I: Nomos (province) and eparchia (municipality) Grevenon. W slope S of the main summit (Drisinkos). Grass heath with serpentine outcrops and scattered Buxus sempervirens, Quercus and Juniperus oxycedrus shrubs on S and E exposed slopes and on the summit area of a minor ridge. Alt. 1250-1325 m. Date 28.4.1989.


List of lichens
The following list is reasonably complete for the epiphytic and epigeous lichens, while the saxicolous lichens were paid only minor attention in the field.

41, 44 and 28 lichen taxa were recorded from locality I, II and III, respectively.

If not stated otherwise, the specimens of locality III were collected from bark of bitten twigs and dead branch ends of heavily browsed Carpinus bushes.

Anaptychia ciliaris (L.) Körb.
I: On the bark of branches of dead Juniperus, 5996, 6011, 6015 (with apothecia); on the bark of twigs and stems of dead Juniperus (6008). – No. 6011 has a smooth, brown upper cortex and only the lobes in the lowermost part of the tufted thallus are felted. This is perhaps a symptom of stress due to this very exposed situation on the summit area.
II: On a dead Buxus stem, 9060.
III: (9287, 9293).

*Aspicilia cheresina* var. *justii* (Servít) Clauz. & Roux
II: On SE facing vertical side of rock outcrop, 9041.

The variety *granulifera* (Steiner) Szatala has been recorded from Mt Olimbos (Szatala 1959) and the variety *justii* (Servít) Clauz. & Roux only from the Aegean (Sipman & Raus 1999). The variety *justii* is thus new to the Greek mainland. *A. cheresina*, which is usually found on calcareous substrata and parasitises *Aspicilia calcarea* in the juvenile stage, was here growing partly on *Aspicilia* sp. and *Acarospora* sp., partly directly on the serpentine rock.

Buellia alboatra (Hoffm.) Th. Fr.
II: On the bark of Buxus branches (9013, 9015).

**Buellia cf. erubescens** Arnold
II: On the bark of a Juniperus stem (9021). – The spores (18-23 × 7-12 µm) are a little too large and the hymenium (100-120 µm) too high in comparison with the measurements published by e.g. Schauer (1965), Poelt (1969), Clauzade & Roux (1985) and Purvis & al. (1992) for *B. erubescens*. The K+ red reaction of the verrucose-areolate thallus is, however, indicative of this taxon. Alternatively, the specimen may be a chemically aberrant form of *B. zahlbruckneri* Steiner; Nimis (1993), however, suggests that the two taxa might be conspecific.

**Buellia insignis** (Naeg.) Th. Fr.
I: On the bark of a twig of dead Juniperus (5990).

Buellia triphragmia (Nyl.) Arnold
II: On the bark of a Juniperus stem, 9043; on wood of dead Juniperus twig (9053).
**Buellia zahlbruckneri** Steiner
I: On the bark of a twig of dead *Juniperus* (5989).

**Caloplaca cerina** (Ehrh.) Th. Fr.
II: On the bark of a stem of dead *Juniperus* (9029).

**Caloplaca cerina** var. *muscorum* (Massal.) Jatta
I: On moss and litter on the ground (5988a).

**Caloplaca conglomerata** (Bagl.) Jatta

**Caloplaca ferruginea** (Huds.) Th. Fr.
I: On the bark of twigs of dead *Juniperus*, 5982, 6012.
II: On the bark of branches and dead twigs of *Buxus*, 9013, 9037; on the bark of a *Juniperus* stem (9021, 9043).
III: (9289, 9293, 9298).

**Caloplaca flavorubescens** (Huds.) Laundon
III: (9285, 9288, 9289, 9293, 9296, 9298).

**Caloplaca haematites** (Chaub.) Zwackh
II: On the bark of twigs and branches of *Buxus*, 9017, 9034.
III: (9289).

**Caloplaca necator** Clauz. & Roux
II: On *Aspicilia* sp. on SW slanting serpentine rock, 9039.

**Caloplaca pyracea** (Ach.) Th. Fr.
I: On the bark of a twig of dead *Juniperus* (5990).
II: On the bark of trunks of living and dead *Juniperus* bushes (9022), 9028.
III: (9287).

**Candelariella reflexa** (Nyl.) Lettau
II: On the bark of a dead *Buxus* twig (9064); on the bark of the lower side of a slanting *Juniperus* stem, 9055.

Previously recorded from Santorini (Sipman & Raus 1995).

**Candelariella vitellina** (Hoffm.) Müll. Arg.
I: On the bark of twigs of dead *Juniperus* (5982, 5989, 5990, 5991, 6012).
II: On the bark of branches and of dead twigs of *Buxus*, 9024, (9046); on wood and bark of living and dead *Juniperus* bushes (9022), 9030, (9029).
III: (9288, 9289, 9291, 9292, 9293, 9298).

**Candelariella xanthostigma** (Ach.) Lettau
II: On the bark of a *Buxus* branch (9033); on the bark of a stem of dead *Juniperus*, 9063.

**Cetraria aculeata** (Schreb.) Fr.
I: On soil, 5985.

A rare lichen in Greece: two previous collections are known from the Greek mainland (Kärnefelt 1986).
**Cladonia convoluta** (Lam.) Anders
II: On soil and litter, partly under *Buxus* shrub, 9014.
III: On soil and litter, 9301.
For the authorship of this name see Burgaz & Ahti (1992).

**Cladonia foliacea** (Huds.) Willd.
I: On moss and litter on the ground, 5983.

**Cladonia macilenta** Hoffm.
I: On soil under trunk of dead *Juniperus*, 6006 (K+ & P+ yellow).

**Cladonia merochlorophaea** var. *novochlorophaea* Sipman
I: On soil rich in organic matter, 5984. – Homosekikaic, sekikaic and fumarprotocetraric acids by tlc.

**Cladonia pocillum** (Ach.) O.-J. Rich.
III: On moss and litter on limestone outcrop, 9302, 9304 (both det. S. Stenroos).

**Cladonia pyxidata** (L.) Hoffm.
II: On soil, 9052.

**Cladonia rangiformis** Hoffm.
I: On soil and litter, 5986.
II: On soil and litter, partly under *Buxus* shrub, 9038.
III: On soil and litter, 9305.

**Cladonia symphycarpa** (Ach.) Fr.
II: On shallow soil on serpentine outcrop, 9047.
Though normally found on calcareous ground (Nimis 1993) it is here reported from serpentine soils. Previously recorded from Evvia (Krause & Klement 1962).

**Dermatocarpon miniatum** var. *complicatum* (Lightf.) Th. Fr.
II: On serpentine outcrop, 9045, 9061.

**Evernia prunastri** (L.) Ach.
III: 9310.

**Hypogymnia tubulosa** (Schaer.) Hav.
III: 9311.

**Lecanora carpinea** (L.) Vainio
II: On the bark of a *Buxus* branch, 9091a.

**Lecanora hagenii** (Ach.) Ach.
I: On the bark of twigs of dead *Juniperus*, 5989, 5990, 5991.

**Lecanora leptyrodes** (Nyl.) Degel.
II: On a *Juniperus* stem (9022).
III: 9289, 9290.
Distinguished from *L. carpinea* by the P+ yellow reaction only, the two taxa are likely to be conspecific (Ibáñez & Burgaz 1998); however, until the taxonomy is clarified, both should be maintained as separat species.
Lecanora meridionalis H. Magn.
Syn.: L. chlarotera subsp. meridionalis (H. Magn.) Clauz. & Roux
I: On wood and bark of twigs and branches of dead Juniperus, 5992, 5997 (det. O. Vitikainen), 5998, 6004.
II: On the bark of branches and of dead twigs of Buxus, 9015, 9031, 9064; on the wood of a dead Juniperus twig, 9053; on the bark of Juniperus stem (9043).

Lecanora mughicola Nyl.
I: On the wood of dead Juniperus (6000, conf. H. Vänskä)

Lecanora rugosella Zahlbr.
Syn.: L. chlarotera subsp. chlarotera f. rugosella (Zahlbr.) Poelt
II: On the bark of branches and twigs of Buxus, 9015, 9019, 9020, 9032; on bark of Juniperus stem (9021, 9022).
III: 9284, 9286.

Lecanora varia (Hoffm.) Ach.
I: On the wood of stems and branches of dead Juniperus, 5993, 6000 (conf. H. Vänskä), 6001, 6009.

Lecidella achrizotera (Nyl.) Hertel & Leuckert
I: On the bark of twigs of dead Juniperus (5991).
II: On the bark of dead twigs of Buxus (9064); on the bark of the stem of living and dead Juniperus bushes (9022, 9029).
III: 9292 (hymenium with inspersion in the basal one third only, thallus C-).

I have the same experience as Sipman & Raus (1999) that the inspersion of the hymenium in Lecidella achrizotera/elaeochroma is highly variable and probably of no taxonomic value. However, I find it better to retain the two taxa separated, awaiting a taxonomic revision of the group, as literature records are more easily united than split at a later stage.

Lecidella carpathica Körb. var. carpathica
I: On pebbles (5994).

Lecidella elaeochroma (Ach.) Choisy var. elaeochroma
I: On wood and bark of twigs of dead Juniperus (5982, 5992, 5997, 5998, 6007).
II: On the bark of dead branches of living and dead Buxus bushes (9035, 9042), 9050.
III: 9288.

Lecidella euphorea (Flörke) Hertel
I: On wood and bark of twigs of dead Juniperus (5997, 6012).
II: On the bark of branch of Buxus (9017); on the bark of a stem of Juniperus (9021); on the wood of a dead twig of Juniperus (9053).
III: (9284).

Lepraria lobificans Nyl.
II: On soil in rock crevice, 9054; tlc: atranorin, zeorin, stictic acid and constictic acid.

Lepraria sp.
III: Seen, not collected.

Megaspora verrucosa var. mutabilis (Ach.) Nimis & Roux
Syn.: Aspicilia mutabilis (Ach.) Körb.
I: On the bark of a branch of dead *Juniperus* (5998).
III: 9285, 9287.

The species seems to be known from deciduous trees only (Clauzade & Roux 1985, Nimis 1993).

**Ochrolechia alboflavescens** (Wulfen) Zahlbr.
I: On the wood of a twig of dead *Juniperus*, 6004a (sterile, det. I. Brodo; tlc: variolaric acid, protolichesterinic acid, and lichesterinic acid, det. I. Brodo).

**Ochrolechia szatalaensis** Vers.

**Parmelia acetabulum** (Neck.) Duby
I: On the bark of stems of dead *Juniperus*, 6008.
II: On the bark of stems and dead branches of *Buxus*, 9042, 9049, 9056.
III: 9283.

**Parmelia glabratula** (Lamy) Nyl. var. *glabratula*
III: 9300a.

**Parmelia pastillifera** (Harm.) Schub. & Klem.
I: On the bark of a branch of dead *Juniperus*, 5999.
II: On the bark of the trunk of *Juniperus* (9021).

*Parmelia pulla* var. *pokornyi* (Körb.) Türk & Poelt, ined. (fide Scholz 1995)
I: On soil, pebbles and rock, 5994.

The variety *pokornyi* is known from Kriti (Kleinig 1966).

**Parmelia somloensis** Gyeln.

Syn.: *P. taractica* auct. europ., non Krempelh.
I: On moss and litter on the ground; loosely attached to soil and *Cladonia foliacea* (5983). – Lobes more or less linear. Medulla K+ yellow, turning red. The substrate indicates *Parmelia sublaevis* Cout. (= *P. taractica* f. *hypoclista* (Nyl.) Clauz. & Roux according to Poelt & Vězda (1981) and Clauzade & Roux (1985), but this taxon seems to be more broad-lobed (Hale 1990) than the present specimen. The chemical reactions (Krog 1978 as *P. taractica* Krempelh.) as well as the morphology of the lobes (Hale 1990) indicate *Parmelia somloensis*.

**Parmelia subargentifera** Nyl.
III: 9300.

**Parmelia sulcata** Th. Tayl.
III: 9312.

**Parmelia tiliacea** (Hoffm.) Ach.
II: On the bark of stems of living and dead *Juniperus* bushes, 9026, 9044; on serpentine outcrop, 9059.

*Parmelia tinctina* Mah. & Gill.
II: On serpentine outcrop, 9062.
Peltigera rufescens (Weis) Humb.
I: On soil and litter, 6016 (with regeneration lobuli, conf. O. Vitikainen).
III: On mosses and litter, 9303.

Pertusaria albescens (Huds.) Choisy & Werner
I: On dead Juniperus, 5995.

*Pertusaria rhodiensis* Erichs.
I: On the wood of a branch of dead *Juniperus* (6010, thallus C-, K+ yellow).
Hitherto known only from the type locality on Rhodos and from a single gathering in S Italy (Nimis 1993).

Physcia adscendens (Fr.) H. Oliv.
II: On the bark of branches and stems of living and of dead *Juniperus* bushes, 9022, 9023, 9025.
III: 9299.

Physcia biziana (Massal.) Zahlbr.
II: On the bark of a *Buxus* branch, 9016.

**Physcia dubia** (Hoffm.) Lettau
II: On SE facing vertical rock outcrop, 9040 with apothecia.
Reported in the Mediterranean region from Italy (Nimis 1993) and Cyprus (Litterski & Mayrhofer 1998).

Physcia semipinnata (J. F. Gmel.) Moberg
I: On the bark of a twig of dead *Juniperus*, 6007 (det. R. Moberg). – Seemingly attacked by *Xanthoria parietina*, producing apothecia. The specimen is badly developed with only few cilia, possibly a stress-reaction caused by the harsh environment of the summit area (cf. the note under *Anaptychia ciliaris*).
III: 9291, 9293, 9294, 9295, 9298, 9306, 9307.

Physcia stellaris (L.) Nyl.
I: On the bark of a branch of dead *Juniperus*, 6002 (conf. R. Moberg).
II: On the bark of a branch of dead *Juniperus*, 9027.

Physcia tenella (Scop.) DC.
II: On the bark of twigs and branches of dead and living *Buxus* bushes, (9022), 9036, (9042, 9064); on bark of a *Juniperus* stem (9021).

Porpidia cinereoatra (Ach.) Hertel & Knoph
II: On serpentine rock outcrop, 9046.

Pseudevernia furfuracea var. ceratea (Ach.) D. Hawksw.
I: On the wood of twigs and branches of dead *Juniperus*, 5987, 6014.
II: On the bark of a dead *Buxus* branch, 9058; on the bark of a *Juniperus* twig, 9051.

Pseudevernia furfuracea (L.) Zopf var. furfuracea
I: On the bark of a branch of dead *Juniperus*, 6013.
II: On the bark of a branch of *Juniperus*, 9066; on the bark of a *Juniperus* stem (9043).

Psora decipiens (Hedw.) Hoffm.
I: On soil, 5988 (with apoth.).
**Ramalina farinacea** (L.) Ach.
III: 9308.

**Ramalina fraxinea** var. *calicariformis* (Nyl.) Hue
III: 9309.

The variety *calicariformis* is new to Greece.

**Rinodina conradi** Körb.
I: On moss and litter on the ground, 5988a.

**Rinodina septentrionalis** H. Magn. s. lat.
I: On the bark of a twig of dead *Juniperus* (6012) det. H. Mayrhofer.
III: (9298) det. H. Mayrhofer.

Known from the Italian Alps (Nimis 1993) and from Cyprus (Litterski & Mayrhofer 1998).

**Rinodina pyrina** (Ach.) Arnold
I: On the bark of twigs of dead *Juniperus* (5989, 5991).
II: On the bark of trunks of living and dead *Juniperus* bushes, 9021, (9022), 9023a. – No. 9021 and 9023a conf. H. Mayrhofer.

**Scoliciosporum umbrinum** var. *corticola* (Anzi) Clauz. & Roux
II: On the bark of a *Buxus* branch, 9033.

The variety *corticola* is new to Greece.

**Tephromela atra** (Huds.) Hafellner ex Kalb
I: On the wood of the trunk of dead *Juniperus* (6000).
II: On the bark of a *Buxus* branch (9032); on the wood of a dead *Juniperus* twig (9053).

**Toninia cinereovirens** (Schaer.) Massal.
II: On shallow soil on serpentine rock outcrop, 9048.

Only two previous records are known from Greece, one from Attika (Szatala 1940) and one from Kriti (Timdal 1991).

**Xanthoria parietina** (L.) Th. Fr.
I: On the bark of branches and twigs of *Juniperus* (5998).
II: On the bark of branches and dead twigs of *Buxus*, 9018, 9035, (9064); on the bark of a stem of dead *Juniperus*, 9029.
III: 9296, 9297.

**Discussion**

Of the 76 lichens reported in this study 12 taxa or 16 % have apparently not been recorded from Greece before. Such a high figure and similar figures from other recently published works, e.g. Sipman & Raus (1999), substantiate that the Greek lichen flora is still incompletely known and that many more unrecorded taxa are likely to be found.

A number of epigeous and epilithic lichens normally confined to more or less calcareous substrata were found here on serpentine or serpentine derived soils, viz. *Aspicilia cheresina* var. *justii*, *Cladonia convoluta*, *C. symphycarpa*, *Dermatocarpon miniatum* var. *complicatum*, *Peltigera rufescens*, *Physcia dubia* and *Psora decipiens*. To a lesser extent this applies to *Cladonia rangiformis*, which shifts from calcareous to siliceous substrate in the southern part of its range, and to *Lecidella carpatica* var. *carpathica*, which makes this change in the northern part of its
range (data from Nimis 1993). Though the lichen flora of serpentine and limestone is normally
different (James & al. 1977), calciphilous lichens growing on the moderately basic serpentine or
soils derive from it have been observed elsewhere, e.g. in Cornwall (Gilbert & James 1987).

The soil-inhabiting lichens (17 taxa, 12 in locality I, 7 in locality II and 3 in locality III) in-
clude all Cetraria and Cladonia species as well as Caloplaca cerina var. muscorum, Lepraria
lobificans, Parmelia pulla var. p.orkornyi, P. somloensis, Peltigera rufescens, Psora decipiens,
Rinodina conradi and Toninia cinereovirens. Their low number in the Carpinus orientalis
thicket (locality III) is probably a result of the almost total absence of soil on this limestone
slope. In this thicket, the lichens were found in places where litter accumulates, i.e. in crevices
and depressions of difficult access for browsing animals. On the two serpentine sites soils are
better developed on the rocky slopes. The epigeous lichens generally find shelter below the
branches close to the ground of the Juniperus oxycedrus and Buxus sempervirens shrubs, they
were never found in the open. This is likely a result of the browsing herds of sheep and goats.

The fact that the highest number of epigeous lichens was found in locality I, may be due to the
lower grazing pressure in this place at a higher altitude and further distance from the villages as
well as to the more rugged terrain. An altitude-dependant increase in precipitation and fog fre-
quency (the latter experienced during field work on 28 June) may also be important.

The epiphytic flora of all three localities has a relatively high number of taxa belonging to
the families Candelariaceae (represented by the genus Candelariella), Physciaceae
(Anaptychia, Buellia, Physcia and Rinodina) and Teloschistaceae (Caloplaca and Xanthoria).
The recorded members of these families as well as others, e.g. Lecanora rugosella and Lecidella
elaeochroma, belong to the Xanthorion parietinae alliance and are indicative of nutrient-en-
riched substrates, in the sampling sites caused by flocks of sheep and goats and the dry summer
climate, which support dust formation. However, a number of species of the genera Buellia and
Rinodina, as well as e.g. Lecanora mughicola, L. varia and Ochrolechia alboflavescens, are
characteristic of more nutrient-poor conditions, growing on lignum or acid bark. In the sampling
sites they were generally found on exposed wood of Juniperus stems. The smooth surface of the
wood is likely to accumulate less dust and nutrients than the bark. Thus two ecologically differ-
ent assemblies of lichens, at least in regard to nutrient requirements, are harboured within the
relatively limited space of single Juniperus bushes. This may explain the higher number of taxa on
Juniperus (38) than on Buxus (20) or Carpinus (25) where exposed wood was missing.

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