

Oceanic and hygrophytic lichens from the Gargano-Peninsula (Puglia / South-Eastern-Italy)

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Abstract: THÜS, H. & LICHT, W. 2006. Oceanic and hygrophytic lichens from the Gargano-Peninsula (Puglia / South-Eastern-Italy). – *Herzogia* 19: 149–153.

A list of 12 oceanic and hygrophytic lichens and lichenicolous fungi new to the Gargano-Peninsula (Puglia / SE-Italy) is presented, of which *Pertusaria waghornei* and *Usnea silesiaca* are reported for the first time from mainland Italy. Remarks on the altitudinal stratification of the lichen flora and their dependence on certain tree species are given and the roles of forest continuity versus climatic conditions for the distribution patterns of oceanic and hygrophytic lichens of the Gargano are discussed.

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Es werden 12 Neunachweise ozeanischer und hygrophytischer Flechten und lichenicoler Pilze für die Gargano-Halbinsel (Apulien / SE-Italien) vorgestellt. *Pertusaria waghornei* und *Usnea silesiaca* werden als Neufunde für das italienische Festland festgestellt. Hinweise zur Höhenverbreitung der Flechtenflora und ihrer Abhängigkeit von einzelnen Baumarten werden gegeben und die Rollen der Kontinuität des Waldbestandes sowie der klimatischen Bedingungen für die Verbreitungsmuster der ozeanischen und hygrophytischen Flechten des Gargano diskutiert.

Key words: Old growth forest, ecological continuity, biodiversity, lichen distribution.

Introduction

Owing to its generally dry climate, the district of Puglia is a rather species-poor region in south-eastern Italy which, with the exception of the Gargano-Peninsula, has been rarely visited by lichenologists (NIMIS 1992, NIMIS & TRETJACH 1999). Since the "Golden Age" of Italian lichenology in the late 19th century many lichenologists have visited the Gargano-Peninsula because of its famous beech stands which are unique for SE-Italy and harbour an extraordinary rich epiphytic flora. However, the knowledge of its lichen flora is still far from complete. The present work adds to our knowledge of the lichen flora of the Gargano-Peninsula, especially hygrophytic and oceanic species, and discusses the need of their conservation.

Materials and Methods

Whereas most parts of Puglia are dry and mostly without woodland, the Gargano-Peninsula is a mountainous region with large areas of woodlands in upland areas. The central part of the peninsula, the "Foresta Umbra", comprises a coherent woodland ranging from c. 200 m to more than 900 m above sea level, with *Quercus cerris* forests in the lowest parts and mixed *Quercus* and *Fagus* stands at higher altitudes. In these forests, *Acer opalus* s.l. and *Fraxinus ornus* are

widely distributed, but usually occur only as scattered individuals. The Foresta Umbra is a historical woodland with a continuity of several centuries, which was protected by its use as a royal reserve (LAURIOLA & PALMIERI 1994). The annual rainfall is more than 1000 mm at higher altitudes, with a maximum during the winter, and at least 30 mm per month in summer (FENAROLI 1966a). The general climate is sub-Mediterranean, but may be strongly modified inside forested areas, where humidity is much higher and temperature amplitudes are reduced, thus increasing mesoclimatic oceanicity. The bedrock is calcareous. During two visits to the area in 1995 and 1997, collections were made, mainly in the central parts of the Foresta Umbra in an area of c. 20 km². Specimens of all cited species (except *Bryoria fuscescens* and *Pseudevernia furfuracea*) are deposited in the Herbarium Senckenbergianum in Frankfurt/M. (FR). Determination of samples of *Pertusaria* and *Usnea* were confirmed by detection of chemical compounds using HPTLC (ARUP et al. 1993). The nomenclature follows NIMIS (2003) and WIRTH (1995).

Collection sites:

1 Valle del Tesoro,	320 m a.s.l.,	16°2'46"E/41°51'53"N.
2 Valle del Tesoro,	390 m a.s.l.,	16°3'0"E/41°50'57"N.
3 Valle del Tesoro, parking area,	560 m a.s.l.,	16°1'49"E/41°49'21"N.
4 Road Vico – Foresta Umbra,	620 m a.s.l.,	16°0'15"E/41°50'53"N.
5 Lago d'Otri,	780m a.s.l.,	16°1'47"E/41°47'52"N.
6 Ridge E of Coppa dei Prigionieri,	700 m a.s.l.,	16°0'45"E/41°48'42"N.
7 Cugnetta di Censa,	770 m a.s.l.,	16°0'53"E/41°49'42"N.
8 Coppa dei Prigionieri,	800 m a.s.l.,	16°0'15"E/41°48'40"N.

Results / List of taxa

(Ordination numbers of sampling sites are given in brackets)

Bacidia circumspecta (Norrl. ex Nyl.) Malme

Valle del Tesoro (1): in a well illuminated *Quercus*-forest. In Italy there have been scattered records of this widespread but rare species (NIMIS 2003).

Bryoria fuscescens (Gyeln.) Brodo & D.Hawksw.

Cugnetto di Censa (7): poorly developed thalli on trunks in a *Quercus* sp.-stand. This is perhaps the most frequent species of *Bryoria* in Italy (NIMIS 2003) occurring even in lowland areas, but only a few recent records from southern Italy are published. The scattered records are mainly due to taxonomic changes in the circumscription of plants formerly referred to as "*Alectoria jubata*".

Calicium quercinum Pers.

Road Vico del Gargano-Foresta Umbra (4): in a well-illuminated mixed forest, dominated by *Fagus sylvatica*, *Quercus* sp. and *Acer opalum* close to a road. At the base of an old oak together with *Chrysothrix candelaris*. Although found elsewhere in Puglia, this species is remarkable because of its rarity in south-eastern Italy (NIMIS & TRETACH 1999). This is the first record from the Gargano-Peninsula.

Cyphelium sessile (Pers.) Trevis.

Valle des Tesoro (2): at the bottom of a V-shaped valley, intermixed with *Calicium salicinum* on the base of an old *Quercus*-tree. A lichenicolous fungus which is generally rare in Italy and confined to very old oaks (NIMIS 2003). New for the district of Puglia.

Lethariella intricata (Moris) Krog

Road Vico del Gargano-Foresta Umbra (4): this suboceanic beard-lichen occurs in a well-illuminated mixed forest dominated by *Fagus sylvatica*, *Quercus* sp. and *Acer opalum* close to a road. Numerous thalli found on an old oak were very small (up to a max. length of 5 cm), perhaps indicating low vitality or recent colonisation, the latter explanation contradicting the suggestion that *L. intricata* is an old Mediterranean relict species (NIMIS 2003).

Pertusaria ophthalmiza (Nyl.) Nyl.

Coppa dei Prigionieri (8): this is an oceanic species with cool-temperate to S-boreal distribution (WIRTH 1995, NIMIS 2003). In Italy it was only known from humid-cool locations in the Alps.

Pertusaria waghernei Hulting

Road Vico del Gargano-Foresta Umbra (4): this oceanic lichen occurs on the western side of a road in a mixed forest, mainly consisting of *Quercus* sp. and *Fagus sylvatica* on the bark of old beeches. It is new to Italy, its nearest populations in humid forests of the northern Alps (SCHAUER 1965).

Pseudevernia furfuracea (L.) Zopf

Coppa dei Prigionieri (8): small thalli were found on low twigs of some old *Fagus sylvatica*-trees. Although this acidophytic and hygrophytic species is rather widespread, at least in mountain areas (NIMIS 2003), no previous findings from Puglia have been published.

Pyrenula nitidella (Flörke ex Schaer.) Müll.Arg.

Valle del Tesoro (1): on *Fraxinus ornus* in a V-shaped valley. Only a few records from southern Italy have been published, none from Puglia (NIMIS 2003). It generally prefers warmer areas than the ecologically very similar *Pyrenula nitida* and is restricted to smooth bark at humid sites (WIRTH 1995).

Usnea fulvoreagens (Räsänen) Räsänen.

Valle del Tesoro (3); in the canopy of *Fagus sylvatica* close to a parking lot. Formerly this suboceanic species has often been confused with *U. lapponica* (NIMIS 1993). This is the first record from south-east Italy.

Usnea silesiaca Motyka

Lago d'Otri (5), Coppa dei Prigionieri (6, 7); this lichen was locally abundant in the higher parts of the Foresta Umbra, particularly on twigs in *Fagus sylvatica* canopies. It is an euoceanic species new to mainland Italy, known from the western coasts of Europe, Sardinia (ZEDDA 2002), the Canary Islands and North America. During the last decades most records were treated under its synonym *U. madeirensis*, but as this name is a younger homonym of *U. silesiaca* it had to be rejected (CLERC 2004). More or less isolated populations occur in forests, supposed to be of long ecological continuity at euoceanic sites in Central Europe and at the Caspian Sea. All populations in Central Europe are regarded as highly endangered (CLERC 1991). The records from Gargano are the first from mainland Italy.

Usnea wasmuthii Räsänen

Valle del Tesoro (3): in the canopy of old representatives of *Fagus sylvatica* near a parking lot. The taxon shows a sub-oceanic distribution very similar to *U. florida* (CLERC 1992).

Discussion

Most of the past and recent records of hygrophytic and (sub-)oceanic lichens from the Gargano Peninsula are epiphytes from the extensive woodlands of the Foresta Umbra. The occurrence of an extraordinary high number of these lichens in this area was first mentioned in the 19th century (JATTA 1881, PASQUALE & LICOPOLI 1872, RABENHORST 1850a, 1850b). Former authors reported such spectacular species as *Usnea articulata*, *Lobaria pulmonaria*, *L. virens* and *Parmotrema perlatum*. Additional records of oceanic and hygrophytic lichens were published by DEGELIUS (1954), SCHAUER (1965) and HANKO (1989) and most of the species so far recorded, as well as a large number of new species, were noted by NIMIS & TRETACH (1999).

Twelve further epiphytic lichens and lichenicolous fungi have been found during two field-trips in 1995 and 1997. *Bryoria fuscescens*, *Calicium quercinum* and *Pseudevernia furfuracea* are new for the Gargano, *Bacidia circumspecta*, *Cyphelium sessile*, *Lethariella intricata*, *Pertusaria ophthalmiza*, *Pyrenula nitidella*, *Usnea fulvoreagens* and *U. wasmuthii* are new to the district of Puglia, *Usnea silesiaca* is new to mainland Italy, and *Pertusaria waghernei* is new to Italy.

Of the 290 epiphytic and epixylic lichen species so far recorded from the district of Puglia (including our new records), 119 (41 %) are classified as oceanic or suboceanic (NIMIS 2003,

WIRTH 1995). Among saxicolous and terricolous lichens from the same area, this distribution type is represented by only 41 (12 %) of 354 species. The number of oceanic and suboceanic species in the total lichen flora (581 species) of the district Puglia is 137 (24 %). No detailed lists of phytoclimatical preferences are available for the phanerogamic flora of Puglia, but the 14 % of Atlantic or western Mediterranean species (FENAROLI 1966b, 1970, 1973, 1974), which is likely to include most oceanic / sub-oceanic species, is within the same range as that for oceanic / suboceanic lichens from soil or rock. These striking differences of the proportions of oceanic / suboceanic taxa among epiphytic lichens and organisms from soil or rocks leads one to suggest that care must be taken in comparing phytoclimatical diagnoses based on cryptogams (including many epiphytic representatives) versus those based on purely terrestrial phanerogams or of areas where putative substrata for epiphytes differ greatly in number or quality.

During the field-trips, an obvious restriction of several hygrophytic or oceanic species to different altitudinal ranges was observed. The majority of the new oceanic lichens were observed only in the highest (650 to 800 m a.s.l.) and most humid parts of the Foresta Umbra, but some hygrophytes (*Cyphelium sessile*, *Pyrenula nitidella*) were exclusively found at rather low altitudes in V-shaped valleys. These lichens prefer locations with a constantly high air-humidity but seem to be more tolerant to lower amounts of rainfall than the species listed above.

The occurrence of some of the lichens mentioned above does not depend on (micro-)climate alone, but is also correlated to the presence of specific species of trees. All thalli of the newly found species of *Pertusaria* and *Usnea* were exclusively found on old representatives of *Fagus sylvatica*, while *Bryoria fuscescens*, *Calicium quercinum*, *C. salicinum* and *Lethariella intricata* were specific to old oaks. *Pyrenula nitidella* was restricted to the smooth bark of young *Fraxinus ornus* trees. Other sub-oceanic lichens in greater need of conservation, such as *Lobaria amplissima*, appear to be best developed on *Acer obtusatum*.

The Gargano Peninsula provides a unique outpost of oceanic and hygrophytic forest lichens in the dry south-east of Italy. If these populations persist because of climatic reasons or due to ecological continuity of the Foresta Umbra remains open to debate. The concept of ecological continuity has recently been criticised as its current definition does not specify if the long-time continuity itself or a correlated increased diversity of small scale habitat structures and microclimate are the key factors that cause the presence of the so-called old-growth forest indicator species (e.g. NORDÉN & APPELQVIST 2001). In the Foresta Umbra, the diversity of epiphytic lichens is clearly dependent on the diversity of tree species of different ages, including very old representatives at different altitudes and mesoclimatic conditions caused by the various relief forms. A diverse mixture of forest tree species is not necessarily connected to long standing continuity but seems to be more dependent on an extensive form of use with scarce or little, selective use for logging. These conditions may also prevail in forests of only one or two centuries in age, but the continuous presence of very old representatives of the different tree species in accessible distances is more likely in a large coherent area with long standing continuity. These conditions occur in the Foresta Umbra, which formerly was protected by its use as a royal reserve for hunting (LAURIOLA & PALMIERI 1994).

It is remarkable that even trees bordering parking lots are still inhabited by many thalli of endangered and rare lichens such as *Usnea fulvovireagens*, *U. silesiaca* and *U. wasmuthii*. Obviously traffic on the few routes crossing the woodland had currently not exceeded a critical level. Forest management should focus on the preservation of the current diversity of deciduous tree species with its mixture of beech, oak, maple and ash in the higher parts of the Foresta Umbra as well as in V-shaped valleys at lower altitudes. To avoid the risk of a substantial loss of lichen

diversity, stands with very old representatives of different tree species should be excluded from logging and an increase of single species stands at all altitudes should be avoided.

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