

# Lichens of Barla Mountain in Isparta, Turkey: Diversity study and ecological assessment of the area

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## Abstract

This study reports on 230 infrageneric lichenized and lichenicolous taxa from Barla Mountain, Isparta, Turkey and assesses the ecological features of the area using the distribution of the lichens in the region and their poleophoby and solar irradiation ecological indicator values. One lichenized fungus, *Protoblastenia terricola*, and one lichenicolous fungus, *Zwackhiomyces dispersus*, are recorded as new in Turkey and 194 taxa are reported for the first time from Barla Mountain. After this research, number of the lichenized and lichenicolous fungi taxa of Barla Mountain rose to 241. Based on assessments using the ecological indicator values, the area is dominated by natural or semi-natural and well-preserved habitats.

**Keywords:** Biodiversity, ecological indicator value, lichens, lichenicolous fungi, Barla Mountain

## Introduction

Lichens are symbiotic organisms, usually composed of a fungal partner, the mycobiont, and one or more photosynthetic partners called photobiont(s) (Nash 2008). Lichens are sensitive to environmental changes due to their physiological and ecological characteristics (Hawksworth & Rose 1976; Salo et al. 2012). This is why they have been used as indicators for air pollution, climatic changes, and forest structures and dynamics (Giordani et al. 2012; Matos et al. 2015). Ecological indicator scales for lichen species for various environmental factors, such as light, eutrophication, and moisture, have already been developed. Wirth (2010) prepared a scale of ecological indicator values of 516 central European lichen species based on Ellenberg's ecological indicator values. Nimis and Martellos (2008) also developed their own lichen ecological indicator values for light, aridity, acidity, and eutrophication and used them for lichens in Italy. Their scale has five classes for each indicator element, whereas Wirth's scale has nine.

In spite of the increased number of studies concerning the diversity of lichens in Turkey in recent years, there is insufficient information regarding lichens in many areas of the country. Isparta province is in one of these areas. Although a significant number

of lichenized and lichenicolous fungi diversification studies have already been reported from the province, the recorded number of lichen taxa is only 191 according to previous research. These records are given by Szatala (1960), Öztürk and Kaynak (1998, 1999), Öztürk et al. (2005), Çobanoğlu and Yavuz (2006), Oran et al. (2007), Şenkardeşler (2009), and Halıcı et al. (2012, 2013).

The lichens of Barla Mountain, located in the Isparta province of Turkey, have not been comprehensively studied before now. Forty-six taxa were recorded from eight localities by Öztürk et al. (2005), while a species from the mountain was found in the collection of V. Vašák by Şenkardeşler (2009).

In order to monitor environmental changes in an area using lichens, its lichen diversity must first be comprehensively determined. Bearing this in mind, our study aims to initially to determine the lichenized and lichenicolous fungi diversity of Barla Mountain and then to evaluate the resultant data through their ecological indicator values.

## Study area

Barla Mountain, situated to the west of Eğirdir Lake, covers an area of 89,000 ha and is located

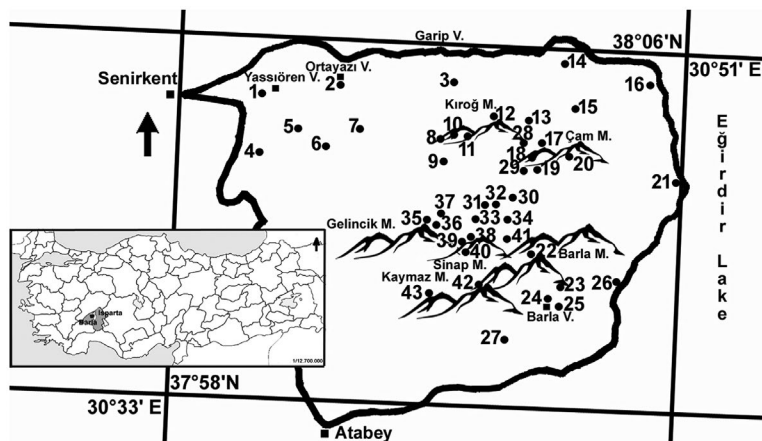


Figure 1. Map of Barla Mountain with studied localities, Isparta, Turkey.

at 37°52'–38°17' N and 30°20'–30°51' E. It is surrounded by the Senirkent plain to the north and the Atabey plain to the South. The height of the mountain ranges from 900 to 2779 m (Gelincikana Summit). Kiroğ (2300 m), Nişangara (2373 m), Karabeygir (2200 m), Kaymaz (2214 m), Orta (2100 m), Sinap (2200 m), Korugöğsü (1745 m), Kuzgun (1500 m), Kıran (1800 m), and Kuştaşı (1600 m) are other notable heights in the study area (Figure 1 and Table I).

The geological structure of Barla Mountain consists of two units. One of these is the Senirkent sub-unit, which includes precipitated rocks from the Upper Triassic to the Lower Eocene periods. It rises to the surface north and northwest of the area. The other part of the mountain is located at the Barla sub-unit, which covers sedimentary stratigraphic units from the Upper Triassic to the Lower Eocene periods and includes the Ayazmana Formation. This formation, which is comprised of sandstone and shale with reef limestone blocks, is the oldest rock unit of the Barla sub-unit and appears as an allochthon on the Senirkent unit (Özgül et al. 1991).

The climate of the study area has characteristics similar to Mediterranean and continental climates. The summers are hot and slightly rainy, the winters are cold and snowy, and the spring and autumn periods are mild and rainy (Walter & Lieth 1960; Mızrakçı 2006).

Barla Mountain is located in the transition zone of the Mediterranean and Irano-Turanian phytogeographic regions of Turkey. *Quercus coccifera* L., with maquis vegetation, is spread over a wide area alongside Eğirdir Lake, Atabey district and around the villages of Gökçe, Akkeçili and Garip, between 850 and 1200 m in altitude. This is also encountered at 1300 m in the vicinity of Kapıcak village. *Cedrus libani* A. Richand and *Pinus nigra* J.F. Arnold are the main species of the forest vegetation that forms pure or mixed forests at altitudes higher than 1200 m. *Juniperus excelsa* M. Bieb and

*J. foetidissima* Wild are also found between 1000 and 1450 m. The main vegetation of the Subalpine belt on the mountain consists of *Juniperus communis* L., *Astragalus angustifolius* Lam. subsp. *longidens* Hub.-Mor. & V.A. Matthews, and *Acanthalimon puberulum* Boiss.&Bal. var. *puberulum* (Bekat 1987). The west of the study area, which includes Kaymaz Tepe, Sinap Tepe, Gelincikana Tepe, and Orta Tepe, has almost no vegetation due to escarpments, crags, erosion and landslides. The natural vegetation of the mountain has been destroyed by heavy grazing over many years.

## Materials and methods

Lichen and lichenicolous fungi specimens were collected from 43 localities (Table I) on Barla Mountain from April 2008 to December 2010 and later stored in the Herbarium of Eskişehir Osmangazi University and the Herbarium of Anadolu University Faculty of Science. The sections of the samples were examined in water, 10% KOH or Lugol's solution. A stereomicroscope (Leica MZ6) and a light microscope (Olympus BX51) were used for microscopic observations. Spot tests and TLC were performed to determine the lichen taxa according to identification keys when required.

## Results

### List of taxa

The list is given in alphabetical order, followed by locality number(s) in Table I. New taxa for Turkey are indicated by (+) and for Isparta Province, they are indicated by (\*). Abbreviations for the substrate are: calcareous rocks (CR), dead trees (DT), lichen taxa on other lichens (L), soil (S), siliceous rocks (SR). It was also stated the name of the plants on which epiphytic species live. In addition, the list

Table I. List of the studied localities in Barla Mountain, Isparta.

No.	Localities	Altitude	Coordinates	Dates
1	Senirkent, around Yassıören village	1045 m	38°05'52" N 30°35'91" E	05.12.2010
2	Senirkent, around Ortayazı village	968 m	38°06'87" N 30°38'72" E	16.10.2010
3	Senirkent, Garip village, dam lake roadside	994 m	38°07'06" N 30°42'80" E	12.10.2010
4	Senirkent, Yassıören village, rocky area, around sand pit	1119 m	38°04'91" N 30°35'93" E	05.12.2010
5	Senirkent, Yassıören village, Ayazmana	1028 m	38°05'67" N 30°37'27" E	16.10.2010
6	Senirkent, SE of Yassıören village	1310 m	38°05'21" N 30°38'33" E	05.12.2010
7	Senirkent, S of Ortayazı village, woody area	1172 m	38°05'61" N 30°39'48" E	05.12.2010
8	Senirkent, Garip village, around spring, <i>Cedrus libani</i> forest	1760 m	38°05'44" N 30°42'40" E	13.10.2010
9	Senirkent, Gelincik Hill, Kızlar Pınarı place, rocky area	2040 m	38°04'95" N 30°42'51" E	13.10.2010
10	Senirkent, N slopes of Kıröğ Gediği, <i>C. libani</i>	1539 m	38°05'61" N 30°42'97" E	13.10.2010
11	Senirkent, N slopes of Kıröğ Hill, <i>P. nigra</i> var. <i>pallasiana</i> forest	1385 m	38°05'95" N 30°43'40" E	13.10.2010
12	Eğirdir, N slopes of Kıröğ Hill, Karataş place	1228 m	38°06'20" N 30°44'33" E	12.06.2010
13	Senirkent, Garip village, Obruk taşı place	1270 m	38°06'20" N 30°45'50" E	12.10.2010
14	Senirkent, Akkeçili village, Kazayağı place	1210 m	38°08'19" N 30°46'22" E	12.06.2010
15	Senirkent, Garip village, Göksu place, <i>Ÿ. excelsa</i> population	1363 m	38°06'40" N 30°47'39" E	12.10.2010
16	Fourth km between Boyalı and Akkeçili, <i>Ÿ. excelsa</i> forest	919 m	38°07'32" N 30°50'09" E	05.12.2010
17	Barla, GMNP, around guesthouse, Çam Hill, <i>P. nigra</i> var. <i>pallasiana</i> forest	1800 m	38°05'46" N 30°45'92" E	06.04.2008
18	Barla, GMNP, Çaçırlı Hill	1988 m	38°05'02" N 30°45'67" E	08.07.2010
19	Barla, GMNP, Boklu Boyun Hill	1801 m	38°04'78" N 30°45'84" E	08.07.2010
20	Barla, GMNP, Medet Pınarı	1600 m	38°05'09" N 30°47'06" E	06.04.2008
21	Barla, Boyalı village, Eğirdir lake side	923 m	38°04'73" N 30°51'35" E	05.12.2010
22	Barla, Barla Dağı, around Üç Söğütlü fountain	1712 m	38°02'66" N 30°45'57" E	18.10.2008
23	Barla Dağı, around spring water reservoir of Barla town	1169 m	38°01'47" N 30°46'92" E	20.03.2010
24	Barla town, Eşik Hill	1209 m	38°01'17" N 30°46'52" E	19.10.2008
25	SW of Barla town, rocky area of Saint Paules roadside	1075 m	38°00'91" N 30°46'93" E	19.10.2008
26	Fourth km of between Barla and Boyalı, Eğirdir lakeside	927 m	38°01'46" N 30°49'07" E	16.10.2010
27	Barla, 2 km S of Bağören village, <i>Quercus</i> sp. wood	1400 m	37°59'97" N 30°44'94" E	31.08.2010
28	Barla, GMNP, Çam Hill, canyon of Kapı stream	1632 m	38°05'19" N 30°45'21" E	14.07.2010
29	Barla, GMNP, Bozörün Hill	1990 m	38°04'52" N 30°45'34" E	09.07.2010
30	Barla, GMNP, Karabeygir summit	2413 m	38°04'02" N 30°45'00" E	09.07.2010
31	Barla, Barla Hill, Kızılgedik place	2310 m	38°03'74" N 30°44'32" E	17.08.2009
32	Barla, Barla Hill, slopes of Toklu Tepe	2380 m	38°03'70" N 30°44'05" E	14.08.2009
33	Barla, Barla Hill, Kar obruğu place	2267 m	38°03'33" N 30°43'77" E	16.08.2009
34	Barla, Barla Hill, around Kiraz fountain	1930 m	38°03'26" N 30°44'77" E	20.03.2010
35	Barla, Gelincik Hill, Ayı Yalağı place	2410 m	38°03'49" N 30°42'56" E	18.08.2009
36	Barla, Gelincik Hill summit	2799 m	38°03'25" N 30°42'14" E	19.08.2009
37	Barla, Gelincik Hill	2646 m	38°03'24" N 30°42'39" E	19.08.2009
38	Barla, Sinap Hill, Yunak waterfall	2040 m	38°02'80" N 30°43'53" E	16.08.2009

Table I. (Continued).

No.	Localities	Altitude	Coordinates	Dates
39	Barla, Sinap Hill, around Yunak spring	2160 m	38°02'70" N 30°43'38" E	16.08.2009
40	Barla, Sinap Hill, kral mezarı place	2290 m	38°02'44" N 30°43'46" E	16.08.2009
41	Barla, Barla Hill, above Kiraz fountain	1675 m	38°02'75" N 30°44'87" E	15.08.2009
42	Isparta, Eğirdir, Barla, Kaymaz Hill, Edil place	1492 m	38°01'48" N 30°43'99" E	30.08.2010
43	Barla, Kaymaz Hill, Kalkan Gedigi place	1690 m	38°01'21" N 30°42'21" E	15.08.2010

Note: S – South; SE – Southeast; N – North; GMNP – Gelincik Mountain Nature Park.

includes species reported by Öztürk et al. (2005) and Şenkardeşler (2009), but which are not found in this study. According to Nimis and Martellos (2008), poleophoby (P) classes and solar irradiation (Si) values of taxa were also shown at below. Poleophoby consists of four classes varying from heavily disturbed areas (1) to undisturbed ancient forests (4). Solar irradiation values are grouped in five classes varying from very shaded situations (1) to very high direct solar irradiation (5). A species may belong to more than one class depending on its ecological amplitude.

\**Acarospora badiofusca* (Nyl.) Th. Fr.: 42 SR, **P:** 3 2, **Si:** 4 5

*Acarospora cervina* (Ach.) A. Massal.: 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 26, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, CR; 42, SR, **P:** 3, **Si:** 4 5

*Acarospora glaucocarpa* (Ach.) Körb.: Öztürk et al., 2005, **P:** 3, **Si:** 4 5

*Acarospora laqueata* Stizenb. ex Flagey: 6, 15 CR, **P:** 3, **Si:** 4 5

\**Acarospora macrospora* (Hepp) A. Massal. ex Bagl.: 6, 15, 20, 32 CR, **P:** 3, **Si:** 4 5

\**Amandinea punctata* (Hoffm.) Coppins & Scheid.: 15, 17 DT, **P:** 3 2 1, **Si:** 4 5

*Anaptychia ciliaris* (L.) Körb.: 8, 12, 15, 20 *C. libani*; 11, 17, 10, *P. nigra* var. *pallasiana*; 24 *f. excelsa*; 25 *Quercus* sp., **P:** 3 2, **Si:** 4 5

\**Anaptychia crinalis* (Schleich.) Vězda: 8, 10, 12 *C. libani*, **P:** 3, **Si:** 3

\**Anaptychia setifera* (Mereschk.) Räsänen: 20 *f. excelsa*, **P:** –, **Si:** –

\**Arthonia herтели* (Calat, Barreno & V.J.Rico) Hafellner & V.John: 22, 32, 35, 39 L. (on *Aspicilia desertorum*), **P:** –, **Si:** –

\**Arthonia lapidicola* (Taylor) Branth & Rostr.: 43 CR, **P:** 3 2, **Si:** 4

\**Arthonia molendoi* (Heufl. ex Frauenf.) R.Sant.: 30, 32 L. (on *Caloplaca* and *Xanthoria* sp.), **P:** 3, **Si:** 4 5

\**Arthonia varians* (Dav.) Nyl.: 42 L. (on *Lecanora rupicola*), **P:** 3, **Si:** 3 4

*Aspicilia cinerea* (L.) Körb.: 42 SR, **P:** 3 2, **Si:** 3 5

*Aspicilia desertorum* (Kremp.) Mereschk.: 8, 14, 20, 22, 24, 30, 31, 32, 33, 34, 35, 38, 40, 43 CR, **P:** 3, **Si:** 5

\**Aspicilia intermutans* (Nyl.) Arnold: 42, 43 SR, **P:** 3 2, **Si:** 3 4

*Athallia alnetorum* (Giralt, Nimis & Poelt) Arup, Frödén & Söchting: Öztürk et al., 2005, **P:** 3, **Si:** 4

\**Athallia cerinelloides* (Erichsen) Arup, Frödén & Söchting: 34 *Salix alba* L.; 20 *f. excelsa*, **P:** 3 2, **Si:** 4 5

*Athallia holocarpa* (Hoffm.) Arup, Frödén & Söchting: 42 CR; 17 *P. nigra* var. *pallasiana*, **P:** 3 2 1, **Si:** 4 5

\**Bacidia bagliettoana* (A. Massal. & De Not.) Jatta: 20 M; 18, 28 S, **P:** 3, **Si:** 3 4

\**Bacidia subincompta* (Nyl.) Arnold: 20 *f. excelsa*, **P:** 3, **Si:** 3

\**Bagliettoa parmigerella* (Zahlbr.) Vězda & Poelt: 25 CR, **P:** 3 2, **Si:** 1 3

\**Biatora globulosa* (Flörke) Fr: 20 *C. libani*, **P:** 3, **Si:** 2 3

\**Bilimbia sabuletorum* (Schreb.) Arnold: 15 *C. libani*; *f. excelsa*; M, **P:** 3 2 1, **Si:** 2 4

\**Blastenia ferruginea* (Huds.) A. Massal.: 17, 18, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5

\**Blastenia herbidella* (Hue) Servit: 17 *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 4

*Bryoria capillaris* (Ach.) Brodo & D. Hawksw.: 8, 10, 18, 20 *C. libani*; *f. excelsa*, **P:** 3, **Si:** 3 5

*Bryoria fuscescens* (Gyeln.) Brodo & D. Hawksw.: 8, 10, 18, 20 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3, **Si:** 3 5

\**Bryoria nadvornikiana* (Gyeln.) Brodo & D. Hawksw.: 8, 10, 18, 20 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3, **Si:** 3 4

\**Buellia aethalea* (Ach.) Th. Fr.: 15, 22 CR; 42 SR, **P:** 3 2, **Si:** 4 5

\**Buellia griseovirens* (Turner & Borrer ex Sm.) Almb.: 20 *C. libani*, **P:** 3 2, **Si:** 3 4

\**Buellia stellulata* (Taylor) Mudd: 42 SR, **P:** 3 2, **Si:** 4 5

*Calogaya biatorina* (A. Massal.) Arup, Frödén & Söchting: 32, 36, CR, **P:** 3, **Si:** 4 5

- \**Calogaya decipiens* (Arnold) Arup, Frödén & Söchting: 22, 30 CR, **P:** 3 2, **Si:** 4 5
- \**Cvalogaya lobulata* (Flörke) Arup, Frödén & Söchting: 20 *Quercus* sp, **P:** 3 2, **Si:** 4
- Calogaya schistidii* (Anzi) Arup, Frödén & Söchting: 31 M; 5, 12 S, **P:** 3, **Si:** 4 5
- \**Caloplaca albopruinosa* (Arnold) H.Olivier: 24 CR, **P:** 3, **Si:** 4 5
- Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr. var. *cerina*: 2, 5, 22, 23, 25, 27, 34, 41 *S. alba*; *Morus alba* L.; *Ficus carica* L.; *Quercus* sp.; 4, 5, 8, 15, 17, 20, *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 20, 30 M, **P:** 3 2 1, **Si:** 3 5
- \**Caloplaca erythrocarpa* (Pers.) Zwackh.: 5, 6, 14 CR, **P:** 3 2, **Si:** 4 5
- \**Caloplaca haematites* (Chaub. ex St.Amans) Zwackh.: 20, 23, 34, *M. alba*; *F. carica*; 17 *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- Caloplaca inconnexa* (Nyl.) Zahlbr.: 15, 22, 43 CR, **P:** 3 2, **Si:** 4 5
- Caloplaca saxicola* (Hoffm.) Nordin: 5, 14, 15, 22, 23, 24, 25, 30, 32, 34, 38, 39, 41, 42, CR, **P:** 3, **Si:** 4 5
- \**Caloplaca stillicidiorum* (Vahl) Lynge: 20 *f. excelsa*; 30 M, **P:** 3 2 1, **Si:** 4
- Caloplaca teicholyta* (Ach.) J.Steiner: 24, CR, **P:** 2 1, **Si:** 3 4
- Candelariella aurella* (Hoffm.) Zahlbr.: 1, 2, 5, 15, 21, 26, 41 *S. alba*; *Prunus domestica* L.; *Amygdalus communis* L.; *Platanus orientalis* L.; 4, 16, 20, 23 *f. excelsa*; *P. nigra* var. *pallasiana*; 14, 15, 18, 20, 22, 23, 24, 25, 28, 30, 32, 32, 34, 38, 39, 40, 41, 42, 43 CR; 41, 42 SR, **P:** 3 2 1, **Si:** 3 5
- \**Candelariella unilocularis* (Elenkin) Nimi, **Si:** 23, 34 M, **P:** 3, **Si:** 4 5
- Candelariella vitellina* (Ehrh.) Müll. Arg.: 3, 4, 6, 7, 9, 13, 14, 19, 20, 29, 30, 36, 37 CR; 41, 42, 43 SR, **P:** 3 2 1, **Si:** 3 5
- Candelariella xanthostigma* (Pers. ex Ach.) Lettau: 18, 28 CR; 12, 17, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2 1, **Si:** 3 5
- \**Carbonea vitellinaria* (Nyl.) Hertel: 14, 43 L.(on *Candelariella vitellina*), **P:** 3 2, **Si:** 4 5
- \**Cercidospora epicarphinea* (Nyl.) Grube & Hafellner: 42 L. (on *Caloplaca saxicola*), **P:** –, **Si:** –
- \**Cercidospora macrospora* (Uloth) Hafellner & Nav.-Ros.: 34 L.(on *Lecanora bolcana*), **P:** –, **Si:** –
- \**Cercidospora verrucosaria* (Linds.) Arnold: 20 L. (on *Megaspora verrucosa*), **P:** –, **Si:** –
- Cerothallia luteoalba* (Turner) Arup, Frödén & Söchting: Öztürk et al. (2005), **P:** 3 2, **Si:** 4 5
- \**Chrysothrix candelaris* (L.) J.R.Laundon: 15 *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3
- Circinaria caesiocinerea* (Nyl. ex Malbr.) A. Nordin, S. Savić & Tibell: 42, 43 SR, **P:** 3 2, **Si:** 3 5
- C. calcarea* (L.) A. Nordin, S. Savić & Tibell: 3, 4, 5, 6, 7, 9, 13, 14, 15, 17, 18, 19, 20, 21 22, 24, 25, 26, 27, 28, 29, 30, 30, 31, 32, 33, 34, 35, 36, 39, 40, 41, 42, 43 CR, **P:** 3 2, **Si:** 4 5
- Circinaria contorta* (L.) A. Nordin, Savić & Tibell ssp. *contorta*: 4, 6, 40, 7, 8, 10, 23, 30 CR, **P:** 3 2, **Si:** 4 5
- Circinaria contorta* subsp. *hoffmanniana*: S.Ekman & Fröberg ex R.Sant.: 4, 6, 7, 8, 15, 22, 23, 35 CR, **P:** 3 2 1, **Si:** 3 4
- \**Circinaria hispida* (Mereschk.) A. Nordin, S. Savić & Tibell: 32, 36 S, **P:** 3, **Si:** 4 5
- \**Cladonia cervicornis* (Ach.) Flot.: 20 M; 20, 31 S, **P:** 3, **Si:** 4
- \**Cladonia coniocraea* (Flörke) Spreng.: 20 *C. libani*; *f. excelsa*, **P:** 3 2, **Si:** 3 4
- \**Cladonia fimbriata* (L.) Fr.: 8, 10, 11, 15, 17, 18, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 10, 11 M; 27, 28, 30 S, **P:** 3 2, **Si:** 3 4
- Cladonia pyxidata* (L.) Hoffm.: 10, 11, 20 *C. libani*; *P. nigra* var. *pallasiana*; 20 M; 20 S, **P:** 3 2 1, **Si:** 3 5
- \**Clauzadea immersa* (Hoffm.) Hafellner & Bellem.: 15, 20 CR, **P:** 3 2, **Si:** 3 4
- \**Clauzadea monticola* (Ach.) Hafellner & Bellem.: 3, 7, 9, 13, 18, 19, 28, 29, 32, 36, 37, 40, 43 CR, **P:** 3 2, **Si:** 3 4
- Collema nigrescens* (Huds.) DC.: 20 CR, **P:** 3 2, **Si:** 3 4
- Collema subflaccidum* Degel.: 25 BT; 20 M, **P:** –, **Si:** –
- Dacampia rufescentis* (Vouaux) D. Hawksw.: 20 L.(on *Peltigera ponojensis*), **P:** –, **Si:** –
- Dermatocarpon miniatum* (L.) W.Mann: 4, 5, 6, 7, 3, 9, 13, 17, 19, 22, 24, 25, 29, 30, 32, 33, 35, 36, 37, 38, 39, 40, 41, 43 CR, **P:** 3, **Si:** 3 5
- \**Dimelaena oreina* (Ach.) Norman: 42 SR, **P:** 3, **Si:** 4 5
- Diplotomma alboatrum* (Hoffm.) Flot.: 15, 41 *C. libani*; *f. excelsa*, **P:** –, **Si:** –
- Diplotomma epipolium* (Ach.) Arnold: 3, 4, 5, 6, 7, 9, 13, 19, 24, 29, 31, 32, 33, 36, 37, 42, 43 CR; 42 SR, **P:** 3 2, **Si:** 4 5
- \**Enchylium polycarpon* (Hoffm.) Otálora, P.M.Jørg. & Wedin: 22 CR; 20 M, **P:** 3 2, **Si:** 4 5
- \**Endocarpon adscendens* (Anzi) Müll.Arg.: 3, 13, 19, 29, 31, 36, 40 S, **P:** 3, **Si:** 3 5
- Evernia prunastri* (L.) Ach.: 8, 10, 11, 12 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- \**Flavoplaca citrina* (Hoffm.) Arup, Frödén & Söchting: 22 CR, **P:** 3 2 1, **Si:** 4 5
- Flavoplaca coronata* (Kremp. ex Körb.) Arup, Frödén & Söchting: 32, 35 CR, **P:** 3, **Si:** 4 5
- Gallowayella fulva* (Hoffm.) S.Y.Kondr. et al.: 21, 23, 26 *M. alba*; *S. alba*, **P:** 3, **Si:** 4 5
- \**Glypholecia scabra* (Pers.) Müll. Arg.: 14, 30, 32 CR, **P:** 3, **Si:** 4 5
- \**Gyalolechia bracteata* (Hoffm.) A.Massal.: 30 M, **P:** 3, **Si:** 4 5
- Gyalolechia flavorubescens* (Huds.) Söchting, Frödén & Arup: 23, *F. carica*; *S. alba*, **P:** 3 2, **Si:** 4 5

- Gyalolechia flavovirescens* (Wulfen) Söchting, Frödén & Arup: 22 CR, **P:** 3 2, **Si:** 3 4
- Gyalolechia fulgens* (Sw.) Söchting, Frödén & Arup: 3, 5, 18, 24, 28, 30, 31 CR, **P:** 3, **Si:** 4 5
- \**Gyalolechia subbracteata* (Nyl.) Söchting, Frödén & Arup: 30, 31 M; 12, 32 S, **P:** 3 2, **Si:** 4 5
- Hafellia disciformis* (Fr.) Marbach & H. Mayrhofer: 15, 17, 20 *C. libani*; *f. excelsa*, **P:** 3, **Si:** 3 4
- Hafellia leptoclinoides* (Nyl.) Kalb, H. Mayrhofer & Scheid.: 15, CR, **P:** 3, **Si:** 3 4
- \**Hypocenomyce scalaris* (Ach.) M.Choisy: 18, 20 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- \**Hypogymnia farinacea* Zopf: 8, 10, 20 *C. libani*; *f. excelsa*, **P:** 3 2, **Si:** 3 4
- Hypogymnia tubulosa* (Schaer.) Hav.: 8, 10, 11, 12, 15, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3
- \**Immersaria athrocarpa* (Ach.) Rambold & Pietschm.: 42 CR, **P:** 3, **Si:** 4
- Lathagrium cristatum* (L.) Otálora, P.M.Jørg. & Wedin: 20, 25, 35, 43 CR, **P:** 3 2, **Si:** 4 5
- \**Lecania naegelii* (Hepp) Diederich & Van den Boom: 20 *f. excelsa*, **P:** 3 2, **Si:** 4
- \**Lecanora agardhiana* Ach.: 20, 22, 24 CR, **P:** 3, **Si:** 3 5
- \**Lecanora bolcana* (Pollich) Poelt: 4, 6, 7, 24, 27, 30, 32, 34, 43, 42 27 CR; 41, 42, 43 SR, **P:** 3 2, **Si:** 4 5
- Lecanora carpinea* (L.) Vain.: 8, 10, 20, 23 *C. libani*; *f. excelsa*; 34 *P. domestica*; *S. alba*, **P:** 3 2 1, **Si:** 3 5
- Lecanora chlorotera* Nyl.: 22, 23, 41 *M. alba*, **P:** 3 2 1, **Si:** 3 5
- Lecanora crenulata* Hook.: 35, 42 CR, **P:** 3, **Si:** 3 4
- \**Lecanora glabrata* (Ach.) Malme: 17 *f. excelsa*, **P:** 3, **Si:** 3
- Lecanora hagenii* (Ach.) Ach.: 34 *S. alba*; *M. alba*; 15, 17, 20 *f. excelsa*, **P:** 3 2 1, **Si:** 4 5
- \**Lecanora persimilis* (Th. Fr.) Nyl.: 23 *Moru. alb*; 20 *f. excelsa*, **P:** 3 2, **Si:** 4 5
- \**Lecanora pulicaris* (Pers.) Ach.: 17 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- \**Lecanora rupicola* (L.) Zahlbr.: 42 SR, **P:** 3 2, **Si:** 3 5
- Lecanora saligna* (Schr.) Zahlbr.: 37DT; 15 M, **P:** 3 2, **Si:** 4 5
- \**Lecanora semipallida* H. Magn.: 6, 23 CR, **P:** –, **Si:** –
- \**Lecanora strobilina* (Spreng.) Kieff.: 20 *f. excelsa*, **P:** 3, **Si:** 3
- \**Lecanora subintricata* (Nyl.) Th. Fr.: 15, 20 *f. excelsa*, **P:** 3, **Si:** 3
- \**Lecanora symmicta* (Ach.) Ach.: 15, 20 *f. excelsa*, **P:** 3 2, **Si:** 3 4
- \**Lecanora umbrina* (Ehrh.) Röhl.: 3, 20 *F. carica*, **P:** 3 2 1, **Si:** 3 5
- Lecanora varia* (Hoffm.) Ach.: 15, 18, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- Lecidella carphatica* Körb: 3 CR, **P:** 3 2, **Si:** 4 5
- Lecidella elaeochroma* (Ach.) M. Choisy: 5, 10, 11, 15, 12, 17, 18, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 22, 34 *Quercus* sp.; *S. alba*, **P:** 3 2 1, **Si:** 3 5
- Lecidella patavina* (A.Massal.) Knoph & Leuckert.: 3, 4, 6, 7, 9, 13, 19, 20, 22, 29, 36, 37, 40 CR, **P:** 3 2, **Si:** 4 5
- Lecidella stigmatea* (Ach.) Hertel & Leuckert: 14, 15, 32, 39, 40 CR, **P:** 3 2 1, **Si:** 3 4
- Lepraria incana* (L.) Ach.: 22 CR; 20 *C. libani*; 15 M, **P:** 3, **Si:** 2 4
- Lepraria membranacea* (Dicks.) Vain.: Öztürk et al. (2005), **P:** 3, **Si:** 2 3
- \**Lepraria nivalis* J.R.Laundon: 8, CR, **P:** 3 2, **Si:** 1 3
- Leproplaca cirrochroa* (Ach.) Arup, Frödén & Söchting: 14 CR, **P:** 3 2, **Si:** 3 4
- Leproplaca xantholyta* (Nyl.) Hue: 8, 12, 14 CR, **P:** 3, **Si:** 2 3
- \**Letharia vulpina* (L.) Hue: 18 *C. libani*, **P:** 3, **Si:** 4 5
- \**Lichenostigma maureri* Hafellner: 17, 20 L. (on *Pseudevernia furfuracea* var. *furfuracea* and var. *ceratea*), **P:** –, **Si:** –
- \**Lobothallia farinosa* (Flörke) A. Nordin, S. Savic & Tibell: 15 CR, **P:** 3, **Si:** 4
- Lobothallia radiosa* (Hoffm.) Hafellner: 3, 4, 6, 7, 9, 13, 14, 15, 18, 19, 20, 22, 23, 24, 25, 27, 28, 29, 30, 32, 36, 37, 38, 39, 40, 41, 42, 43 CR; 41, SR, **P:** 3, **Si:** 4 5
- \**Lobothallia recedens* (Taylor) A.Nordin, S.Savić & Tibell: 22, CR; 42 SR, **P:** 3 2 1, **Si:** 3 5
- Megaspora verrucosa* (Ach.) Hafellner & V.Wirth: 20 M; 5, 31 S, **P:** 3, **Si:** 4 5
- \**Melanelia stygia* (L.) Essl.: 41 SR, **P:** 3, **Si:** 4 5
- Melanelixia glabrata* (Lamy) Sandler & Arup: 20 *f. excelsa*, **P:** 3 2 1, **Si:** 3 4
- \**Melanelixia subargentifera* (Nyl.) O.Blanco, A.Crespo, Divakar, Essl, D.Hawksw. & Lumbsch: 20 *f. excelsa*, **P:** 3 2, **Si:** 4 5
- Melanohalea elegantula* (Zahlbr.) O.Blanco, A.Crespo, Divakar, Essl, D. Hawksw. & Lumbsch: 10, 11, 17, 18, 20, *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3, **Si:** 3 4
- Melanohalea exasperata* (De Not.) O.Blanco, A.Crespo, Divakar, Essl, D.Hawksw. & Lumbsch: 4, 16, 17, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 1, 2, 20, 21, 26 *A. communis*, **P:** 3 2, **Si:** 4 5
- Melanohalea exasperatula* (Nyl.) O.Blanco, A.Crespo, Divakar, Essl, D.Hawksw. & Lumbsch: 42 CR; 8, 10, 12, 15, 17, 20, *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 15 M, **P:** 3 2 1, **Si:** 3 5
- \**Micarea denigrata* (Fr.) Hedl.: 20 *f. excelsa*, **P:** 3, **Si:** 2 4
- \**Micarea melaena* (Nyl.) Hedl.: 15 *C. libani*, **P:** 3, **Si:** 2 4
- \**Miriquidica deusta* (Stenh.) Hertel & Rambold: 42 SR, **P:** 3, **Si:** 4

- \**Muellerella erratica* (A.Massal.) Hafellner & V.John: 20, 22, 40, 42 L. (on *Clauzadea monticola* and *Pyrenodesmia alociza*), **P:** –, **Si:** –
- \**Muellerella lichenicola* (Sommerf.) D.Hawksw.: 20 L. (on *Pyrenodesmia alociza*), **P:** –, **Si:** –
- \**Muellerella ventosicola* (Mudd) D.Hawksworth: 35 L. (on *Rhizocarpon geographicum*), **P:** –, **Si:** –
- \**Mycocalicium subtile* (Pers.) Szatala: 17 *P. nigra* var. *pallasiana*, **P:** 3, **Si:** 4
- \**Ochrolechia androgyna* (Hoffm.) Arnold: 18, 20 *C. libani*, **P:** 3, **Si:** 3
- \**Ochrolechia szatalaensis* Verseghy: 20 *C. libani*, **P:** 3, **Si:** 3
- \**Pannaria conoplea* (Ach.) Bory: 20 *C. libani*, **P:** 4, **Si:** 3
- Parmelia saxatilis* (L.) Ach.: 27 *Quercus* sp.; 18 *C. libani*, **P:** 3 2, **Si:** 3 4
- Parmelia sulcata* Taylor: 20 *C. libani*, **P:** 3 2 1, **Si:** 3 5
- Parmelina tiliacea* (Hoffm.) Hale: 10, 11, 12, 18 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3 2 1, **Si:** 3 4
- \**Parmeliopsis ambigua* (Wulfen) Nyl.: 10, 11, 17, 18, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- Peltigera canina* (L.) Willd.: 17, 20, 21, 28, 30, 31, 32 S, **P:** 3, **Si:** 3
- \**Peltigera malacea* (Ach.) Funck: 20 S, **P:** 3, **Si:** 3 4
- \**Peltigera monticola* Vitik.: 20 M; 10, 29 S, **P:** 3, **Si:** 4 5
- Peltigera ponojensis* Gyeln.: 20 S, **P:** 3, **Si:** 3 4
- Peltigera praetextata* (Flörke ex Sommerf.) Zopf: Öztürk et al. (2005), **P:** 3 2, **Si:** 3 4
- Peltigera rufescens* (Weiss.) Humb.: 20 S, **P:** 3 2, **Si:** 4 5
- Pertusaria albescens* (Huds.) Choisy & Werner: 20 *C. libani*, **P:** 3 2, **Si:** 3 4
- \**Phaeophyscia nigricans* (Flörke) Moberg: 25 *Quercus* sp.; 43 CR, **P:** 3 2, **Si:** 4 5
- Phaeophyscia orbicularis* (Neck.) Moberg: 1, 2, 23, 26, 34 *F. carica*; *M. alba*; *P. domestica* *A. communis*; *S. alba*; 4, 16, 21, 23, 24 *f. excelsa*; *P. nigra* var. *pallasiana*; 22, 42 CR, **P:** 3 2 1, **Si:** 3 5
- \**Phaeophyscia poeltii* (Frey) Clauzade & Cl.Roux: 23 *F. carica*; 20 *f. excelsa*, **P:** 3 2, **Si:** 4 5
- \**Phaeophyscia sciastra* Ach.: 23 CR, **P:** 3 2, **Si:** 3 5
- Phlyctis argena* (Ach.) Flot.: 12, 20 *C. libani*, **P:** 3 2, **Si:** 2 3
- \**Phoma peltigerae* (P. Karst.) D.Hawksw.: 20 L. (on *Peltigera rufescens*), **P:** –, **Si:** –
- Physcia adscendens* (Fr.) H.Olivier: 2, 5, 21, 22, 25, 26 *P. orientalis*; *Quercus* sp.; *S. alba*; 4, 5, 8, 12, 15, 16, 17, 20, 24 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 20 CR, **P:** 3 2 1, **Si:** 4 5
- Physcia aipolia* (Ehrh. ex Humb.) Fürnr.: 41 *S. alba*; *P. domestica*; 20, 23 *f. excelsa*; 20 CR, **P:** 3 2 1, **Si:** 4 5
- \**Physcia biziana* (A. Massal.) Zahlbr.: 8, 16, 17, 20, 23 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 23, 34 *P. domestica*; *F. carica*; *M. alba*, **P:** 3 2 1, **Si:** 4 5
- Physcia caesia* (Hoffm.) Fürnr.: Öztürk et al. (2005), **P:** 3 2, **Si:** 4 5
- Physcia dubia* (Hoffm.) Lettau: 37 CR, **P:** 3 2 1, **Si:** 4 5
- Physcia leptalea* (Ach.) DC.: 25 *Quercus* sp.; 8, 17, 24 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- Physcia stellaris* (L.) Nyl.: 1, 2, 5, 20, 21, 22, 26, 27, 34 *P. domestica*; *F. carica*; *M. alba*; *S. alba*; *A. communis*; *Quercus* sp.; 4, 5, 8, 10, 11, 15, 16, 17, 20, 24 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 15 M, **P:** 3 2, **Si:** 4 5
- Physcia tenella* (Scop.) DC.: 2, 21, 26 *A. communis*, **P:** 3 2, **Si:** 4 5
- \**Physcia tribacia* (Ach.) Nyl.: 14, 42 CR, **P:** 3, **Si:** 4 5
- \**Physconia detersa* (Nyl.) Poelt: 25 *Quercus* sp, **P:** 3, **Si:** 4
- Physconia distorta* (With.) J.R.Laundon: 2, 5 *P. orientalis*; *A. communis*; 4, 8, 15, 20, 24 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 15 M, **P:** 3 2 1, **Si:** 4 5
- Physconia enteroxantha* (Nyl.) Poelt: 2, 5, 21, 25, 26, 27 *Quercus* sp.; *P. orientalis*; *A. communis*; 4, 5, 8, 12, 16, 24 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- Physconia grisea* (Lam.) Poelt: 25 *Quercus* sp.; 41 SR, **P:** 3 2 1, **Si:** 3 5
- Physconia perisidiosa* (Erichsen) Moberg: 21, 25, 26 BT; 16 CT; 25 M; 42 S, **P:** 3 2, **Si:** 3 4
- Placidium rufescens* (Ach.) A. Massal.: 3, 5, 7, 17, 20, 24 25, 28, 29, 32, 38, 39, 40 S, **P:** 3, **Si:** 4 5
- Placidium squamulosum* (Ach.) Breus, **Si:** 6, 20, 40 S, **P:** 3 2, **Si:** 4 5
- Placocarpus schaeferi* (Fr.) Breus, **Si:** 5, 8, 20, 22, 25, 24, 30, 34 CR, **P:** 3, **Si:** 4 5
- \**Placynthiella uliginosa* (Schrad.) Coppins & P.Jame, **Si:** 20 *C. libani*, **P:** 3 2, **Si:** 3 4
- Placynthium nigrum* (Huds.) Gray: 4, 5, 6, 7, 8, 12, 14, 15, 17, 18, 20, 22, 24, 25, 27, 28, 30, 32 CR, **P:** 3 2 1, **Si:** 3
- Platismatia glauca* (L.) W.L.Culb. & C.F.Culb.: Öztürk et al. (2005), **P:** 3 2, **Si:** 3 5
- Pleurosticta acetabulum* (Necker) Elix & Lumbsch: 8, 10, 11, 15 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- \**Polycoccum marmoratum* (Kremp.) D.Hawksw.: 22 L. (on *Verrucaria* sp.), **P:** –, **Si:** –
- \**Protoblastenia incrustans* (DC.) J.Steiner: 14, CR, **P:** 3 2 1, **Si:** 3 5
- +\**Protoblastenia terricola* (Anzi) Lynge: 30 S, **P:** 3, **Si:** 4
- Protoparmeliopsis achariana* (A.L.Sm.) Moberg & R.Sant.: Öztürk et al. (2005), **P:** 3, **Si:** 3 4
- \**Protoparmeliopsis laatokkaensis* (Räsänen) Moberg & R.Sant.: 42 SR, **P:** –, **Si:** –
- Protoparmeliopsis muralis* (Schreb.) M. Choisy: 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 32, 34, 36, 37, 42, 43 CR; 42, 43 SR, **P:** 3 2 1, **Si:** 3 5

- Pseudevernia furfuracea* (L.) Zopf var. *ceratea* (Ach.) D.Hawksw.: 17, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- Pseudevernia furfuracea* (L.) Zopf var. *furfuracea*: 8, 10, 12, 15, 17, 18, 20, *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 3 5
- Psora decipiens* (Hedwig) Hoffm.: 5, 8, 14, 15, 20, 40 **S, P:** 3 2, **Si:** 4 5
- \**Psora testacea* Hoffm.: 20 **S, P:** 3, **Si:** 4 5
- \**Psora vallesiaca* (Schaer.) Timdal: 5, 6, 12, 24, 25, 27, 33 **CR, P:** 3, **Si:** 4
- Pyrenodesmia alociza* (A.Massal.) Arnold.: 3, 4, 6, 7, 8, 9, 13, 15, 18, 19, 20, 21, 22, 26, 28, 29, 30, 31, 36, 37, 40 **CR, P:** 3, **Si:** 4 5
- Pyrenodesmia chalybaea* (Fr.) A.Massal.: 3, 4, 6, 7, 9, 13, 18, 19, 20, 22, 24, 28, 29, 30, 32, 33, 36, 37, 40, **CR, P:** 3, **Si:** 4 5
- \**Pyrenodesmia erodens* (Tretiach, Pinna & Grube) Söchting, Arup & Frödén: 3, 7, 9, 13, 18, 19, 21, 26, 28, 29, 30, 32, 33, 36, 37, 41, 43 **CR, P:** 3 2, **Si:** 4 5
- Pyrenodesmia variabilis* (Pers.) A.Massal.: 8, 15, 18, 20, 22, 28 **CR, P:** 3 2 1, **Si:** 4 5
- \**Pyrrhospora querneana* (Dicks.) Körb.: 20 *C. libani*, **P:** 3 2, **Si:** 4 5
- Ramalina farinacea* (L.) Ach.: 8, 10 *Cedr.lib*, **P:** 3 2, **Si:** 3 5
- Rhizocarpon geminatum* Körb.: 42 **SR, P:** 3, **Si:** 3 4
- Rhizocarpon geographicum* (L.) DC.: 35, 41, 42, 43 **SR, P:** 3 2, **Si:** 3 5
- Rimodina dubyana* (Hepp) J.Steiner: Öztürk et al. (2005), **P:** 3 2, **Si:** 4
- \**Rimodina bischoffii* (Hepp) A.Massal.: 15, 32, 39, 41, 42 **CR, P:** 3, **Si:** 4 5
- Rimodina immersa* (Körb.) Arnold: 5, 18, 22, 28, 43 **CR, P:** 3, **Si:** 3 5
- Rimodina insularis* (Arnold) Hafellner: 42 L.(on *Lecanora rupicola*), **P:** 3, **Si:** 4
- Rimodina lecanorina* (A.Massal.) A. Massal.: 43 **CR, P:** 3, **Si:** 4 5
- Rimodina oleae* Bagl.: 15 *f. excelsa*, **P:** 3, **Si:** 3 5
- Rimodina pyrina* (Ach.) Arnold: 12, 15, 17, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- Rimodina sophodes* (Ach.) A.Massal.: 1, 2, 20, 21 *A. communis*; *S. alba*; 4, 15, 16, 20 *f. excelsa*; *P. nigra* var. *pallasiana*, **P:** 3 2, **Si:** 4 5
- \**Romjularia lurida* (Ach.) Timdal: 20 **S, P:** 3, **Si:** 4 5
- Rusavskia elegans* (Link) S.Y.Kondr. & Kärnefelt: 3, 4, 6, 7, 9, 13, 14, 15, 19, 29, 31, 36, 37, 43 **CR; 42 SR, P:** 3 2, **Si:** 4 5
- Sarcogyne fallax* H. Magn.: 12 **CR, P:** 3, **Si:** 3 4
- Scytinium gelatinosum* (With.) Otálora, P.M.Jørg. & Wedin: 20 **CT; 20, 32 S, P:** 3 2, **Si:** 4 5
- Scytinium lichenoides* (L.) Otálora, P.M.Jørg. & Wedin: 18, 28 **CR; 20 M; 30, 31 S, P:** 3 2, **Si:** 3 5
- Scytinium parvum* (Degel.) Otálora, P.M.Jørg. & Wedin: 5, 20 **CR, P:** 3, **Si:** 4 5
- Squamarina cartilaginea* (With.) P.Jame, **Si:** 5, 17, 24, 25 **CR; 12, 18, 28, 28, 30 S, P:** 3, **Si:** 3 5
- Squamarina gypsacea* (Sm.) Poelt: Şenkardeşler (2009), **P:** 3, **Si:** 4 5
- Squamarina lentigera* (Weber) Poelt: Öztürk et al. (2005), **P:** 3, **Si:** 4 5
- Staurothele areolata* (Ach.) Lettau: 3, 4, 6, 7, 9, 13, 18, 19, 28, 29, 32, 35, 36, 37, 38, 39, **CR, P:** 3, **Si:** 3 5
- Stigmatidium peltidae* (Vain.) R. Sant.: 20 L.(on *Peltigera ponojensis*), **P:** -, **Si:** -
- Tetramelas pulverulentus* (Anzi) A.Nordin & Tibell: 15, 20, 30 L.(on *Physciaceae*), **P:** 3, **Si:** 4 5
- Toninia candida* (Weber) Th. Fr.: 27, **CR; 17, 20 S, P:** 3, **Si:** 4 5
- Toninia diffracta* (A.Massal.) Zahlbr.: 24, 25, 28, 34 **CR; 12, 28 S, P:** 3, **Si:** 4 5
- Toninia opuntioides* (Vill.) Timdal: 27 **CR; 20 M; 12, 20 S, P:** 3, **Si:** 3 4
- Toninia physaroides* (Opiz) Zahlbr.: 24, 25 **CR; 20 S, P:** 3 2, **Si:** 4
- Toninia sedifolia* (Scop.) Timdal: 20 **M; 14 CR; 5, 20, 28, 30, 31 S, P:** 3 2, **Si:** 3 5
- Trapeliopsis flexuosa* (Fr.) Coppins & P. Jame, **Si:** 20 *C. libani*, **P:** 3 2, **Si:** 4 5
- Usnea filipendula* Stirt.: 10 *C. libani*, **P:** 3, **Si:** 3 5
- Usnea hirta* (L.) Weber ex F.H.Wigg.: 10, 11, 18 *C. libani*; *P. nigra* var. *pallasiana*, **P:** 3, **Si:** 4 5
- Variospora dolomiticola* (Hue) Arup, Söchting & Frödén: 32, 33 **CR, P:** 3 2, **Si:** 2 3
- Variospora flavescens* (Huds.) Arup, Söchting & Frödén: 14, 24, 25, 30, 32, 33, **CR; 40 M; 32 S, P:** 3 2 1, **Si:** 3 5
- Variospora velana* (A.Massal.) Arup, Söchting & Frödén: 32, 41 **CR, P:** 3 2, **Si:** 4 5
- Verrucaria compacta* (A.Massal.) Jatta: 24, 25, 32, 38, 39, 41, 43 **CR, P:** 3, **Si:** 4
- Verrucaria dolosa* Hepp: 30, 42 **CR, P:** 3, **Si:** 3
- Verrucaria muralis* Ach.: 15 **CR, P:** 2 1, **Si:** 3 4
- Verrucaria fuscella* (Turner) Winch: 15, 40 **CR, P:** 3, **Si:** 3 5
- Verrucaria nigrescens* Pers.: 3, 6, 15, 22 **CR, P:** 3 2 1, **Si:** 3 5
- Weddellomyces turcicus* Halıcı & Orange: 15, 24 L. (on *Caloplaca cerina* var. *cerina* and *Diplotomma epipolium*), **P:** -, **Si:** -
- Xanthocarpia crenulatella* (Nyl.) Frödén, Arup & Söchting: 20, 30, 40 **CR, P:** 3 2, **Si:** 4
- Xanthocarpia lactea* (A.Massal.) A.Massal.: 20 **CR, P:** 3 2 1, **Si:** 3
- Xanthocarpia ochracea* (Schaer.) A.Massal. & De Not.: 15, 28 **CR, P:** 3 2, **Si:** 3
- Xanthoria parietina* (L.) Th. Fr.: 4, 5, 8, 15, 16, 20 *C. libani*; *f. excelsa*; *P. nigra* var. *pallasiana*; 2, 5, 21, 23, 25, 26, 34 *Quercus* sp.; *M. alba*; *P. orientalis*; *A. communis*, **P:** 3 2 1, **Si:** 3 5



*Zwackhiomyces coepulonus* (Norman) Grube & R.Sant.: 35 L. (on *Flavoplaca coronata*), **P:** –, **Si:** –  
 +*Zwackhiomyces dispersus* (J.Lahm ex Körb.) Triebel & Grube: 30 L. (on *Protoblastenia terricola*), **P:** –, **Si:** –  
*Zwackhiomyces lecanorae* (Stein) Nik.Hoffm. & Hafellner: 20, 42 L. (on *Lecanora* sp.), **P:** –, **Si:** –

## Discussion

This study describes 230 infrageneric taxa on Barla Mountain. Of these, one lichenized, *Protoblastenia terricola*, and one lichenicolous fungus, *Zwackhiomyces dispersus*, are determined as new for Turkey. In addition, 194 taxa are reported for the first time from the mountain, with 101 taxa similarly reported from Isparta Province. The taxa number of the lichenized and lichenicolous fungi of Barla Mountain reached 241 with this present study.

*Protoblastenia terricola* grows on soil over weakly calcareous or dolomitic substrata and has arctic-alpine distribution (Wirth et al. 2013). Nimis and Martellos (2008) indicate its distribution from the Mediterranean-Montane belt to the vegetation above the tree line in Italy. It also contributes lichen rich soil crusts as well as Arctic Greenland (Hansen 2003). In this study, the species was collected from the summit of Karabeygir Tepe (2413 m) on calcareous soil, in a sun-exposed habitat, which has a weak eutrophication level.

The taxonomical characteristics of *Zwackhiomyces dispersus* fit well with those in the literature (Calatayud et al. 2007). It was found on the thallus of *Protoblastenia terricola*. This substratum is the second for the species, with the other being *Protoblastenia rupestris*.

Ninety-six percent of the taxa (including those found in this study, as well as those of previous records for Barla Mountain) have ecological indicator

values according to the Ecological Indicator Value Scale of Nimis and Martellos (2008), developed using Italian lichens. Considering the similarities in phytogeographical conditions, we evaluated our findings using their poleophoby and solar irradiation values.

Nimis and Martellos (2008) describe ‘Poleophoby’ as a parameter that points to the tendency of lichen to occur in areas experiencing different degrees of human disturbance. We analyzed our lichen taxa according to their four-class poleophoby scale, and found that Barla Mountain hosts eighty-nine taxa (40%) occurring only in natural or semi-natural habitats (class 3). Ninety-two taxa (41%) were placed in both classes 2 and 3. Class 2 covers lichens growing in moderately disturbed areas. There is only one species found in class 1, in which lichens occur in heavily disturbed areas. This significant grouping of the lichens indicates that Barla Mountain has natural or semi-natural habitats at the present time. Thirty-eight taxa (17%) of the mountain demonstrate weak poleophoby indicator values, because each of these is in three classes (classes 1, 2, and 3). Class 4 is reserved for the epiphytic species, which exclusively occur on old trees in ancient, undisturbed forests. Barla Mountain has only one such species, *Pannaria conoplea*, in class 4 (Figure 2).

Large, sun-exposed habitats are common on Barla Mountain, and this feature makes photophilous lichens dominant in the study area. Even photophilous lichens were observed in forests that usually lack dense canopies. According to the five-class Solar Irradiation Scale of Nimis and Martellos (2008), our study area hosts one lichen in sites with very high direct solar irradiation, e.g. on the southern side of isolated boles (class 5), 18 lichens that prefer sun-exposed sites but avoid extreme solar irradiation (class 4), and 94 species placed in both of these classes. These lichens make up 52%

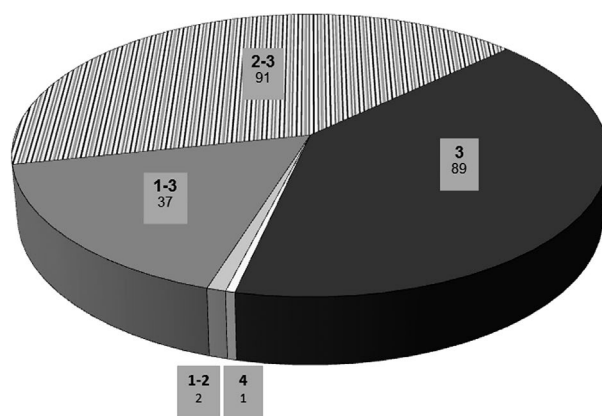


Figure 2. Distribution of Barla Mountain lichen taxa according to poleophoby scale of Nimis and Martellos (2008). (The bold numbers are poleophoby classes of the determined taxa.)

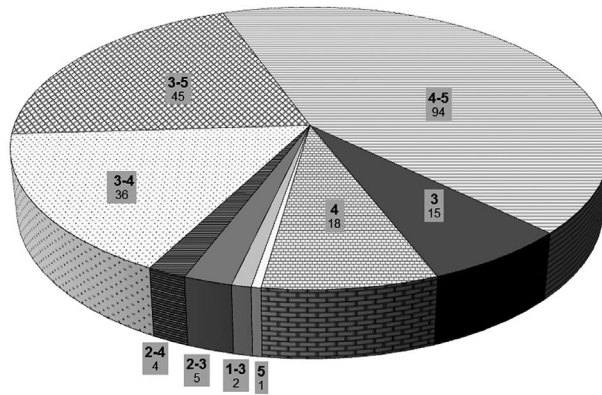


Figure 3. Distribution of Barla Mountain lichen taxa according to solar irradiation scale of Nimis and Martellos (2008). (The bold numbers are solar irradiation values of the determined taxa).

of all lichens having Solar Irradiation Scale values (Nimis and Martellos 2008). Fifteen lichens are placed in class 3. Class 3 contains lichens that grow in sites with plenty of diffuse light, but scarce direct solar irradiation, such as in rather open-canopied deciduous woodlands (Figure 3).

Substrate types, as well as climatic conditions and habitat features, largely govern the distribution of lichens (Wirth et al. 2013). CR are predominant in our study area. Siliceous rocks are rare, restricted to the localities numbered 41, 42, and 43 in Table I, and are present together with CR. Calcicolous lichens, such as *Acarospora cervina*, *Circinaria calcarea*, *Circinaria contorta*, *Clauzadea monticola*, *Dermatocarpon miniatum*, *Diplotomma epipolium*, *Lecidella patavina*, *Pyrenodesmia alociza*, *Pyrenodesmia chalybaea*, *Pyrenodesmia erodens*, *Pyrenodesmia variabilis*, *Squamarina cartilaginea*, and *Staurothele areolata* are very common in the study area.

The diversity of epiphytic lichen is affected by the types of bark along with the habitat conditions (Wirth et al. 2013). Natural forest vegetation, especially in the localities numbered 8, 10, 11, 18, and 20, is comprised of *Cedrus libani* and *Pinus nigra*, *Parmeliopsis ambigua*, *Pyrrhospora quernea*, *Micarea denigrata*, *Buellia griseovirens*, *Bryoria capillaris*, *Bryoria fuscescens*, *Bryoria nadvornikiana*, and *Letharia vulpina* commonly found on the barks of trees within the forests at these localities. On the bark of trees on the margins of these forests, and in maquis vegetation, photophilous and more xerophilous lichens are common.

The richest lichen diversity was found at Medet Pınarı (Table I) with 111 infrageneric taxa. This locality comprises different habitats, such as coniferous forests, valleys of creeks, and exposed or shaded places, as well as substrata, such as coniferous and broad leaved trees, mosses, soil, and rocks.

Eighteen lichenicolous fungi have been identified from the study area. Lichenicolous fungi are known

to be extremely common in mature lichen communities in rather natural habitats (Lawrey and Diederich 2003). The presence of a high number of lichenicolous fungi is another indication that the study area includes well-preserved habitats. In addition to these taxa, two lichenicolous lichens, *Carbonea vitellinaria* and *Rinodina insularis*, were found in the study area. Furthermore, a non-lichenized, non-lichenicolous fungus *Mycocalicium subtile* was also recorded at one locality. Species of this genus, earlier referred to as Caliciales, are traditionally included in lichenological lists (Tibell 1999).

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