

***Lobaria amplissima* and other rare lichens and bryophytes on lava rock outcrops in the Eifel (Rheinland-Pfalz, Germany)**

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Abstract: APTROOT, A. & ZIELMAN, R. 2004. *Lobaria amplissima* and other rare lichens and bryophytes on lava rock outcrops in the Eifel (Rheinland-Pfalz, Germany). – *Herzogia* 17: 87–93.

On lapilli lava outcrops on the Wöllersberg near Lissingen in the Eifel, 127 lichen species were found, including the rare, usually epiphytic *Lobaria amplissima*, *Anaptychia ciliaris*, *Gyalecta ulmi* and *Melanelia subargentifera*. Also several usually epiphytic bryophytes, like *Frullania dilatata*, *Leucodon sciuroides* and *Pterogonium gracile*, were found on this type of rock, which is soft and moist.

Zusammenfassung: APTROOT, A. & ZIELMAN, R. 2004: *Lobaria amplissima* und andere seltene Flechten und Bryophyten auf Lavafelsen in der Eifel (Rheinland-Pfalz, Deutschland). – *Herzogia* 17: 87–93.

127 Flechten wurden an Lavafelsen auf dem Wöllersberg bei Lissingen in der Eifel nachgewiesen, darunter die seltenen, meist epiphytisch wachsenden Arten *Lobaria amplissima*, *Anaptychia ciliaris*, *Gyalecta ulmi* und *Melanelia subargentifera*. Einige meist epiphytisch vorkommende Bryophyten, wie *Frullania dilatata*, *Leucodon sciuroides* und *Pterogonium gracile*, wurden auch auf den weichen und feuchten Felsen gefunden.

Key words: Lobarion, lapilli, biodiversity, conservation.

Introduction

Lobaria amplissima is one of the most threatened lichen species all over central Europe, and is cited in most Red Lists as either extinct or critically endangered (e.g. TÜRK & HAFELLNER 1999, WIRTH et al. 1996). Before 1900, it was rather widespread in Germany, and was known from over half of the Federal States. In the 20th century, it has only been found in the southernmost regions of Baden-Württemberg and Bavaria, and since 1975 it has disappeared from many localities, including the last known one in Bavaria.

The reasons for the decline of this and other Lobarion species have been thoroughly investigated, as this is the most threatened lichen element throughout. Air pollution by sulphur dioxide has unquestionably had a harmful effect, but changes in forest management are often also provided as explanation. Recent research has shifted towards population studies, as individuals of the *Lobaria* species, and especially *L. amplissima*, are thought to be long-lived (in the order of a century and more), as can be deduced from the often large thalli and the minimal yearly radial growth. In general, habitat continuity seems to be a prerogative for the survival of Lobarion species.

The lichen flora of the Eifel is relatively well known through the inventory work of MÜLLER (1965), JOHN (1990), SCHLECHTER (1994) and DÜLL (2002). The Wöllersberg near Lissingen, West of Gerolstein is a lapilli rock outcrop consisting of volcanic material overlaying the older Buntsandstein, and is not protected as a nature conservancy. The northern slope contains much (acidic) basalt, whereas the south facing slope, overseeing the Kyll valley, consists of eruptives, consisting of shallow soils with lapilli and slightly harder cemented material for-

ming steep cliffs. Here the pH is probably rather alkaline, a factor that together with the high water content, makes this an ideal site for a rich lichen and bryophyte flora. The major vegetation, apart from that found on the rocks, is grassland.

Material and methods

The location was visited by the authors on October 12th, 2003. The list was compiled from field notes and, for the most part, small collected specimens kept in the respective herbaria of the authors. All collected specimens have either been studied by microscope and/or with chemistry, consisting of spot reactions and/or thin-layer chromatography for sorediate crustose species. Nomenclature of the lichens largely follows SCHOLZ (2000) and that of the bryophytes FRAHM & FREY (1987).

Results

A few dozen lichen species have been reported from this locality before by SCHLECHTER (1994), SIPMAN (1982) and WIRTH & HEIBEL (1998). All of the saxicolous and terricolous species reported, e.g. *Lecanora gangaleoides*, *L. pannonica*, *Moelleropsis nebulosa*, *Peltigera lepidophora*, *P. leucophlebia* and *P. malacea*, could still be found, except for a few dubious records. In total, 127 identifiable lichen species and two lichenicolous fungi (tab. 1) were found on a small surface of less than 1 ha; only about 30 % of the actual exposed rock faces (the ones closest to the village, just left of the middle and to the right on fig. 1) have been investigated so far. Still, the list includes several species which were thought to be extinct in Rheinland-Pfalz (following WIRTH et al. 1996), or were never reported from the area previously. Surprisingly, our visit revealed the presence of many *Lobarion* species on bare rock. The most unexpected finding is of course *Lobaria amplissima*, but other epiphytic species like *Anaptychia ciliaris*, *Gyalecta ulmi*, *Melanelia subargentifera* (all saxicolous records), *Ochrolechia tartarea* and *Polychidium muscicola* deserve attention as well.



Fig. 1: The Wöllersberg area seen from the south. Photo: A. Aptroot.

Tab. 1: Species list from 5705/4 Lissingen, Wöllersberg, surroundings of lava cliffs. e – epiphyte, t – terrestrial, b – basalt, s – sandstone, ! – sporophyte (incl. gamet.), h – herbarium of authors. RL – Red List status acc. to WIRTH et al. 1996, (RL) – Red Listed, but reported since; RP- – not reported from Rheinland-Pfalz by John 1990; (RP-) – reported from Rheinland-Pfalz since.

lichens

| | | | | | |
|-------------------------------|------|-----|---------------------------------|------|-----|
| <i>Amandinea punctata</i> | | e | <i>Parmeliopsis ambigua</i> | | e |
| <i>Arthonia radiata</i> | | h | <i>Pertusaria albescens</i> | | e |
| <i>Candelariella reflexa</i> | | e | <i>Pertusaria amara</i> | | e |
| <i>Chaenotheca ferruginea</i> | | e | <i>Pertusaria coccodes</i> | RL 3 | e |
| <i>Cladonia fimbriata</i> | | e | <i>Pertusaria pertusa</i> | | e |
| <i>Cladonia grayi</i> | | e | <i>Phaeophyscia orbicularis</i> | | e |
| <i>Dimerella pineti</i> | RL 3 | e | <i>Phlyctis argena</i> | | e |
| <i>Evernia prunastri</i> | | e | <i>Physcia adscendens</i> | | e |
| <i>Flavoparmelia caperata</i> | RL 3 | e | <i>Physcia tenella</i> | | e |
| <i>Hypogymnia physodes</i> | | e | <i>Physconia perisidiosa</i> | | h e |
| <i>Hypogymnia tubulosa</i> | | e | <i>Placynthiella icmalea</i> | | e |
| <i>Lecania naegelii</i> | | h e | <i>Platismatia glauca</i> | | e |
| <i>Lecanora argentata</i> | | h e | <i>Porina aenea</i> | | e |
| <i>Lecanora carpinea</i> | | e | <i>Pseudevernia furfuracea</i> | | e |
| <i>Lecanora chlarotera</i> | | h e | <i>Punctelia borrieri</i> | RP - | h e |
| <i>Lecanora conizaeoides</i> | | e | <i>Punctelia subrudecta</i> | | e |
| <i>Lecanora expallens</i> | | e | <i>Punctelia ulophylla</i> | RP - | e |
| <i>Lecanora hagenii</i> | | h e | <i>Ramalina farinacea</i> | | h e |
| <i>Lecanora pulicaris</i> | | e | <i>Ramalina pollinaria</i> | | h e |
| <i>Lecanora saligna</i> | | e | <i>Ropalospora viridis</i> | | e |
| <i>Lecanora symmicta</i> | | e | <i>Trapeliopsis flexuosa</i> | | e |
| <i>Lecidella elaeochroma</i> | | e | <i>Trapeliopsis granulosa</i> | | e |
| <i>Lepraria incana</i> | | h e | <i>Usnea filipendula</i> | RL 3 | h e |
| <i>Lepraria lobificans</i> | | h e | <i>Usnea florida</i> | RL 2 | h e |
| <i>Melanelia exasperatula</i> | | e | <i>Usnea glabrata</i> | RP - | h e |
| <i>Melanelia subaurifera</i> | RL 3 | e | <i>Usnea subfloridana</i> | RL 2 | h e |
| <i>Mycoblastus fucatus</i> | | e | <i>Xanthoria candelaria</i> | | e |
| <i>Opegrapha rufescens</i> | | h e | <i>Xanthoria parietina</i> | | e |
| <i>Parmelia saxatilis</i> | | h e | <i>Xanthoria polycarpa</i> | | e |
| <i>Parmelia sulcata</i> | | h e | | | |

liverworts

| | | | | | | | |
|---------------------------------|--|---|------|--------------------------------|--|---|-------|
| <i>Cephaloziella divaricata</i> | | h | t | <i>Metzgeria furcata</i> | | h | e, b! |
| <i>Frullania dilatata</i> | | h | e | <i>Plagiochila porelloides</i> | | h | b |
| <i>Frullania tamarisci</i> | | h | e, b | <i>Porella platyphylla</i> | | h | b |
| <i>Lophocolea bidentata</i> | | h | b | <i>Radula complanata</i> | | h | e |
| <i>Lophozia excisa</i> | | h | b | <i>Riccia sorocarpa</i> | | h | t |

mosses

| | | | | | | | |
|--------------------------------|--|---|-------|-------------------------------|--|---|----|
| <i>Amphidium mougeotii</i> | | h | b | <i>Dicranoweisia cirrata</i> | | h | e! |
| <i>Atrichum undulatum</i> | | h | b, s | <i>Dicranum scoparium</i> | | h | b |
| <i>Bartramia pomiformis</i> | | h | t! | <i>Didymodon vinealis</i> | | h | t |
| <i>Brachythecium albicans</i> | | h | t | <i>Eurhynchium praelongum</i> | | h | e |
| <i>Brachythecium rutabulum</i> | | h | b! | <i>Homalothecium sericeum</i> | | h | b |
| <i>Brachythecium velutinum</i> | | h | b | <i>Hylocomium splendens</i> | | | t |
| <i>Bryum capillare</i> | | h | e!, s | <i>Hypnum cupressiforme</i> | | h | t |
| <i>Ceratodon purpureus</i> | | h | t | <i>Leptobryum pyriforme</i> | | h | b! |
| <i>Dicranella heteromalla</i> | | h | s | <i>Mnium stellare</i> | | h | b |

| | | | |
|-------------------------------------|------|-------------------------------------|----------|
| <i>Orthotrichum affine</i> | h e! | <i>Rhytidiadelphus squarrosus</i> | t |
| <i>Orthotrichum lyellii</i> | h e | <i>Rhytidiadelphus triquetrus</i> | t |
| <i>Plagiomnium affine</i> | h t | <i>Schistidium apocarpum</i> s.str. | h b! |
| <i>Pleurozium schreberi</i> | h t | <i>Thuidium abietinum</i> | h t |
| <i>Polytrichum piliferum</i> | h s | <i>Tortula calcicolens</i> | h t, e |
| <i>Pseudoscleropodium purum</i> | h t | <i>Tortula subulata</i> | h b!, s! |
| <i>Racomitrium canescens</i> s.str. | h t | <i>Ulota bruchii</i> | h e! |
| <i>Rhytidium rugosum</i> | t | <i>Ulota crispa</i> | h e! |

Just to give a more complete overview, some sampling was done from nearby young trees (mostly *Salix* sp.) and shrubs and from a former millstone quarry at the eastern end of the cliffs (tab. 2). These locations yielded 59 lichen species, 47 of which were not otherwise collected in the area, including *Usnea glabrata*, which is very rare in Germany. This leads to a total of 174 lichen species listed for 1 ha of the Wöllersberg.

Discussion

The question arises whether the high occurrence of *Lobarion* species in this area can be expected to be a new settlement, or rather to be relictual. In the absence of evidence this can only be subject of speculation, but the only *Lobaria* specimen found was c. 10 cm in diameter and quite healthy, with well developed cephalodia (fig. 2). This combination of characters sug-

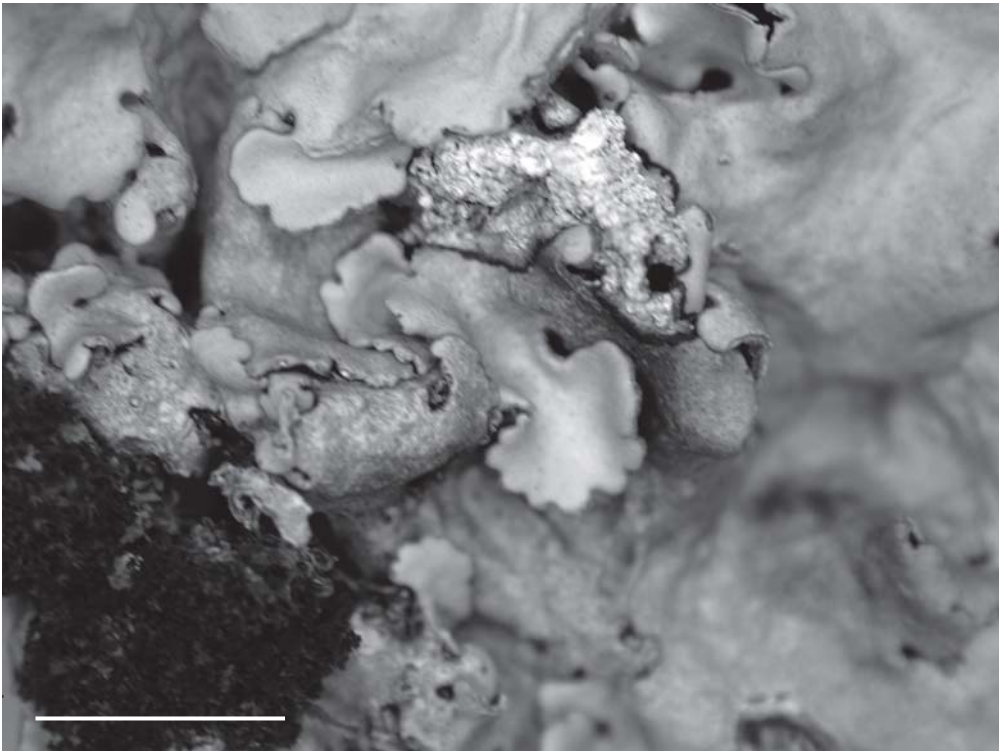


Fig. 2: *Lobaria amplissima* on the Wöllersberg. Note cephalodia in the left corner below. Photo: A. Aptroot. Scale bar = 5 mm.

Tab. 2: Species list from 5705/4 Lissingen, Wöllersberg, on lava. ! – sporophyte (incl. gamet.), h – herbarium of authors, RL – Red List status acc. to WIRTH et al.1996, (RL) – Red Listed, but reported since; RP- – not reported from Rheinland-Pfalz by John 1990; (RP-) – reported from Rheinland-Pfalz since; * lichenicolous.

lichens

| | | | | | |
|---------------------------------|------|---|----------------------------------|--------|---|
| <i>Acarospora fuscata</i> | | h | <i>Lecanora gangaleoides</i> | | h |
| <i>Agonimia tristicula</i> | | h | <i>Lecanora horiza</i> | RP - | h |
| <i>Anaptychia ciliaris</i> | RL 1 | h | <i>Lecanora muralis</i> | h | |
| <i>Aspicilia calcarea</i> | | h | <i>Lecanora orosthea</i> | | h |
| <i>Aspicilia contorta</i> | | | <i>Lecanora pannonica</i> | (RP -) | h |
| <i>Buellia aethalea</i> | | h | <i>Lecanora polytropa</i> | | h |
| <i>Caloplaca cirrochroa</i> | RL 4 | h | <i>Lecanora rupicola</i> | | h |
| <i>Caloplaca citrina</i> | | h | <i>Lecanora sulphurea</i> | | h |
| <i>Caloplaca dolomiticola</i> | | h | <i>Lecidea fuscoatra</i> | | |
| <i>Caloplaca flavescens</i> | | | <i>Lecidella carpathica</i> | | h |
| <i>Caloplaca flavocitrina</i> | RP - | h | <i>Lecidella stigmatea</i> | | |
| <i>Caloplaca lactea</i> | RL 3 | h | <i>Lepraria caesioalba</i> | RP - | h |
| <i>Caloplaca saxicola</i> | | h | <i>Lepraria incana</i> | | h |
| <i>Candelariella aurella</i> | | | <i>Lepraria lesdainii</i> | RP - | h |
| <i>Candelariella vitellina</i> | | h | <i>Lepraria lobificans</i> | | h |
| <i>Catillaria chalybeia</i> | | h | <i>Lepraria vouauxii</i> | | h |
| <i>Cetraria aculeata</i> | | h | <i>Leprocaulon microscopicum</i> | RL 3 | h |
| <i>Cladonia arbuscula</i> | | h | <i>Leproplaca chrysodeta</i> | | h |
| <i>Cladonia cariosa</i> | RL 3 | h | <i>Leptogium teretiusculum</i> | RP - | h |
| <i>Cladonia ciliata</i> | | h | <i>Leptogium turgidum</i> | RP - | h |
| <i>Cladonia furcata</i> | | | * <i>Lichenonium pyxidatae</i> | h | |
| <i>Cladonia grayi</i> | | h | <i>Lobaria amplissima</i> | RL 0 | h |
| <i>Cladonia humilis</i> | RL 4 | | <i>Lobothallia radiosa</i> | | h |
| <i>Cladonia macilentata</i> | | h | <i>Melanelia fuliginosa</i> | | |
| <i>Cladonia pocillum</i> | | h | <i>Melanelia subargentifera</i> | RL 2 | h |
| <i>Cladonia pyxidata</i> | | h | <i>Micarea lignaria</i> | | h |
| <i>Cladonia ramulosa</i> | | | <i>Moelleropsis nebulosa</i> | (RL 0) | h |
| <i>Cladonia rangiformis</i> | | h | * <i>Muellerella lichenicola</i> | | h |
| <i>Cladonia squamosa</i> | | | <i>Myxobilimbia sabuletorum</i> | | h |
| <i>Cladonia subulata</i> | | | <i>Neofuscelia loxodes</i> | | h |
| <i>Cladonia symphycarpa</i> | | h | <i>Ochrolechia androgyna</i> | RL 3 | h |
| <i>Collema crispum</i> | RL 3 | h | <i>Ochrolechia parella</i> | | h |
| <i>Collema fuscovirens</i> | RL 3 | h | <i>Ochrolechia tartarea</i> | RL 0 | h |
| <i>Collema tenax</i> | | h | <i>Parmelia saxatilis</i> | | |
| <i>Diploicia canescens</i> | RL 2 | h | <i>Parmelia sulcata</i> | | |
| <i>Diploschistes muscorum</i> | RL 3 | h | <i>Parmelina tiliacea</i> | RL 3 | h |
| <i>Diploschistes scruposus</i> | | h | <i>Peltigera canina</i> | RL 2 | h |
| <i>Diplotomma albostratum</i> | | h | <i>Peltigera didactyla</i> | | h |
| <i>Endocarpon pusillum</i> | RL 2 | h | <i>Peltigera hymenina</i> | | h |
| <i>Fuscopannaria leucophaea</i> | RL 0 | h | <i>Peltigera lepidophora</i> | RL 4 | h |
| <i>Gyalecta ulmi</i> | RL 0 | h | <i>Peltigera leucophlebia</i> | RL 1 | h |
| <i>Haematomma ochroleucum</i> | | | <i>Peltigera malacea</i> | RL 2 | h |
| <i>Lecania erysibe</i> | | | <i>Peltigera membranacea</i> | RL 2 | |
| <i>Lecania rabenhorstii</i> | RP - | h | <i>Peltigera neckeri</i> | RL 3 | |
| <i>Lecanora albescens</i> | | h | <i>Peltigera praetextata</i> | | |
| <i>Lecanora campestris</i> | | | <i>Peltigera rufescens</i> | | h |
| <i>Lecanora crenulata</i> | | | <i>Phaeophyscia nigricans</i> | | |
| <i>Lecanora dispersa</i> | | h | <i>Phaeophyscia orbicularis</i> | | |

| | | | | |
|---------------------------------|------|----|-------------------------------------|--------|
| <i>Physcia adscendens</i> | | | <i>Rhizocarpon reductum</i> | h |
| <i>Physcia caesia</i> | | h | <i>Rinodina conradii</i> | RL 1 h |
| <i>Physcia dimidiata</i> | | h | <i>Rinodina gennarii</i> | h |
| <i>Physcia dubia</i> | | | <i>Scoliciosporum umbrinum</i> | h |
| <i>Physcia tenella</i> | | | <i>Staurothele rugulosa</i> | RL 4 h |
| <i>Physconia grisea</i> | RL 3 | h | <i>Toninia aromatica</i> | RL 3 h |
| <i>Physconia perisidiosa</i> | RL 3 | h | <i>Toninia sedifolia</i> | RL 3 h |
| <i>Placynthium nigrum</i> | | h | <i>Trapelia coarctata</i> | |
| <i>Pleurosticta acetabulum</i> | RL 3 | h | <i>Trapelia placodioides</i> | h |
| <i>Polychidium muscicola</i> | RL 1 | h | <i>Verrucaria glaucina</i> | h |
| <i>Porpidia crustulata</i> | | | <i>Verrucaria macrostoma</i> | h |
| <i>Porpidia soledizodes</i> | | h | <i>Verrucaria muralis</i> | h |
| <i>Porpidia tuberculosa</i> | | h | <i>Verrucaria nigrescens</i> | |
| <i>Protoblastenia rupestris</i> | | h | <i>Verrucaria pingicula</i> | RP - h |
| <i>Psilolechia lucida</i> | | h | <i>Xanthoria candelaria</i> | |
| <i>Psorotichia schaereri</i> | RL 4 | h | <i>Xanthoria parietina</i> | |
| <i>Ramalina pollinaria</i> | | h | | |
| liverworts | | | | |
| <i>Cephaloziella divaricata</i> | | h | <i>Metzgeria furcata</i> | h |
| <i>Frullania dilatata</i> | | h | <i>Porella platyphylla</i> | h |
| mosses | | | | |
| <i>Barbula revoluta</i> | | h | <i>Homalothecium lutescens</i> | h |
| <i>Bryum argenteum</i> | | h | <i>Homalothecium sericeum</i> | h |
| <i>Bryum bicolor</i> | | h | <i>Hypnum cupressiforme</i> | h |
| <i>Ceratodon purpureus</i> | | h | <i>Leucodon sciuroides</i> | h |
| <i>Didymodon vinealis</i> | | h | <i>Neckera complanata</i> | h |
| <i>Encalypta vulgaris</i> | | h! | <i>Pterogonium gracile</i> | h |
| <i>Grimmia muehlenbeckii</i> | | h | <i>Racomitrium canescens</i> s.str. | h |
| <i>Grimmia pulvinata</i> | | h! | <i>Schistidium apocarpum</i> | h |
| <i>Grimmia trichophylla</i> | | h | <i>Schistidium strictum</i> | h |

gests recent establishment. However, the species was growing on an outcrop full of *Parmelina tiliacea*, which is rather reminiscent of *Lobaria amplissima* in colour and lobe configuration, and this may cause *Lobaria* specimens to be overlooked. Also the fact that so many other species were reported for the first time from this locality suggests that previous inventories were not exhaustive. The lava cliffs are covered with extensive mats of the moss *Pterogonium gracile* and of the liverwort *Porella platyphylla*.

Some potential threats to this extraordinary lichen and moss flora have to be mentioned. Although the effects seen here are not as severe as those encountered on other formerly grazed terrains in the Eifel, the abolition of grazing has resulted in the growth of shrubs and young trees (none appearing to be older than 70 years) and of a dense grass sward diminishing the amount of exposed rock and thus threatening one of the niche features needed for growth of *Lobaria*. Also the degree of threat to the terrain posed by the large lava quarry that is being extended down the northwestern part of the Wöllersberg is uncertain.

Interestingly, a few of the epiphytes previously recorded from the area, viz. *Bryoria fuscescens*, *Physconia distorta* and *Tuckermannopsis chlorophylla*, were not found, most probably due to exposure to dilute long-range ammonia pollution, these species being especially sensitive to

ammonia (VAN HERK et al. 2003). From the same grid square (5705/4) dozens of additional species are known, mainly from nearby calcareous rock outcrops like the Auberg, including *Cetraria islandica*, *Clauzadea metzleri*, *C. monticola*, *Gyalecta jenensis*, *Involucropyrenium waltheri*, *Lecania inundata*, *Solenopsora candicans* and *Solorina saccata*. This is thus one of the grid squares in Germany with the highest lichen diversity.

The presence of so many Lobarion species on rock might to some degree shift the focus of those concerned with conservation and extinction of this highly endangered element (e.g. SCHEIDEGGER et al. 2000) from forest management to habitat continuity in general. It is significant that the only lowland area in central Europe with a well-developed Lobarion is a series of rock outcrops and not an ancient forest remnant.

Acknowledgements

Elisabeth Schlechter is warmly thanked for sending her thesis. Norbert Stapper is thanked for various manuscript improvements. Thanks are also due to Huub van Melick and Henk Greven for checking some bryophyte identifications. Richard Summerbell kindly provided linguistic corrections.

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Manuscript accepted: 10 March 2004.

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