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Lichenised and Lichenicolous Fungi of Aladağlar National Park (Niğde, Kayseri and Adana Provinces) in Turkey

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Abstract: Three hundred and two lichenised fungi taxa belonging to 90 genera and 45 lichenicolous fungi taxa belonging to 24 genera are reported from Aladağlar National Park. Of these, 290 lichenised fungi taxa and 21 lichenicolous fungi taxa are reported for the first time from Aladağlar National Park. Nine species of lichenised fungi, namely *Arthopyrenia fraxini* A.Massal., *Aspicilia obscurata* (Fr.) Arnold, *Cephalophysia leucospila* (Anzi) H.Kiliyas & Scheid., *Chaenotheca ferruginea* (Turner ex Sm.) Mig., *Collema texanum* var. *texanum* Tuck., *Leconora usbekica* Poelt, *Placidium boccanum* (Servit) Breuss, *Sarcogyne distinguenda* Th.Fr., and *Verrucaria latericola* Erichsen, are new to Turkey. One lichenicolous fungus species, *Stigmidium rouxianum* Calatayud & Triebel, is new to Turkey. Moreover, one saprobic fungus species, apparently in an initial phase of lichenisation, named *Dactylospora mediterranea* Sarrión & Hafellner, is also a new record for Turkey and it seems that this species is reported for the first time after its description in 2002. Furthermore, 107 taxa are new to Kayseri province, 97 taxa are new to Niğde province, and 24 taxa are new to Adana province. Comments on taxonomy, habitat, and substrata are provided for some interesting taxa.

Key Words: *Ascomycota*, lichens, coelomycetes, hyphomycetes

Aladağlar Milli Parkının (Niğde, Kayseri, Adana) Liken ve Likenikol Fungusları

Özet: Aladağlar Milli Parkından 90 cinse ait 302 likenleşmiş fungus taksonu ve 24 cinse ait 45 likenikol fungus taksonu rapor edilmiştir. 290 likenleşmiş fungus taksonu ve 22 likenikol fungus taksonu Aladağlar Milli Parkı'ndan ilk kez rapor edilmiştir. Dokuz likenleşmiş fungus taksonu Türkiye için yeni kayıttır: *Arthopyrenia fraxini* A.Massal., *Aspicilia obscurata* (Fr.) Arnold, *Cephalophysia leucospila* (Anzi) H.Kiliyas & Scheid., *Chaenotheca ferruginea* (Turner ex Sm.) Mig., *Collema texanum* var. *texanum* Tuck., *Leconora usbekica* Poelt, *Placidium boccanum* (Servit) Breuss, *Sarcogyne distinguenda* Th.Fr., *Verrucaria latericola* Erichsen. Bir likenikol fungus taksonu: *Stigmidium rouxianum* Calatayud & Triebel Türkiye için yeni kayıttır. Aynı zamanda, *Dactylospora mediterranea* Sarrión & Hafellner olarak adlandırılan ve açıkça likenleşmenin erken safhalarında bulunan saprofitik bir fungus türü Türkiye için yeni kayıttır ve bu tür 2002'deki tanımlamadan sonra ilk kez rapor edilmiştir. Ayrıca, 107 takson Kayseri ili için, 97 takson Niğde ili için ve 24 taxon Adana ili için yeni kayıt durumundadır. Bazı ilginç taksonların taksonomisi, habitat ve substratları hakkında yorumlar verilmiştir.

Anahtar Sözcükler: *Ascomycota*, likenler, coelomycetes, hyphomycetes

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Introduction

The Mediterranean phytogeographical region is an area of Turkey that has been well studied in terms of lichenology. A preliminary catalogue of lichenised and lichenicolous fungi of this area was previously provided by John (1996). After this catalogue was published, some detailed studies were carried out in this region and published (Tufan et al., 2005; Halıcı & Güvenç, 2008). Definitely much more detailed studies should be carried to have a better idea about the lichenised and lichenicolous fungi biodiversity of this area. By considering this problem, we started a project entitled "Lichens and lichenicolous fungi of Aladağlar National Park (Adana, Niğde, Kayseri)" in 2005. There was no record of any lichen or lichenicolous fungi taxa before this project was started, mainly because transportation to this area is very difficult. As a result of this project, one new genus of lichenicolous fungi, namely *Gemmaspora* (Hawksworth & Halıcı, 2007), and five species of lichenicolous fungi, namely *Endococcus variabilis* (Halıcı et al., 2007a), *Polycoccum acarosporicola*, *P. aksoyi* (Halıcı et al., 2007b), *Stigmidium johnii* (Halıcı & Hawksworth, 2007), and *Weddellomyces turcicus* (Halıcı et al., 2005a), were described. In addition, six taxa of lichens and five taxa of lichenicolous fungi collected from Aladağlar National Park were detailed in Halıcı et al. (2006), along with five taxa of lichenicolous fungi in Halıcı et al. (2007c), five taxa of lichens and eight taxa of lichenicolous fungi in Halıcı et al. (2007d), one species of lichenicolous fungi in Halıcı (2008a), and three species of lichenicolous fungi in Candan and Halıcı (2008). Here, we provide a full list of lichenised and lichenicolous fungi taxa identified from the collections between 2005 and 2007 in Aladağlar National Park.

Study area

Aladağlar National Park is in the middle of the Taurus mountain range and is one of the largest national parks in Turkey, covering an area of approximately 55,000 ha. It is situated within the Central Anatolia and Mediterranean political regions. The park is located at 37°41'-37°55'N and 35°04'-35°26'E. It is located in a high mountain chain near the eastern border of the Ecemiş River Valley, in the eastern part of the middle Taurus mountain range. The north-western and western parts are within Niğde province (11,464 ha), the northern parts are within Kayseri province (31,358 ha), and the southern and eastern parts are within Adana province (11,702 ha)

(Figure 1). In this huge park, the summit of Demirkazık at 3756 m is the highest point in the middle Taurus mountain range. The lowest altitude is 620 m in vicinity of Kapuzbaşı Waterfalls.

The annual mean precipitation is 707.2 mm in Pozantı, 451.2 mm in Yahyalı, and 388.7 mm in Çamardı. According to measurements from these stations, the study area has a Mediterranean climate characterised by dry summers and warm temperatures. This is a typical first variant of the East Mediterranean climate in Pozantı and second variant of the East Mediterranean climate in Yahyalı and Çamardı stations (Akman, 1990). According to Emberger's Mediterranean Bioclimate layers classification, the study area is semi-arid and Mediterranean (Akman, 1990).

In Aladağlar National Park, mainly forest vegetation, steppe vegetation, and rock vegetation are seen. In the south-east part of the park (Kapuzbaşı Waterfalls), the most common maquis elements belonging to Mediterranean phytogeographical region are *Sytrax officinalis* L. and *Pistacia terebinthus* L. Between Ulupınar village and Kapuzbaşı Waterfalls, deciduous forests are predominant in which *Ostrya carpinifolia* Scop. is dominant. *Sambucus ebulus* L., *Populus tremula* L., *Pyrus syriaca* Boiss. var. *syriaca*, *Acer sempervirens* L., *Pistacia terebinthus*, *Juniperus excelsa* M.Bieb., *J. oxycedrus* L. subsp. *oxycedrus*, *Pinus nigra* J.F.Arnold, *Platanus orientalis* L., and *Rhus coriaria* L. are also important species of tree and shrubs in these forests. Hacer Forests are the biggest forest area in the park. In these forests, *Pinus nigra* and *Abies cilicica* (Antoine & Kotschy) Carriere subsp. *cilicica* are predominant. Some tree and shrub species such as *Cedrus libani* A.Rich., *Juniperus oxycedrus* subsp. *oxycedrus*, *J. excelsa*, *Quercus pubescens* Willd., *Ostrya carpinifolia*, *Ulmus glabra* Huds., *Berberis crataegina* DC., *Pistacia terebinthus*, *Acer monspessulanum* L. subsp. *microphyllum* (Boiss.) Bornm. are also present (Tüfekçi et al., 2002). Pos Forests are located in the southern part of the park, within Adana province. The predominant tree and shrub species are *Pinus brutia* Ten., *P. nigra*, *Abies cilicica*, *Cedrus libani*, *Quercus pubescens*, *Q. libani* Olivier, *Q. cerris* L. var. *cerris*, *Q. petraea* (Matt.) Liebl., *Q. coccifera* L., *Ulmus glabra*, *Pistacia terebinthus*, *Juniperus drupacea* Labill., *J. excelsa*, *J. foetidissima* Willd., and *J. oxycedrus* subsp. *oxycedrus* in these forests (Yurdakulol, 1977).

Materials and Methods

The lichen and lichenicolous fungi specimens were collected from 89 localities between 2005 and 2007. We considered altitude, substratum, and inclination in the choice of localities. All samples are now stored in the lichen herbarium of Erciyes University's Biology Department. The taxa are listed in alphabetical order followed by the collection locality numbers and substrata. The taxa previously described or reported from Aladağlar National Park are also listed here and references are given.

In general, spot tests were performed to determine the compounds in the lichens that are necessary for

identification. TLC was carried out to determine some of the compounds in Solvent System C (Orange et al., 2001) when the results of spot tests were inconclusive. Numbers of species identified from the national park were compared with the species deposited in the Lichen Section of the Natural History Museum, London (BM) and MAF (Departamento de Biología Vegetal II, Facultad de Farmacia, Universidad Complutense de Madrid). The nomenclature follows Hafellner and Türk (2001) and other recent results (Blanco et al., 2004). Abbreviations of author names are according to Kirk and Ansell (1992). The collecting localities are given in the Table and the distributions of these localities are shown in the Figure.

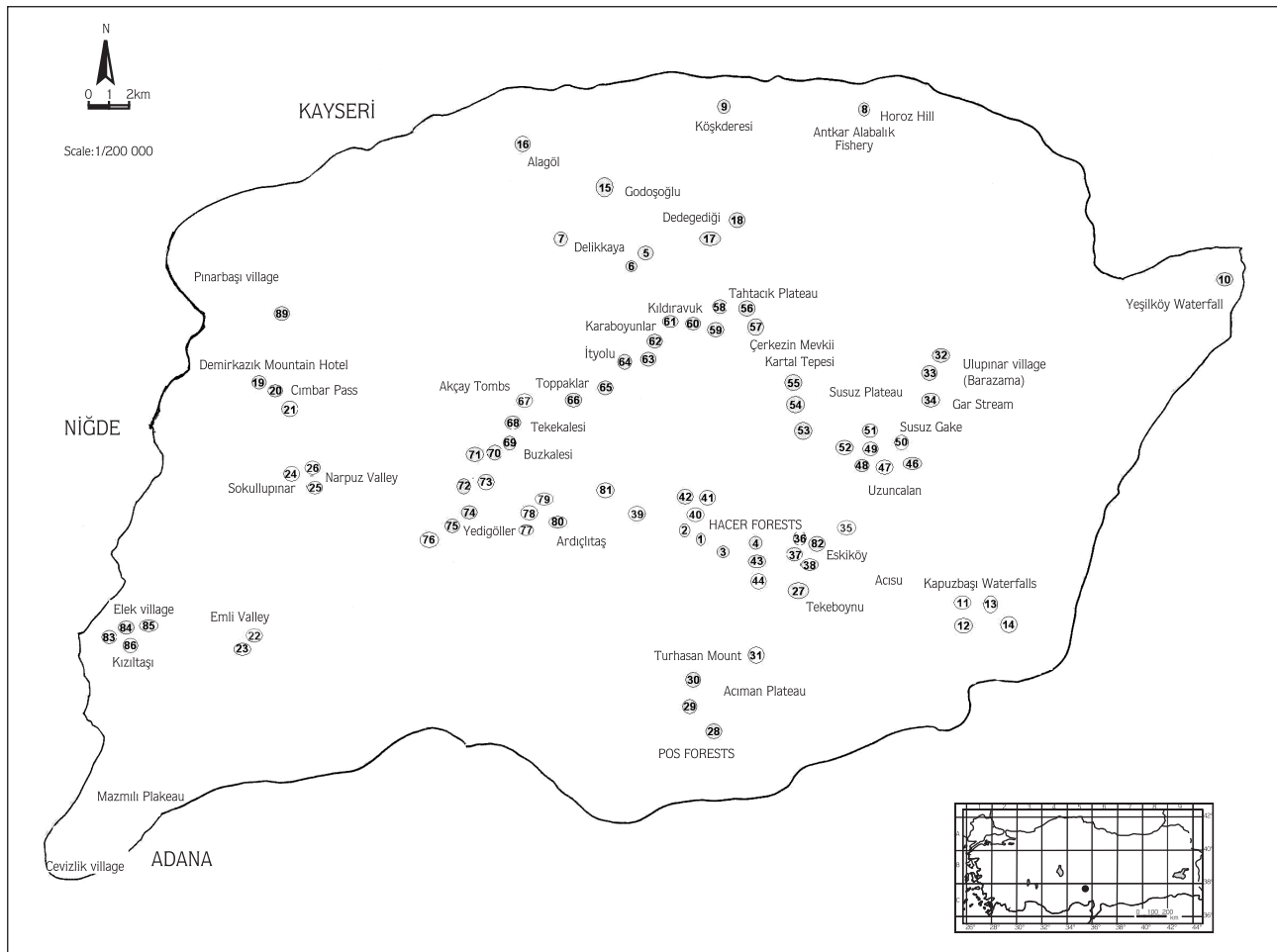


Figure. Map of the study area showing the collecting localities.

Table. The collecting localities in the study area.

Locality no.	Date of collection	GPS coordinates	Locality name	Altitude (m)
1	20.09.2005	37°48'07"N, 35°16'91"E	Kayseri, Yahyalı, Hacer Forest	1727
2	20.09.2005	37°48'15"N, 35°16'87"E	Kayseri, Yahyalı, Hacer Forest	1690
3	20.09.2005	37°47'90"N, 35°17'88"E	Kayseri, Yahyalı, Hacer Forest	1595
4	20.09.2005	37°47'93"N, 35°18'13"E	Kayseri, Yahyalı, Hacer Forest	1648
5	03.10.2005	37°54'94"N, 35°15'50"E	Kayseri, Yahyalı, Delikkaya	2910
6	03.10.2005	37°54'84"N, 35°15'45"E	Kayseri, Yahyalı, Delikkaya	2940
7	03.10.2005	37°55'24"N, 35°13'41"E	Kayseri, Yahyalı, Delikkaya	3000
8	03.10.2005	37°58'10"N, 35°21'14"E	Kayseri, Yahyalı, Antkar Aladağ Fishery	1740
9	03.10.2005	37°58'56"N, 35°17'69"E	Kayseri, Yahyalı, Around Köşkeresi	1915
10	08.07.2006	37°54'20"N, 35°29'55"E	Kayseri, Yahyalı, Yeşilköy Waterfall	844
11	08.07.2006	37°46'08"N, 35°23'38"E	Kayseri, Yahyalı, Kapuzbaşı Waterfalls	691
12	08.07.2006	37°46'04"N, 35°23'31"E	Kayseri, Yahyalı, Kapuzbaşı Waterfalls	700
13	09.07.2006	37°46'14"N, 35°23'73"E	Kayseri, Yahyalı, Kapuzbaşı Waterfalls	620
14	09.07.2006	37°46'08"N, 35°24'06"E	Kayseri, Yahyalı, Kapuzbaşı Waterfalls, Büyükçakır village	635
15	10.07.2006	37°56'63"N, 35°14'83"E	Kayseri, Yahyalı, Godoşoğlu	2680
16	10.07.2006	37°57'47"N, 35°12'78"E	Kayseri, Yahyalı, Around Alagöl	2880
17	10.07.2006	37°55.392'N, 35°17.376'E	Kayseri, Yahyalı, Gökoluk, Dedegediği Pass	2430
18	11.07.2006	37°55'84"N, 35°17'42"E	Kayseri, Yahyalı, Gökoluk	2340
19	12.07.2006	37°51'72"N, 35°06'14"E	Niğde, Çamardı, Demirkazık	1535
20	12.07.2006	37°51'34"N, 35°06'76"E	Niğde, Çamardı, Cımbar Pass	1700
21	12.07.2006	37°51'05"N, 35°07'10"E	Niğde, Çamardı, End of Cımbar Pass	1900
22	13.07.2006	37°45.886'N, 35°06.454'E	Niğde, Çamardı, Emli Valley	1840
23	13.07.2006	37°45'81"N, 35°06'44"E	Niğde, Çamardı, Towards the south-west of Emli Valley	1920
24	13.07.2006	37°49'50"N, 35°07'03"E	Niğde, Çamardı, Sokullupınar	2030
25	02.08.2006	37°49'46"N, 35°07'26"E	Niğde, Çamardı, 1st Narpuz Valley	2150
26	02.08.2006	37°49'47"N, 35°07'40"E	Niğde, Çamardı, 2nd Narpuz Valley	2200
27	03.08.2006	37°46'64"N, 35°19'16"E	Kayseri, Yahyalı, Between Kapuzbaşı and Ulupınar village road, Tekeboynu, in vicinity of Atoluk Hill	1270
28	03.08.2006	37°43'35"N, 35°17'05"E	Adana, Acıman Plateau, Pos Forest	1610
29	03.08.2006	37°44'05"N, 35°16'66"E	Adana, Acıman Plateau, Turhasan Hill	2000
30	03.08.2006	37°44'11"N, 35°16'67"E	Adana, Acıman Plateau, Turhasan Hill	2050
31	03.08.2006	37°45'28"N, 35°18'02"E	Adana, Around Turhasan Mountain	2000
32	04.08.2006	37°52'32"N, 35°22'71"E	Kayseri, Yahyalı, Ulupınar village, Emin Kadı Bridge	1240
33	04.08.2006	37°52'33"N, 35°22'67"E	Kayseri, Yahyalı, Ulupınar village, Emin Kadı Bridge	1270
34	05.08.2006	37°51'04"N, 35°22'55"E	Kayseri, Yahyalı, Ulupınar village, Ger Stream	1210
35	05.08.2006	37°48'25"N, 35°20'10"E	Kayseri, Yahyalı, Ulupınar village	1150
36	05.08.2006	37°48'29"N, 35°19'63"E	Kayseri, Yahyalı, Ulupınar village, Eskiköy	1200
37	06.08.2006	37°47'98"N, 35°19'14"E	Kayseri, Yahyalı, between Eskiköy and Hacer Forest	1330
38	06.08.2006	37°47'40"N, 35°19'75"E	Kayseri, Yahyalı, Kapuzbaşı, Acısu junction	1020
39	07.08.2006	37°48'61"N, 35°15'59"E	Kayseri, Yahyalı, Hacer Forest	1770
40	07.08.2006	37°48'60"N, 35°15'94"E	Kayseri, Yahyalı, Hacer Forest	1745
41	07.08.2006	37°48'67"N, 35°16'99"E	Kayseri, Yahyalı, Hacer Forest	1770
42	07.08.2006	37°48'50"N, 35°16'77"E	Kayseri, Yahyalı, Hacer Forest	1800
43	08.08.2006	37°47'93"N, 35°18'14"E	Kayseri, Yahyalı, Hacer Forest, Fasıcı	1640

Table. Continued.

Locality no.	Date of collection	GPS coordinates	Locality name	Altitude (m)
44	08.08.2006	37°47'91"N, 35°18'11"E	Kayseri, Yahyalı, Hacer Forest, Fasıcı	1670
45	08.08.2006	37°48'11"N, 35°18'46"E	Kayseri, Yahyalı, Hacer Forest	1600
46	24.08.2006	37°49'94"N, 35°21'37"E	Kayseri, Yahyalı, Ulupınar village, Uzuncalan	1120
47	24.08.2006	No coordinates	Kayseri, Yahyalı, Ulupınar village, Susuz Gate	1150
48	24.08.2006	37°49'99"N, 35°20'97"E	Kayseri, Yahyalı, Ulupınar village, Susuz Valley	1230
49	25.08.2006	No coordinates	Kayseri, Yahyalı, Ulupınar village, Susuz Valley	1300
50	25.08.2006	No coordinates	Kayseri, Yahyalı, Ulupınar village, Susuz Valley	1350
51	25.08.2006	37°49'99"N, 35°20'97"E	Kayseri, Yahyalı, Ulupınar village, Susuz Valley, Gecek	1450
52	25.08.2006	37°50'09"N, 35°20'34"E	Kayseri, Yahyalı, Ulupınar village, Susuz Valley, Gecek	1500
53	26.08.2006	37°50'94"N, 35°19'32"E	Kayseri, Yahyalı, Ulupınar village, Susuz Valley	1900
54	26.08.2006	37°51'38"N, 35°19'48"E	Kayseri, Yahyalı, Ulupınar village, Kartaltepesi	2210
55	26.08.2006	37°51'59"N, 35°19'29"E	Kayseri, Yahyalı, Ulupınar village, Kartalçukuru	2290
56	27.08.2006	37°53'38"N, 35°17'62"E	Kayseri, Yahyalı, Tahtacık Plateau	2360
57	27.08.2006	37°53'12"N, 35°17'28"E	Kayseri, Yahyalı, Tahtacık Plateau, Çerkez	2510
58	27.08.2006	37°53'12"N, 35°17'22"E	Kayseri, Yahyalı, Tahtacık Plateau, Çerkez	2540
59	27.08.2006	37°53'02"N, 35°17'00"E	Kayseri, Yahyalı, between Tahtacık Plateau and Karagedik	2640
60	09.09.2006	37°53'08"N, 35°16'85"E	Kayseri, Yahyalı, Kıldıravuk	2670
61	09.09.2006	37°53'04"N, 35°16'16"E	Kayseri, Yahyalı, Karaboyunlar	2815
62	09.09.2006	37°52'97"N, 35°15'90"E	Kayseri, Yahyalı, Karaboyunlar	2795
63	09.09.2006	37°52'28"N, 35°15'62"E	Kayseri, Yahyalı, İtyolu	2740
64	09.09.2006	37°52'04"N, 35°15'24"E	Kayseri, Yahyalı, İtyolu	2720
65	10.09.2006	37°51'64"N, 35°14'84"E	Kayseri, Yahyalı, Öküzçukuru	2765
66	10.09.2006	37°51'29"N, 35°13'99"E	Kayseri, Yahyalı, Toppaklar	2760
67	10.09.2006	37°51'28"N, 35°12'86"E	Kayseri, Yahyalı, Akçay Tombs	2900
68	10.09.2006	37°50'77"N, 35°12'35"E	Kayseri, Yahyalı, Tekekalesi	3155
69	10.09.2006	37°50'29"N, 35°12'12"E	Kayseri, Yahyalı, Buzkalesi	3250
70	10.09.2006	37°50'27"N, 35°11'94"E	Kayseri, Yahyalı, Dirsek	3320
71	10.09.2006	37°50'01"N, 35°11'90"E	Kayseri, Yahyalı, Yedigöller, Düz kır	3500
72	10.09.2006	37°49'30"N, 35°11'42"E	Kayseri, Yahyalı, Yedigöller, Düz kır	3070
73	01.10.2006	37°49'32"N, 35°11'27"E	Kayseri, Yahyalı, Yedigöller, Karanlık bucak	3080
74	01.10.2006	37°48'79"N, 35°11'032"E	Kayseri, Yahyalı, Yedigöller	3160
75	01.10.2006	37°48'21"N, 35°10'93"E	Kayseri, Yahyalı, Yedigöller	3090
76	01.10.2006	37°48'11"N, 35°10'87"E	Kayseri, Yahyalı, Yedigöller	3080
77	01.10.2006	37°48'26"N, 35°12'21"E	Kayseri, Yahyalı, Yedigöller, Kurugöl	2950
78	08.07.2007	37°48'42"N, 35°12'64"E	Kayseri, Yahyalı, Yedigöller-Hacer Forest, Ardıçlıtaş	2855
79	08.07.2007	37°48'45"N, 35°12'90"E	Kayseri, Yahyalı, Yedigöller-Hacer Forest, Ardıçlıtaş	2750
80	09.07.2007	37°48'46"N, 35°13'11"E	Kayseri, Yahyalı, Avpınarı-Hacer Forest	2600
81	09.07.2007	37°49'25"N, 35°14'72"E	Kayseri, Yahyalı, Yedigöller-Hacer Forest	1960
82	10.07.2007	37°49'25"N, 35°14'72"E	Kayseri, Yahyalı, Ulupınar village, in vicinity of Eskiköy Fountain	1260
83	10.07.2007	37°45'673"N, 35°02'98"E	Niğde, Elekgölü village, Kızılıntaş Hill	1600
84	11.07.2007	37°45'76"N, 35°03'12"E	Niğde, Elekgölü village, Kızılıntaş Hill	1720
85	11.07.2007	37°45'76"N, 35°03'30"E	Niğde, Elekgölü village, Kızılıntaş Hill,	1750
86	12.07.2007	37°45'62"N, 35°03'38"E	Niğde, Elekgölü village, Kızılıntaş Hill	1780
87	12.07.2007	37°40'88"N, 35°01'46"E	Niğde, Cevizlik, Mazmılı Plateau	1310
88	13.07.2007	37°40'85"N, 35°01'60"E	Niğde, Cevizlik, Mazmılı Plateau	1325
89	13.07.2007	37°53'23"N, 35°06'94"E	Niğde, Çamardı, Demirkazık, East of Pınarbaşı village	1670

List of taxa and comments on some species

Symbols used in the list of taxa

● New record for Turkey, ♣ Lichenicolous fungi, * New record for Kayseri province, Δ New record for Niğde province, Ω New record for Adana province

♣* *Abrothallus parmeliarum* (Sommerf.) Arnold – 44: On *Parmelia saxatilis*; this species was previously only recorded from İzmir province in Turkey (John, 1996).

Acarospora cervina A.Massal. – 1, 5, 6, 7, 9, 17, 19, 21, 22, 23, 24, 26, 32, 35, 36, 37, 39, 40, 41, 44, 52, 54, 55, 56, 57, 67, 68, 79, 81, 83, 85, 87, 88, 89 (calcareous rocks)

Ω *A. fuscata* (Nyl.) Arnold – 27, 30, 31, 60, 84 (siliceous rocks)

A. glaucocarpa (Wahlenb. ex Ach.) Körb. – 23 (calcareous rocks)

* *A. heppii* (Nägeli) Nägeli – 9 (calcareous rocks)

A. hospitans H.Magn. – 18 (lichenicolous lichen): this species was observed as parasitic on the areoles of *Aspicilia cinerea* on siliceous rocks.

Δ *A. insolata* H.Magn. – 26 (siliceous rocks): on hard siliceous rocks in limestone-serpentine transition area.

* *A. macrospora* (Hepp) A.Massal. ex Bagl. – 5, 18 (calcareous rocks)

*Δ *A. murorum* A.Massal. – 23, 44 (calcareous rocks): This species was recently recorded as a new record for Turkey by Candan and Özdemir Türk (2008) from Malatya and Adıyaman provinces. It clearly differs from the closely related *A. macrospora* by having greenish squamules as also stated by Purvis and James (1992a). In the study area, *A. macrospora* has a distribution between 2500 and 3000 m altitudes, whereas this species is only observed between 1500 and 2000 m.

* *A. nitrophila* H.Magn. – 18 (siliceous rocks)

Δ *A. scabra* (Pers.) Th.Fr. – 9, 26, 61, 62 (calcareous rocks)

* *Amandinea punctata* (Hoffm.) Coppins & Scheid. – 3 (*Abies cilicica*)

Δ *Anaptychia ciliaris* (L.) Körb. – 3 (*Abies cilicica*, mosses), 4 (*Abies cilicica*, *Pinus* sp., *Populus tremula*), 22 (*Abies cilicica*), 35 (*Pinus* sp.), 44 (*Abies cilicica*), 62 (terricolous): This species is very common on the bark, it also has a large cover in the crevices of big calcareous

rocks at 2800 m altitude on a thin soil layer with *Xanthoria contortuplicata*.

* *A. kaspica* Gyeln. – 4 (*Populus tremula*), 44 (*Abies cilicica*): This species was only previously recorded from Kırklareli province in the European part of Turkey by Özdemir Türk and Güner (1998). It has a relatively large cover in the forest belt of the study area, and may be more widespread in the Mediterranean region in Turkey.

Anisomeridium viridescens (Coppins) R.C.Haris – 2 (*Cedrus libani*): Halıcı et al. (2006).

♣ *Arthonia intexta* Almq. – 22: In the hymenium of *Lecidella patavina*. Previously reported in the hymenium of *Protoparmeliopsis muralis* from Niğde province in Turkey (Halıcı et al., 2007c).

*Δ *A. lapidicola* (Taylor) Branth & Rostr. – 9, 40, 70, 85 (calcareous rocks), 18, 84 (siliceous rocks)

♣ *A. molendoi* (Heufl. ex Frauenf.) R.Sant. – 7, 22, 24, 58, 61, 62, 71: This lichenicolous species has a large cover on the thalli and apothecia of *Caloplaca crenulatella*, *C. flavescens*, *Fulgensia schistidii*, and *Xanthoria elegans* in the study area.

♣ *A. lecanorina* (Almq.) R.Sant. – 87: Lichenicolous on the apothecia of *Lecanora hagenii* var. *hagenii*. This species collected from another locality on the apothecia of *Lecanora flotowiana* in Aladağlar National Park was detailed by Candan and Halıcı (2008).

♣Ω *A. varians* (Davies) Nyl. – 18, 30, 31: In the hymenium of *Lecanora bicincta* and *L. rupicola*.

● *Arthopyrenia fraxini* A.Massal. – 36 (*Quercus*): This species was collected from the smooth bark of *Quercus* sp. in a locality where chickpea agriculture is carried out. New record for Turkey!

Δ *Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold – 23 (calcareous rocks), 27, 31 (siliceous rocks)

A. calcarea (L.) Körb. – 5, 6, 9, 11, 17, 22, 24, 35, 39, 41, 47, 54, 55, 56, 57, 65, 81, 83, 87, 88, 89 (calcareous rocks)

* *A. candida* (Anzi) Hue – 5 (calcareous rocks): Only recorded from Van province in Turkey (Szatala, 1941). The species seems to be restricted to the alpine belt of the study area.

*Δ *A. cheresina* (Müll. Arg.) Hue var. *cheresina* – 7, 9, 39, 62, 83 (calcareous rocks): No lichen compounds in TLC.

* *A. cheresina* var. *justii* (Servit) Clauzade & Cl.Roux – 9 (calcareous rocks): Only previously recorded from Şanlıurfa province in Turkey by Oran and Öztürk (2007). This record is dubious, as those authors did not mention any information about using TLC in their paper. Norstictic and stictic acids in TLC.

A. cheresina var. *microspora* (Arnold) Clauzade & Cl.Roux – 9 (calcareous rocks): Halıcı et al. (2007d).

A. cinerea (L.) Körb. – 18, 30, 38, 34, 84 (siliceous rocks) – Common on siliceous rocks in the study area.

Δ *A. contorta* subsp. *contorta* (Hoffm.) Kremp. – 17, 23, 30, 35, 39 (calcareous rocks)

Ω *A. contorta* subsp. *hoffmanniana* S.Ekman & Fröberg – 9, 17, 26, 27, 31, 32, 33, 38, 39, 54, 67, 83, 84, 85, 87, 88 (calcareous rocks)

* Δ *A. coronata* (A.Massal.) Anzi – 9, 26, 85, 87 (calcareous rocks)

Δ *A. cupreoglauca* de Lesd. – 84 (siliceous rocks)

A. desertorum (Kremp.) Mereschk. – 7, 9, 17, 20, 23, 54, 55, 65, 67, 81, 87 (calcareous rocks), 59 (siliceous rocks)

Δ *A. farinosa* (Flörke) Motyka – 19, 54, 82, 89 (calcareous rocks)

* *A. hispida* Mereschk. – 77 (terricolous): Observed only at one locality at 2950 m altitude as vagrant on a thin soil layer under big calcareous rocks. This species is observed to be eaten abundantly by goats when the soil vegetation is poor.

A. intermutans (Nyl.) Arnold – 18, 27, 30, 31, 38, 88 (siliceous rocks)

* *A. laevata* (Ach.) Arnold – 9 (calcareous rocks)

● *A. obscurata* (Fr.) Arnold – 18 (siliceous rocks) – This rare species has a distribution in the boreal and montane belts of Central Europe (Wirth, 1995).

A. polychroma Anzi – 11, 67 (calcareous rocks): Previously only recorded in Turkey from volcanic Erciyes Mountain in Kayseri province, by Steiner (1905).

* *A. simoënsis* Räsänen – 34 (siliceous rocks)

Δ *A. viridescens* (A.Massal.) Hue – 3, 22 (calcareous rocks)

* *Bacidia subincompta* (Nyl.) Arnold – 42 (*Pinus* sp.): This species is known on acidic barks in Europe and North America (Llop, 2007).

B. laurocerasi (Delise ex Duby) Zahlbr. – 4 (*Pinus nigra*): Halıcı et al. (2006).

Bagliettoa parmigera (J.Steiner) Vězda & Poelt – 32 (calcareous rocks)

* *Bryoria capillaris* (Ach.) Brodo & D.Hawksw. – 44 (*Abies cilicica*)

* *B. fuscescens* (Gyeln.) Brodo & D.Hawksw. – 3 (*Abies cilicica*), 4 (*Abies cilicica*, *Pinus* sp.), 27, 42, 44 (*Pinus* sp.): Soralia sometimes absent in the specimens collected in the study area. In those specimens, fumarprotocetraric acid is generally not observed in TLC.

Buellia erubescens Arnold – 4 (*Abies cilicica*): Halıcı et al. (2006).

* *B. griseovirens* (Turner & Borrer ex Sm.) Almb. – 2 (*Pinus* sp.), 3 (*Abies cilicica*), 4 (*Abies cilicica*, *Populus tremula*), 52 (*Juglans regia*): Common on the acidic and basic barks in the study area.

* *B. leptoclina* (Flot.) A.Massal. – 27 (siliceous rocks)

* *B. spuria* (Schaer.) Anzi – 18 (siliceous rocks)

* Ω *Caloplaca agardhiana* (A.Massal.) Clauzade & Cl.Roux – 9, 19, 21, 30, 32, 33, 36, 39, 41, 52, 54, 65, 74, 77, 83, 85 (calcareous rocks): Very common on hard calcareous rocks between 1000 and 3500 m in the study area.

* *C. alociza* (A.Massal.) Mig. – 1, 9, 16, 17, 26, 37, 68 (calcareous rocks)

C. aractina (Fr.) Häyrén – 18 (siliceous rocks): On hard siliceous rocks in limestone-serpentine transition area.

C. atroflava (Turner) Mong. – 27 (siliceous rocks)

* Δ *C. aurantia* (Pers.) Hellb. – 24, 82 (calcareous rocks): On well-lit hard calcareous rocks in nutrient-rich habitats in the study area.

* *C. biatorina* (A.Massal.) J.Steiner – 16, 61, 65, 70, 71, 75, 76, 83 (calcareous rocks)

Δ *C. cerina* var. *cerina* (Ehrh. ex Hedw.) Th.Fr. – 2 (*Cedrus libani*), 4, 37, 39, 42 (*Pinus* sp.), 22, 23, 44, 86, 87 (*Abies cilicica*), 36 (*Quercus* sp.), 47, 51, 52 (*Juglans regia*), 41 (*Populus tremula*)

C. cerina var. *muscorum* (A.Massal.) Jatta – 18 (Mosses): On burnt mosses on exposed siliceous rocks.

C. chalybaea (Fr.) Müll.Arg. – 17, 19, 22, 24, 39, 65, 83, 85, 87 (calcareous rocks): Common on exposed calcareous rocks.

Δ *C. chlorina* (Flot.) Sandst. – 87 (*Juniperus* sp.): Especially on the base of *Juniperus* trunk.

Δ *C. circumalbata* (Delise) Wunder – 5, 7, 19, 32, 33, 37, 67, 79, 87, 88 (calcareous rocks): This species has a wide distribution in arid and semi-arid habitats of southern Mediterranean parts of Europe and Asia, North Africa, and Afghanistan (Wunder, 1974). Wunder (1974) reported that the highest altitude at which this species is distributed is 2200 m in Afghanistan. However, we collected this species from 3 localities between 2700 and 3000 m in the study area. Only known from Kayseri (Halıcı & Aksoy, 2006) and Gaziantep (Halıcı et al., 2007e) in Turkey, but probably has a wider distribution in southern Turkey.

Δ *C. cirrochroa* (Ach.) Th.Fr. – 24 (calcareous rocks)

C. citrina (Hoffm.) Th.Fr. – 15, 17 (calcareous rocks)

Δ *C. crenularia* (With.) J.R.Laundon – 30, 84 (siliceous rocks)

Δ *C. crenulatella* (Nyl.) H.Olivier – 9, 15, 19, 22, 24, 68, 72, 79, 83 (calcareous rocks): Common on hard calcareous rocks between 1500 and 3500 m.

C. decipiens (Arnold) Blomb. & Forssell – 83 (calcareous rocks)

Δ* *C. diphyodes* (Nyl.) Jatta – 20, 83 (calcareous rocks), 59 (siliceous rocks): Thallus not or weakly developed in the specimens collected from the study area. On rocks with low calcareous content and sometimes siliceous rocks. This species has a wide distribution range especially on calciferous schists in Europe (Wunder, 1974).

C. dolomiticola (Hue) Zahlbr. – 5, 9, 19, 30, 35, 54, 55, 79, 83, 88 (calcareous rocks)

C. epiphyta Lynge – 32, 62 (terricolous): Collected from the soil present in the crevices of big calcareous rocks with cyanolichens. Previously only reported from Şirvan Mountain (Pınarbaşı, Kayseri) by Halıcı and Aksoy (2006). This species may have a wider distribution range in Turkey.

* *C. erythrocarpia* (Pers.) Zwackh – 11, 32 (calcareous rocks): Especially at lower altitudes on hard calcareous rocks.

C. ferruginea (Huds.) Th.Fr. – 3 (*Abies cilicica*), 42 (*Pinus* sp.)

C. flavescens (Huds.) J.R.Laundon – 5, 7, 16, 17, 18,

24, 26, 32, 54, 56, 57, 58, 60, 61, 62, 65, 67, 68, 70, 77, 81, 83, 84, 87, 89 (calcareous rocks)

Δ *C. flavorubescens* (Huds.) J.R.Laundon – 2 (*Cedrus libani*), 4 (*Populus tremula*), 22, 23, 42 (*Abies cilicica*), 36 (*Quercus* sp.), 37, 39 (*Pinus* sp.), 87 (*Juniperus* sp.)

C. flavovirescens (Wulfen) Dalla Torre & Sarnth. – 5, 9, 17, 21, 26, 39, 57, 64 (calcareous rocks)

Δ *C. haematites* (Chaub. ex St.-Amans) Zwackh – 23 (*Abies cilicica*)

C. holocarpa (Hoffm.) A.E.Wade – 3 (*Abies cilicica*), 23 (*Juniperus* sp.), 34 (*Pinus* sp.), 65 (calcareous rocks)

Δ *C. inconnexa* (Nyl.) Zahlbr. – 87, 88 (lichenicolous lichen): Observed as lichenicolous on lichens on calcareous rocks such as *Aspicilia calcarea* and *Caloplaca variabilis*. This observation is consistent with the literature (Wirth, 1995).

C. lactea (A.Massal.) Zahlbr. – 1, 7, 9, 11, 14, 17, 20, 26, 30, 32, 56, 75, 81 (calcareous rocks): Very common on all types of calcareous rocks between 600 and 3500 m in the study area.

C. latzelii (Servazzi) Clauzade & Cl.Roux – 11 (calcareous rocks): Halıcı et al. (2007d).

Ω *C. oxfordensis* Fink ex J.Hedrick – 31 (siliceous rocks): This species seems to be restricted to the Mediterranean part of Turkey (John & Nimis, 1998; John et al., 2000).

* *C. paulsenii* (Vain.) Zahlbr. – 17, 20, 32, 54, 81, 83 (calcareous rocks): Especially on calcareous rocks with siliceous content in limestone-serpentine transition localities.

* *C. pelodella* (Nyl.) Hasse – 11 (lichenicolous lichen): Observed as parasitic on various crustose lichens on calcareous rocks in one of the localities where the altitude is lowest. Known from Italy (Nimis, 1993) and N. America (Brodo et al., 2001).

C. saxicola (Hoffm.) Nordin – 5, 16, 18, 19, 32, 76, 83, 87 (calcareous rocks): Common on exposed calcareous rocks between 1000 and 3500 m in the study area.

C. tirolensis Zahlbr. – 16 (Mosses): Observed only in one locality at 2880 m altitude on burnt moss on exposed calcareous rocks.

C. trachyphylla (Tuck.) Zahlbr. – 5, 6, 16, 62, 66, 67, 81 (calcareous rocks): Common on exposed calcareous rocks especially at high altitudes.

C. variabilis (Pers.) Müll.Arg. – 1, 4, 7, 9, 11, 17, 19, 21, 22, 23, 26, 32, 37, 39, 56, 62, 64, 81, 83, 85, 87, 89 (calcareous rocks): Very common on calcareous rocks. The species has a thick and brown thallus when it grows on exposed parts, which is pale and thin in shady parts. This observation supports the reports by Wunder (1974).

C. xantholyta (Nyl.) Jatta – 5, 11, 32, 82 (calcareous rocks): Always on vertical faces of calcareous rocks in shady sites.

△ *Candelaria concolor* (Dicks.) Stein – 87 (calcareous rocks)

Candelariella aurella (Hoffm.) Zahlbr. – 1, 5, 6, 7, 9, 11, 15, 16, 17, 19, 24, 26, 32, 39, 40, 41, 54, 55, 56, 57, 61, 62, 64, 65, 68, 70, 71, 72, 75, 79, 81, 83, 85, 87, 88, 89 (calcareous rocks), 32 (*Abies cilicica*, calcareous rocks), 23 (calcareous rocks, *Juniperus* sp.), 18, 27, 34, 60, 84 (siliceous rocks), 36 (*Quercus* sp.), 42 (*Pinus* sp.), 86 (*Abies cilicica*): Very common on a wide range of substrata in the study area.

△ *C. coralliza* (Nyl.) H.Magn. – 24 (siliceous rocks)

* *C. medians* (Nyl.) A.L.Sm. – 5, 17, 69 (calcareous rocks)

* *C. unilocularis* (Elenkin) Nimis – 62 (terricolous): Collected from thin soil layer on the crevices of calcareous rocks.

C. vitellina (Hoffm.) Müll.Arg. – 18, 27, 30, 31, 38, 59, 84, 87 (siliceous rocks)

♣Ω *Carbonea vitellinaria* (Nyl.) Hertel – 30: parasymbiotic on *Candelariella vitellina*.

● *Cephalophysis leucospila* (Anzi) H.Kiliyas & Scheid. – 16, 56 (calcareous rocks): This arctic-alpine species (Wirth, 1995) was collected on hard calcareous rocks between 2000 and 3000 m in the study area. New to Turkey!

♣ *Cercidospora caudata* Kernst. – 32 (on apothecia of *Caloplaca flavescens*): Halıcı et al. (2007d).

♣ *C. epicarphinea* (Nyl.) Grube & Hafellner – 22: Lichenicolous on the thallus of *Caloplaca variabilis*. This species collected from Aladağlar National Park was also detailed by Halıcı et al. (2006).

♣Ω *C. macrospora* (Uloth) Hafellner & Nav.-Ros. – 30, 32, 38, 84: parasymbiotic on the thalli of *Protoparmeliopsis muralis*, *Rhizoplaca melanophthalma*, and *R. peltata*.

● *Chaenotheca ferruginea* (Turner ex Sm.) Mig. – 2 (*Pinus* sp.): This widespread and bipolar species (Purvis & James, 1992b) is a new record for Turkey.

△ *Cladonia fimbriata* (L.) Fr. – 4 (*Pinus* sp.), 19 (Mosses)

△ *C. pyxidata* (L.) Hoffm. – 20, 23, 27, 30, 31, 43, 44, 82 (Mosses), 38 (*Juniperus* sp.)

* *Clauzadea chondrodes* (A.Massal.) Clauzade & Cl.Roux – 15 (calcareous rocks): Differs from *C. monticola* listed below by having well-developed thalli and longer ascospores (Wirth, 1995).

* *C. monticola* (Ach.) Hafellner & Bellem. – 3, 44 (calcareous rocks)

△ *Collema auriforme* (With.) Coppins & J.R.Laundon – 23 (calcareous rocks): Collected from a shaded site on hard calcareous rocks.

C. crispum (L.) Weber ex F.H.Wigg. – 3, 67, 77, 83 (calcareous rocks)

C. cristatum (L.) Weber ex F.H.Wigg. – 3, 5, 21, 23, 24, 26, 33, 39, 40, 43, 44, 50, 56, 63, 68, 87, 88, 89 (calcareous rocks)

△ *C. fuscovirens* (With.) J.R.Laundon – 17, 20, 23, 32 (calcareous rocks)

* *C. nigrescens* (Huds.) DC. – 13 (*Morus* sp.)

△ *C. parvum* Degel. – 87 (calcareous rocks)

△ *C. polycarpon* Hoffm. – 16, 17, 64, 83 (calcareous rocks)

* *C. subflaccidum* Degel. – 9 (calcareous rocks)

△ *C. tenax* (Sw.) Ach. – 17, 62, 71 (terricolous), 21, 24, 44 (M), 82 (calcareous rocks): Common on thin soil layer, mosses especially in the crevices of calcareous rocks.

● *C. texanum* Tuck. var. *texanum* – 74 (calcareous rocks): Collected only from one locality at 3160 m altitude. Differs from other *Collema* species collected from the study area by having constantly 1-septate ascospores (12-14 × 4 µm) and elongate lobes in which the tips are not swollen. A detailed description of this species was provided by Degelius (1954). Previously only reported from America. New record for Asia and Turkey!

* *C. undulatum* Laurer ex Flot. – 32 (calcareous rocks)

● *Dactylospora mediterranea* Sarrión & Hafellner – 34 (*Pinus* sp.): This species was described by Sarrión et al. (2002) from Spain as a saprobic fungus, apparently in an initial phase of lichenisation. We did not observe any algae in contact with the fungus in the study area, but included it in the list here. It seems that this species is reported for the first time after its description. New record for Asia and Turkey.

♣* *D. saxatilis* (Schaer.) Hafellner – 34: Lichenicolous on the thallus of *Pertusaria chiodectenoides* on siliceous rocks. Weak bleaching observed in the infected part of the host thallus. Previously only reported from Turkey by John (2000) from Zonguldak province.

* *Dermatocarpon intestiniforme* (Körb.) Hasse – 5, 16, 26 (calcareous rocks), 18 (siliceous rocks): Especially in the crevices of big rocks between 2000 and 3000 m altitude in the study area.

Δ *D. miniatum* (L.) W.Mann – 11, 21, 23, 24, 48, 49, 53, 59, 64, 65, 83, 87 (calcareous rocks)

Δ *D. vellereum* Zschacke – 88 (calcareous rocks): This species is known to have a distribution in Asia and America (St. Clair et al., 1995). Previously only reported from Trabzon province by John and Breuss (2004) in Turkey.

Dimelaena oreina (Ach.) Norman – 26 (calcareous rocks), 84 (siliceous rocks): Common on siliceous and calcareous rocks with high iron content between 1500 and 2500 m.

*Δ *Diplotomma alboatrum* (Hoffm.) Flot. – 22, 23 (*Abies cilicica*), 34 (*Pinus* sp.)

D. epipolium (Ach.) Arnold – 9, 17, 19, 24, 26, 56, 83, 85 (calcareous rocks)

*Δ *D. nivale* (Bagl. & Carestia) Hafellner – 9, 19, 24, 87 (lichenicolous lichen): Parasitic on several *Caloplaca* spp.

Δ *D. venustum* (Körb.) Lettau – 5, 24, 83 (calcareous rocks)

♣ *Echinothecium reticulatum* Zopf – 4 (on *Hypogymnia tubulosa*): Halıcı et al. (2007c).

Ω *Endocarpon adscendens* Malme – 30 (terricolous)

♣ *Endococcus macrosporus* (Arnold) Nyl. – 31 (on *Rhizocarpan geographicum*): Halıcı et al. (2007c).

♣ *E. pseudocarpus* Nyl. – 87 (on *Collema* sp.): Halıcı et al. (2007d).

♣ *E. variabilis* Halıcı, Kocourk. & Diederich – 62 (on *Staurothele areolata*): Halıcı et al. (2007a).

* *Evernia divaricata* (L.) Ach. – 40 (*Pinus* sp.), 42, 44 (*Abies cilicica*)

* *Farnoldia hypocrita* (A.Massal.) Fröberg – 68, 79 (calcareous rocks): On calcareous rocks between 2500 and 3000 m. This arctic-alpine species was only reported from Bayburt province at 1880 m altitude by Yazıcı and Aslan (2007).

* *F. jurana* (Schaer.) Hertel – 5, 9, 17, 39, 61, 75 (calcareous rocks)

Δ *F. micropsis* (A.Massal.) Hertel – 26 (calcareous rocks): On hard calcareous rocks rich in terms of iron and aluminium.

*Δ *Fulgensia fulgens* (Sw.) Elenkin – 36, 87 (calcareous rocks): Especially on the vertical faces of hard calcareous rocks with rich lichen and moss communities between 1000 and 1500 m.

Δ *F. schistidii* (Anzi) Poelt – 20, 22, 23, 39, 41, 76, 85, 88 (Mosses): Very common on the burnt mosses in the crevices of exposed calcareous rocks between 1500 and 3500 m.

♣ *Gemmaspora lecanorae* (Werner) D.Hawksw. & Halıcı – 5, 17 (on *Aspicilia calcarea*): Hawksworth & Halıcı (2007).

* *Hypogymnia farinacea* Zopf – 2 (*Pinus* sp.)

* *H. tubulosa* (Schaer.) Hav. – 4, 44 (*Pinus* sp.)

♣* *Intralichen christiansenii* (D.Hawksw.) D.Hawksw. & M.S.Cole – 2, 7, 11, 16, 22, 23, 37: In the hymenium or on the thalli of *Acarospora* sp., *Caloplaca variabilis*, *Hypogymnia farinacea*, *Lecanora agardhiana*, *Lecania fuscella*, *L. rabenhorstii*, and *Rinodina pyrina*. Sometimes pathogenic when it grows in the hymenia of the host lichens. When infects the apothecia of *Caloplaca variabilis*, epihymenium reacts negatively with K. This is a widespread species, growing on a wide range of lichen and lichenicolous fungi hosts (Hawksworth & Cole, 2002).

♣ *I. lichenum* (Diederich) D.Hawksw. & M.S.Cole – 4 (on *Anaptychia kaspica*): Halıcı et al. (2007c).

*Δ *Lecania fuscella* (Schaer.) A.Massal. – 4 (*Populus tremula*), 22 (*Abies cilicica*), 23 (*Juniperus* sp.), 52 (*Juglans regia*): Especially on smooth, rarely roughened bark.

- L. koerberiana* J.Lahm – 44 (*Pinus* sp.)
- L. rabenhorstii* (Hepp) Arnold – 5, 11, 81 (calcareous rocks)
- *Δ *Lecanora agardhiana* Ach. – 5, 7, 16, 17, 19, 50, 56, 79, 87 (calcareous rocks)
- * *L. albella* (Pers.) Ach. – 2 (*Cedrus libani*), 4 (*Populus tremula*): Usually on smooth bark.
- Δ *L. albescens* (Hoffm.) Branth & Rostr. – 9, 24, 26, 67 (calcareous rocks)
- L. argopholis* (Ach.) Ach. – 16 (calcareous rocks): On exposed calcareous rocks.
- Ω *L. bicincta* Ramond – 18, 30 (siliceous rocks)
- L. bolcana* (Pollich) Poelt – 18, 27 (siliceous rocks)
- L. campestris* (Schaer.) Hue – 9 (calcareous rocks)
- L. carpinea* (L.) Vain. – 3, 42 (*Abies cilicica*), 4 (*Pinus* sp.)
- L. cenisia* Ach. – 18 (siliceous rocks)
- *Δ *L. chlarotera* Nyl. – 2, 4, 36, 40, 42 (*Pinus* sp.), 3, 44 (*Abies cilicica*), 22 (*Quercus* sp.), 51, 52 (*Juglans regia*)
- * *L. circumborealis* Brodo & Vitik. – 23 (*Abies cilicica*): Distinguished from the closely related *L. pulicaris* by ascospores with thicker walls as noted by Brodo and Vitikainen (1984).
- L. crenulata* (Dicks.) Hook. – 7, 9, 17, 19, 20, 23, 26, 62, 65, 70, 71, 76, 79, 85 (calcareous rocks)
- L. dispersa* (Pers.) Sommerf. – 3, 5, 24, 35, 67, 79, 83, 88 (calcareous rocks), 18, 31 (siliceous rocks): Observed on a wide range of substrata and also commensally on other lichens on calcareous rocks.
- *Δ *L. flotoviana* Spreng. – 9, 11, 18, 22, 32, 33, 39, 40, 42, 48, 49, 51, 54, 56, 64, 65, 66, 70, 81, 83, 85, 87, 88 (calcareous rocks): In more natural habitats than *L. dispersa*, usually overgrowing on foliose lichens such as *Collema* spp. and *Dermatocarpon* spp.
- * *L. frustulosa* (Dicks.) Ach. – 18 (siliceous rocks): On weakly calciferous siliceous rocks.
- Δ *L. hagenii* (Ach.) Ach. var. *fallax* Hepp – 16, 17, 19, 24, 58 (plant debris): Common on mosses and on plant debris over calciferous substrata. Previously only reported from Şirvan Mountain (Pınarbaşı, Kayseri) by Halıcı and Aksoy (2006). We think this species has a wider distribution range in the Mediterranean part of Turkey, but probably was overlooked in previous studies.
- Δ *L. hagenii* (Ach.) Ach. var. *hagenii* – 13 (*Prunus* sp.), 22, 23, 44, 86 (*Abies cilicica*), 35, 37, 42 (*Pinus* sp.), 36 (*Quercus* sp.), 51, 52 (*Juglans regia*), 87 (*Juniperus* sp.), 41 (*Populus tremula*)
- Ω *L. intricata* (Ach.) Ach. – 31 (siliceous rocks)
- * *L. intumescens* (Rebent.) Rabenh. – 42 (*Abies cilicica*)
- L. marginata* (Schaer.) Hertel & Rambold – 7, 16, 32, 62 (calcareous rocks): Halıcı et al. (2007d).
- Ω *L. polytropa* (Hoffm.) Rabenh. – 18, 30 (siliceous rocks)
- Ω *L. rupicola* (L.) Zahlbr. – 18, 30, 31 (siliceous rocks)
- * *L. saligna* (Schrad.) Zahlbr. – 2 (*Cedrus libani*)
- * *L. strobilina* (Spreng.) Kieff. – 34 (*Pinus* sp.): Reported from the south of Turkey for the first time. Previously reported only from Kırklareli (Özdemir Türk & Güner, 1998) and Zonguldak (Yazıcı et al., 2007a) in Turkey.
- L. swartzii* (Ach.) Ach. – 18 (siliceous rocks)
- *L. usbekica* Poelt – 26 (calcareous rocks): This species was previously known only from Central Asian countries such as Uzbekistan (Poelt, 1958), Tajikistan (Kudratov & Mayrhofer, 2002), and Iran (Seaward et al., 2004). All the characteristics of the species collected from the study area agree well with the original description provided by Poelt (1958).
- * *L. varia* (Hoffm.) Ach. – 42 (*Pinus* sp.)
- Ω *Lecidea atrobrunnea* (Ramond) Schaer. – 30, 59, 60 (siliceous rocks): Common on siliceous rocks between 2000 - 3000 m. Also has a large cover above coal mine.
- L. confluens* (Weber) Ach. – 18, 30 (siliceous rocks)
- L. fuscoatra* (L.) Ach. – 18, 27, 30 (siliceous rocks)
- Ω *L. lapicida* var. *pantherina* (DC.) Ach. – 30 (siliceous rocks): On siliceous rocks with high iron content.
- * *L. lithophila* (Ach.) Ach. – 59 (siliceous rocks): On coal mine at 2650 m altitude.
- L. plana* (Lahm.) Nyl. – 26 (siliceous rocks)
- Ω *L. promiscens* Nyl. – 31 (siliceous rocks)
- Δ *L. tessellata* Flörke – 9, 17, 20, 61, 62, 83 (calcareous rocks): Starts its life cycle as a parasite of *Aspicilia* sp. on calcareous rocks, but later becomes independent as stated by Wirth (1995).

* *L. umbonata* (Hepp) Mudd – 5, 62, 71 (calcareous rocks): This arctic-alpnic species (Hertel 1973) was observed between 2500 - 3500 m in the study area.

Lecidella carpathica Körb. – 18, 27, 30, 31, 59, 84 (siliceous rocks)

Δ *L. elaeochroma* (Ach.) M.Choisy – 2 (*Cedrus libani*, *Pinus* sp.), 3, 22, 23 (*Abies cilicica*), 4, 42, 44 (*Abies cilicica*, *Pinus* sp.), 13 (*Prunus* sp.), 34, 37, 39, 40 (*Pinus* sp.), 36 (*Quercus* sp.), 51, 52 (*Juglans regia*), 86 (*Abies cilicica*), 87 (*Juniperus* sp.)

Δ *L. patavina* (A.Massal.) Knoph & Leuckert – 5, 6, 9, 16, 17, 21, 22, 53, 54, 58, 61, 62, 65, 68, 69, 70, 71, 74, 76, 79, 81, 83, 85 (calcareous rocks): Especially at high altitudes.

L. stigmataea (Ach.) Hertel & Leuckert – 5, 7, 9, 15, 17, 22, 23, 26, 32, 33, 41, 42, 50, 51, 55, 57, 64, 67, 83, 85, 89 (calcareous rocks), 18, 27, 30 (siliceous rocks): Usually on rocks with low calcareous content.

Lepraria caesioalba (de Lesd.) J.R.Laundon – 18 (Mosses, siliceous rocks): Fumarprotocetraric acid and ± atranorin in TLC.

Δ *L. incana* (L.) Ach. – 87 (*Juniperus* sp.)

* Δ *L. lobificans* Nyl. – 11 (Mosses), 88 (lichenicolous lichen): Usually on mosses on calcareous rocks but sometimes growing on other lichens.

Δ *Leptogium diffractum* Kremp. ex Körb. – 87 (calcareous rocks)

L. gelatinosum (With.) J.R.Laundon – 19, 33 (Mosses): On mosses in the crevices of calcareous rocks.

Δ *L. lichenoides* (L.) Zahlbr. – 20, 35, 43, 44 (Mosses), 36 (calcareous rocks)

* *L. saturninum* (Dicks.) Nyl. – 4 (*Populus tremula*): Only on basic bark of old *Populus tremula* trees in the study area.

Leptorhaphis atomaria (Ach.) Szatala – 4 (*Populus nigra*): Halıcı et al. (2006).

* *Letharia vulpina* (L.) Hue – 2, 27, 42 (*Pinus* sp.)

♣ *Lichenodiplis lecanorae* (Vouaux) Dyko & D.Hawksw. – 3 (on apothecia of *Caloplaca holocarpa*): Halıcı et al. (2006).

♣* *Lichenostigma cosmopolites* Hafellner & Calatayud – 27: Weakly pathogenic on *Xanthoparmelia* sp. as weak bleaching observed in the infected parts of the host thallus.

♣Δ *L. elongatum* Nav.-Ros. & Hafellner – 16, 70, 83, 89: Lichenicolous on *Aspicilia* sp., *A. cheresina* and *Lobothallia alphoplaca* in the study area.

♣* *L. maureri* Hafellner – 42: Parasymbiotic on the thallus of *Usnea subfloridana* in the study area.

♣ *L. triseptatum* Halıcı & D.Hawksw. – 34: This species was described from Turkey on *Aspicilia caesiocinerea* by Halıcı and Hawksworth (2007). The specimen collected on *Aspicilia cinerea* from the study area agrees in all details with the holotype.

♣ *Lichenothelia convexa* Henssen – 31 (siliceous rocks and *Aspicilia caesiocinerea*): Halıcı et al. (2006).

Lobothallia alphoplaca (Wahlenb.) Hafellner – 22, 23, 89 (calcareous rocks), 27, 59 (siliceous rocks)

L. radiosa (Hoffm.) Hafellner – 1, 9, 11, 17, 24, 31, 32, 54, 74, 83, 85, 88 (calcareous rocks), 27 (siliceous rocks)

Megaspora verrucosa (Ach.) Hafellner & V. Wirth – 18 (Mosses), 52 (*Juglans regia*)

Melanohalea elegantula (Zahlbr.) O.Blanco et al. – 2 (*Pinus* sp.), 42 (*Abies cilicica*)

M. exasperata (De Not.) O.Blanco et al. – 34 (*Pinus* sp.), 39 (*Abies cilicica*)

Δ *M. exasperatula* (Nyl.) O.Blanco et al. – 2 (*Cedrus libani*, *Pinus* sp.), 3, 22, 42, 86 (*Abies cilicica*)

Melanolecia transitoria (Arnold) Hertel – 74 (calcareous rocks): Halıcı et al. (2007d).

♣ *Merismatium nigrillum* (Nyl.) Vouaux – 30 (on *Placidium lachneum*): Candan & Halıcı (2008).

Δ *Miriquidica deusta* (Stenh.) Hertel & Rambold – 27, 31 (siliceous rocks): Especially on exposed siliceous rocks.

♣ *Muellerella lichenicola* (Sommerf.) D.Hawksw. – 9, 11, 18, 24, 26, 42, 56, 58, 65, 71, 79: Also detailed by Halıcı et al. (2007c) from two localities in Aladağlar National Park. Common on a wide range of host spectra such as *Aspicilia* sp., *Caloplaca* sp., *C. biatorina*, *C. dolomiticola*, *C. flavescens*, *Lecidea* sp., *L. confluens*, *L. tessellata*, *Lecidella patavina*, *L. stigmatae*, and *Xanthoria elegans* in the study area.

♣ Ω *M. pygmaea* (Körb.) D.Hawksw. – 5, 7, 9, 11, 15, 16, 17, 18, 20, 24, 30, 38, 57, 59, 61, 62, 65, 66, 67, 70, 83, 89: Also detailed by Halıcı et al. (2007c) from four localities in Aladağlar National Park. Common on a

wide range of host spectra such as *Aspicilia* sp., *A. calcarea*, *A. cheresina* var. *cheresina*, *A. contorta* subsp. *hoffmaniana*, *Caloplaca* sp., *C. chalybaea*, *C. crenulatella*, *C. flavovirescens*, *C. paulsenii*, *C. trachyphylla*, *C. variabilis*, *Diplotomma* sp., *Lecanora* sp., *L. albescens*, *L. marginata*, *L. polytropa*, *Lecidea umbonata*, *L. tessellata*, *Lecidella carpathica*, *L. patavina*, *L. stigmatae*, and *Verrucaria compacta*.

♣ *M. ventosicola* (Mudd) D.Hawksw. – 84 (on *Rhizocarpon geographicum*): Halıcı (2008a).

♣ *M. vesicularia* (Linds.) D.Hawksw. – 17 (on *Lecidea fuscoatra*): Halıcı et al. (2007c).

Δ *Mycobilimbia lurida* (Ach.) Hafellner & Türk – 17, 39, 50, 69 (terricolous), 19 (calcareous rocks): Common on calcareous soils, in crevices associated with limestone, sometimes directly on rock, especially in uplands.

* *Mycocalicium subtile* (Pers.) Szatala – 40 (*Pinus* sp.), 42 (*Abies cilicica*, *Pinus* sp.): This non-lichenised, non-lichenicolous saprophyte has a wide distribution in the world (Purvis 1992). However, it was only reported in Turkey from Antalya province by Tufan et al. (2005).

* *Parmelia saxatilis* (L.) Ach. – 2, 34, 37 (*Pinus* sp.), 3, 44 (*Abies cilicica*), 27 (*Pinus* sp., siliceous rocks)

* *Parmelina carporrhizans* (Taylor) Poelt & Vězda – 3 (*Abies cilicica*)

P. pastillifera (Harm.) Hale – 3, 4 (*Abies cilicica*), 27 (Mosses)

P. tiliacea (Hoffm.) Hale – 34 (*Pinus* sp.), 36 (*Quercus* sp.)

* *Parmeliopsis ambigua* (Wulfen) Nyl. – 2, 4, 42, 44 (*Pinus* sp.)

Peltigera rufescens (Weiss) Humb. – 3, 27, 43, 44 (terricolous): Especially on calcareous soil in shaded sites.

* *Pertusaria amara* (Ach.) Nyl. – 40 (*Pinus* sp.)

P. aspergilla (Ach.) J.R.Laundon – 11 (siliceous rocks)

P. chiodectonoides Bagl. ex A.Massal. – 34 (siliceous rocks): On siliceous rocks under forest.

♣ *Phacopsis vulpina* Tul. – Halıcı et al. (2007c).

Phaeophyscia ciliata (Hoffm.) Moberg – 3 (*Abies cilicica*)

*Δ *P. nigricans* (Flörke) Moberg – 23 (*Abies cilicica*), 36 (*Quercus* sp.), 51 (*Juglans regia*)

Δ *P. orbicularis* (Neck.) Moberg – 22 (*Abies cilicica*), 36 (*Quercus* sp.)

♣ *Phaeospora rimosicola* (Leight. ex Mudd) Hepp ex Stein – 54 (on a brown crustose lichen): Halıcı et al. (2007d).

* *Physcia adscendens* (Th.Fr.) H.Olivier – 3, 42 (*Abies cilicica*)

*Δ *P. aipolia* (Ehrh. ex Humb.) Fürnr. – 4, 22, 23, 36 (*Abies cilicica*), 51 (*Juglans regia*), 86 (*Quercus* sp.)

Δ *P. dubia* (Hoffm.) Lettau – 1, 5, 7, 22, 64, 81, 84, 87 (calcareous rocks), 18, 30, 54, 57, 59, 60 (siliceous rocks): Very common on exposed calcareous and siliceous rocks between 1000 and 3000 m.

*Δ *P. leptalea* (Ach.) DC. – 4 (*Pinus* sp.), 36 (*Quercus* sp.), 52 (*Juglans regia*), 86 (*Abies cilicica*): This species has been reported many times under the name "*Physcia semipinnata* (J.F.Gmel.) Moberg" from Turkey (e.g., John, 1996). According to Laundon (1995), the correct name for this species is "*P. leptalea* (Ach.) DC."

Δ *P. stellaris* (L.) Nyl. – 3, 23 (*Abies cilicica*), 36 (*Quercus* sp.), 87 (*Juniperus* sp.)

*Δ *P. tenella* (Scop.) DC. – 3, 22, 42, 86 (*Abies cilicica*)

ΩΔ *P. tribacia* (Ach.) Nyl. – 23 (Abi), 31 (siliceous rocks)

Physconia distorta (With.) J.R.Laundon – 52 (*Juglans regia*)

P. grisea (Lam.) Poelt – 3 (*Abies cilicica*)

P. perisidiosa (Erichsen) Moberg – 27 (Mosses), 44 (*Abies cilicica*)

Pilophorus cereolus (Ach.) Th.Fr. – 21 (terricolous): Halıcı et al. (2006).

● *Placidium boccanum* (Servít) Breuss – 36 (calcareous rocks): This Mediterranean species is a new record for Turkey. Easily distinguished from related *P. squamulosum* by narrower squamules and dark margins (Breuss & Fox, 1992).

P. lachneum (Ach.) de Lesd. – 30 (siliceous rocks)

*Δ *P. rufescens* (Ach.) A.Massal. – 5, 68, 70 (terricolous), 73, 89 (calcareous rocks): Especially common in uplands.

P. squamulosum (Ach.) Breuss – 55, 75 (calcareous rocks)

△ *Placocarpus schaeferi* (Fr.) Breuss – 5, 54, 83, 87, 88, 89 (calcareous rocks): Starts its life cycle on *Protoparmeliopsis muralis*.

△ *Placynthium nigrum* (Huds.) Gray – 22, 37, 88 (calcareous rocks)

* *Platismatia glauca* (L.) W.L.Culb. & C.F.Culb. – 34 (*Pinus* sp.)

Pleurosticta acetabulum (Neck.) Elix & Lumbsch – 3 (*Abies cilicica*), 4 (*Abies cilicica*, *Pinus* sp.), 44 (*Pinus* sp.)

♣ *Polycoccum acarosporicola* Halici & D.Hawksw. – 26 (on *Acarospora cervina*): Halici et al. (2007b).

♣ *P. aksoyi* Halici & Atienza – 34 (on *Aspicilia cinerea*): Halici et al. (2007b).

♣ *P. marmoratum* (Kremp.) D.Hawksw. – 9 (on *Verrucaria* sp.): Halici et al. (2007d).

Polysporina cyclocarpa (Anzi) Vězda – 7, 16, 19, 24, 61, 62, 65, 77, 79, 83 (calcareous rocks): Rather common on exposed hard calcareous rocks between 1500 and 3000 m.

P. simplex (Davies) Vězda – 75 (calcareous rocks): On small pebbles.

* *Porpidia macrocarpa* (DC.) Hertel & A.J.Schwab – 39 (calcareous rocks)

P. speirea (Ach.) Kremp. – 5, 17 (calcareous rocks): Seems to be restricted to the localities between 2000 and 3000 m.

P. superba (Körb.) Hertel & Knoph – 5 (calcareous rocks): Halici et al. (2006).

* *Protoblastenia calva* (Dicks.) Zahlbr. – 5, 82 (calcareous rocks): Especially on vertical faces of hard calcareous rocks between 1500 and 3000 m.

*△ *P. incrustans* (DC.) J.Steiner – 5, 16, 23, 24, 42, 71 (calcareous rocks): Apothecia immersed in the pits of hard calcareous rocks. Nimis and Martellos (2008) reported that this is one of the most common species of calcareous rocks in natural habitats. Our observations confirm this suggestion.

Ω *Protoparmelia badia* (Hoffm.) Hafellner – 30 (siliceous rocks)

Protoparmeliopsis muralis (Schreb.) M.Choisy – 7, 9, 11, 22, 23, 26, 32, 34, 38, 59, 60, 62, 83, 84, 87, 88, 89 (calcareous rocks), 18, 27, 30, 31 (siliceous rocks)

* *Pseudevernia furfuracea* (L.) Zopf var. *ceratea* (Ach.) D.Hawksw. – 2, 4, 37 (*Pinus* sp.)

* *P. furfuracea* (L.) Zopf var. *furfuracea* – 2, 4, 27, 34, 39, 40, 42, 44 (*Pinus* sp.), 3 (*Abies cilicica*)

Psora decipiens (Hedw.) Hoffm – 1, 74 (terricolous): On calcareous soil.

♣ *Pyrenidium actinellum* Nyl. – 67 (on a brown crustose lichen): Halici et al. (2007d).

* *Ramalina farinacea* (L.) Ach. – 3 (*Abies cilicica*), 4, 42, 44 (*Abies cilicica*, *Pinus* sp.)

△ *Rhizocarpon disporum* (Nägeli ex Hepp) Müll. Arg. – 84 (siliceous rocks)

△ *R. geminatum* Körb. – 18, 38, 87 (siliceous rocks): Common especially near streams in the study area.

R. geographicum (L.) DC. – 18, 27, 30, 31, 38, 84, 87 (siliceous rocks)

ΔΩ *R. lecanorinum* Anders – 31, 83 (siliceous rocks)

R. macrosporum Räsänen – 18 (siliceous rocks)

R. viridiatrum (Wulfen) Körb. – 18 (siliceous rocks), 26 (lichenicolous lichen): parasitic on *Protoparmeliopsis muralis*.

Rhizoplaca chrysoleuca (Sm.) Zopf – 26 (siliceous rocks)

R. melanophthalma (DC.) Leuckert – 18, 84 (siliceous rocks)

Ω *R. peltata* (Ramond) Leuckert & Poelt – 18, 26, 30 (siliceous rocks)

Ω *Rimularia insularis* (Nyl.) Rambold & Hertel – 30 (lichenicolous lichen): Parasitic on *Lecanora bicincta*.

* *Rinodina bischoffii* (Hepp) A.Massal. – 9, 32, 33, 61, 81 (calcareous rocks): This is one of the early species colonising calcareous rocks between 1000 and 3000 m in the study area.

R. calcarea (Arnold) Arnold – 16, 19, 33, 62, 65, 83, 87 (calcareous rocks)

*△ *R. castanomesodes* H.Mayrhofer & Poelt – 71, 83 (calcareous rocks): This species clearly differs from the related *R. bischoffii* by having a thicker and brownish thallus as reported by Giralt (2001). On hard calcareous rocks between 1500 and 3500 m in the study area. Previously only reported in Turkey from Osmaniye province on granite rock at 1750 m altitude (Yazıcı et al., 2007b).

R. dubyana (Hepp) J.Steiner – 9, 57 (calcareous rocks)

- R. gennarii* Bagl. – 83, 87 (calcareous rocks)
- Ω *R. immersa* (Körb.) Arnold – 6, 7, 9, 19, 20, 21, 24, 30, 32, 36, 41, 54, 56, 57, 83, 85, 87 (calcareous rocks)
- Δ *R. lecanorina* (A.Massal.) A.Massal. – 7, 24, 36, 39, 83, 85, 87, 88 (calcareous rocks): Especially on exposed calcareous rocks between 1000 and 3000 m.
- Δ *R. luridata* H.Mayrhofer, Scheid. & Sheard – 22 (calcareous rocks): This widespread species throughout Europe reaching the Mediterranean mountains was only previously reported from Gaziantep province, by Oran and Öztürk (2007).
- R. milvina* (Wahlenb.) Th.Fr. – 18, 30 (siliceous rocks): Parasitic on crustose lichens when young. As reported by Giralt (2001), it grows on siliceous rocks that are often enriched with traces of lime.
- Δ *R. pyrina* (Ach.) Arnold – 23, 42 (*Abies cilicica*), 36 (*Quercus* sp.), 87 (*Juniperus* sp.)
- ΔΩ *R. tunicata* H.Mayrhofer & Poelt – 19, 30 (calcareous rocks): This Mediterranean species seems to be restricted to southern Turkey. Previously only reported from Gaziantep province in Turkey (Nimis & John, 1998).
- Δ *Rinodinella controversa* (A.Massal.) H.Mayrhofer & Poelt – 87 (calcareous rocks)
- ♣Ω *Rosellinula haplospora* (Th.Fr. & Almq. ex Th.Fr.) R.Sant. – 31: Parasymbiotic on the thallus of *Aspicilia intermutans*. Previously only reported from Malatya province on the same host in Turkey (Halıcı & Candan, 2007).
- Sarcogyne clavus* (DC.) Kremp. – 39 (calcareous rocks)
- *S. distinguenda* Th.Fr. – 23 (calcareous rocks): This is a well-distinguished species with a chalky white, well-developed thallus. New record for Turkey!
- * *S. fallax* H.Magn. – 41 (calcareous rocks)
- * *S. privigna* (Ach.) A.Massal. – 1 (calcareous rocks)
- * *S. regularis* Körb. – 14, 15, 16, 43, 68, 75 (calcareous rocks): Common between 600 and 3500 m especially on lichen-poor hard calcareous rocks.
- ♣ *Scoliciosporum intrusum* (Th.Fr.) Hafellner – 30 (on *Rhizocarpon geographicum*): Halıcı et al. (2007d).
- * *Squamarina gypsacea* (Sm.) Poelt – 1, 38, 52 (calcareous rocks): Especially on hard calcareous rocks under forest between 1000 - 2000 m.
- Δ *Staurothele areolata* (Ach.) Lettau – 1, 5, 15, 17, 18, 26, 54, 55, 56, 57, 62, 66, 67, 69, 72, 73, 75, 81, 89 (calcareous rocks): Especially in high localities between 1700 - 3500 m.
- * *S. caesia* (Arnold) Arnold – 35 (calcareous rocks): On exposed hard calcareous rocks at 1150 m altitude.
- * *S. frustulenta* Vain. – 64 (calcareous rocks): Clearly differs from related *S. areolata* by having ± globose algae in the hymenium.
- ♣ *Stigmatidium cerinae* Cl.Roux & Triebel – 17: Previously only reported on the apothecia of *Caloplaca cerina* from Erciyes Mountain (Kayseri) by Halıcı et al. (2007c) in Turkey. In the study area, pathogenic on the apothecia of *Caloplaca chalybaea* as it suppresses ascospore production in the infected apothecia of the host.
- ♣ *S. congestum* (Körb.) Triebel – 46 (on apothecia of *Lecanora intumescens*): Candan & Halıcı (2008).
- ♣ *S. johnii* Halıcı & D.Hawksw. – 15 (on a lobate *Caloplaca* sp.): Halıcı & Hawksworth (2007).
- ♣ *S. rouxianum* Calatayud & Triebel – 22: Lichenicolous on the squamules of *Acarospora cervina*. Pathogenic as the infected squamules discoloured and deforms the host. All the characteristics of the Turkish specimen agree well with the description given in Calatayud and Triebel (2003).
- Δ *Synalissa symphorea* (Ach.) Nyl. – 26 (calcareous rocks): In the crevices of calcareous rocks.
- Tephromela atra* (Huds.) Hafellner – 3 (*Abies cilicica*): This species is known to grow also on smooth bark (Wirth, 1995).
- * *Thelidium decipiens* (Hepp) Kremp. – 33, 39 (calcareous rocks): On hard calcareous rocks between 1000 and 2000 m in the study area. Previously only reported from Sivas province in Turkey (Halıcı, 2008b).
- * *Thrombium epigaeum* (Pers.) Wallr. – 39 (Mosses): On mosses on calcareous soil under forest belt in the study area. Previously only reported from Trabzon province under forest belt in Turkey (John & Breuss, 2004). This inconspicuous lichen should probably be more common and widespread as suggested by McCune and Rosentreter (2007).
- * *Toninia aromatica* (Turner ex Sm.) A.Massal. – 49 (Mosses): On mosses on calcareous rocks in a shaded site in the study area.

* *T. athallina* (Hepp) Timdal – 9, 17 (calcareous rocks): On hard calcareous rocks in the study area. Previously only reported from Trabzon province in Turkey (Steiner, 1909). Probably more common in Turkey but may be overlooked.

*Δ *T. candida* (Weber) Th.Fr. – 21, 36 (calcareous rocks), 32 (terricolous), 85 (Mosses): Usually starts its life cycle on *Collema* sp. as reported by Timdal (1991). In locality 32, it was collected on soil with *Caloplaca epiphyta*.

*Δ *T. diffracta* (A.Massal.) Zahlbr. – 82 (calcareous rocks), 87 (siliceous rocks)

♣ *T. episema* (Nyl.) Timdal – 26 (on *Aspicilia caronata*): Halıcı et al. (2007d).

* *T. opuntioides* (Vill.) Timdal – 34 (siliceous rocks): On siliceous rocks that are enriched with traces of lime. Previously only reported from 2 provinces in the Black Sea region in Turkey (John & Breuss, 2004; Yazıcı et al., 2007a).

T. philippea (Mont.) Timdal – 7, 9 (calcareous rocks): On exposed calcareous rocks between 1900 and 3000 m in the study area.

* *T. physaroides* (Opiz) Zahlbr. – 32 (terricolous): On a thin soil layer in the crevices of calcareous rocks associated with cyanolichens.

*Δ *T. rosulata* (Anzi) H.Olivier – 23, 49, 88 (Mosses), 52 (calcareous rocks)

Δ *T. sedifolia* (Scop.) Timdal – 20 (Mosses): On mosses associated with cyanolichens.

♣* *Unguiculariopsis groenlandiae* (Alstrup & D.Hawksw.) Etayo & Diederich – 9: Weak pathogen on the thallus of *Caloplaca crenulatella* as moderate bleaching is seen in the infected parts of the host thallus. This species was also collected from Aladağlar National Park on the apothecia of *Caloplaca lactea* and detailed by Halıcı et al. (2007d).

* *Usnea subfloridana* Stirt. – 42 (*Abies cilicica*)

Verrucaria aspiciliicola R.Sant. – 27 (on *Aspicilia contorta*): Halıcı et al. (2007d).

* *V. baldensis* A.Massal. – 44 (calcareous rocks): On hard calcareous rocks under forest belt.

V. caerulea DC. – 51 (calcareous rocks)

Δ *V. calciseda* DC. – 1, 4, 44, 87 (calcareous rocks)

Δ *V. compacta* (A.Massal.) Jatta – 7, 11, 33, 39, 64, 65, 67, 75, 88 (calcareous rocks): Especially parasitic on *Aspicilia calcarea* in its young stage on hard calcareous rocks. Areolles almost squamule-like, very well developed. Very common between 600 and 3100 m in the study area.

V. dolosa Hepp – 1 (calcareous rocks): On hard calcareous rocks under forest belt.

*Δ *V. dufourii* DC. – 11, 14, 23, 37, 63, 89 (calcareous rocks)

V. fuscella (Turner) Winch – 19, 21, 22, 32, 33, 47, 49, 51, 52, 81, 88 (calcareous rocks): Especially parasitic on *Verrucaria nigrescens* in its young stage on hard calcareous rocks. Very common on calcareous rocks.

● *V. latericola* Erichsen – 17, 58, 83 (lichenicolous lichen): Parasitic on *Caloplaca* spp. on calcareous rocks between 1500 - 3000 m in the study area. New record for Turkey!

V. lecideoides (A.Massal.) Trevis. – 21, 26, 35, 36, 88 (calcareous rocks)

* *V. macrostoma* Dufour ex DC. – 9, 82 (calcareous rocks)

* *V. marmorea* (Scop.) Arnold – 11, 35, 47, 49, 51 (calcareous rocks): Especially on hard limestones in shaded sites between 600 - 1500 m in the study area.

* *V. muralis* Ach. – 1, 32 (calcareous rocks)

V. nigrescens Pers. – 1, 5, 6, 11, 14, 21, 22, 35, 39, 41, 43, 52, 82, 85 (calcareous rocks)

* *V. parmigerella* Zahlbr. – 44 (calcareous rocks): On hard calcareous rocks under forest belt.

* *V. pinguicula* A.Massal. – 11, 54 (calcareous rocks)

♣ *Weddellomyces turcicus* Halıcı & Orange – 4 (on *Acarospora* sp.): Halıcı et al. (2005a).

Δ *Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale – 30, 84 (siliceous rocks)

X. pulla (Ach.) O.Blanco et al. – 27, 38, 84 (siliceous rocks)

X. stenophylla (Ach.) Ahti & D.Hawksw. – 27 (siliceous rocks)

X. verruculifera (Nyl.) O.Blanco et al. – 18 (siliceous rocks)

△ *Xanthoria candelaria* (L.) Th.Fr. – 36 (*Quercus* sp.), 86 (*Abies cilicica*), 51 (*Juglans regia*): Only in the localities where agricultural activities are carried out.

* *X. contortuplicata* (Ach.) Boistel – 62 (terricolous): Vagrant on the thin soil layer in the crevices of big calcareous rocks at about 2800 m altitude. Previously only reported in Turkey from Yozgat province (John, 2002).

X. elegans (Link) Th.Fr. – 1, 5, 7, 16, 22, 23, 24, 55, 61, 69, 70, 71, 74 (calcareous rocks), 18, 84 (siliceous rocks), 76 (Mosses): Very common especially at higher altitudes in the study area.

△ *X. fulva* (Hoffm.) Poelt & Petut. – 86 (*Abies cilicica*)

*△ *X. parietina* (L.) Th.Fr. – 22, 23 (*Abies cilicica*), 36 (*Quercus* sp.), 42, 86 (*Abies cilicica*)

△ *X. polycarpa* (Hoffm.) Rieber – 23 (*Abies cilicica*)

* *X. soreliata* (Vain.) Poelt – 18 (siliceous rocks): On the top of exposed siliceous rocks in limestone-serpentine transition area. Previously only reported from Van province in Turkey by Szatala (1941).

♣ *Zwackhiomyces coepulonus* (Norman) Grube & R.Sant. – 55, 85: On the apothecia of *Caloplaca variabilis*. Pathogenic as discolourations occur in the infected apothecia of the host. This species collected from Aladağlar National Park on the apothecia of an orange *Caloplaca* sp. was also reported by Halıcı et al. (2007c).

♣*△ *Z. lecanorae* (Stein) Nik.Hoffm. & Hafellner – 19, 68, 88: On the apothecia of *Candelariella aurella* and *Lecanora dispersa* and the thallus of a brown unidentified crustose lichen on calcareous rocks. Pathogenic as discolourations occur in the infected parts of the host lichens.

♣△ *Z. sphinctrinoides* (Zwackh) Grube & Hafellner: 9, 36, 83: On the thalli and apothecia of *Caloplaca dolomitcola*, *Lecanora* sp., *Mycobilimbia lurida*, and *Toninia philippea*. Pathogenic as discolourations occur in the infected parts of the host lichens. This species collected from Aladağlar National Park on the apothecia of *Xanthoria elegans* was also reported by Halıcı et al. (2006).

Discussion

The list includes 347 taxa including 302 lichenised and 45 lichenicolous fungal taxa. Of these, 107 taxa from the

province of Kayseri, 97 taxa from the province of Niğde, and 24 taxa from the province of Adana are reported for the first time from these provinces. In addition, 11 taxa, namely *Arthopyrenia fraxini*, *Aspicilia obscurata*, *Chaenotheca ferruginea*, *Collema texanum* var. *texanum*, *Dactylospora mediterranea*, *L. usbekica*, *Placidium boccanum*, *Sarcogyne distinguenda*, *Stigmidium rouxianum*, and *Verrucaria latericola*, are new records for Turkey.

In Aladağlar National Park, the genera represented by the most infraspecific taxa are *Caloplaca* (37 taxa), *Lecanora* (27 taxa), *Aspicilia* (20 taxa), and *Verrucaria* (15 taxa). Rock, especially limestone, is predominant in the study area as a substrate on which the lichens can grow. As a result, these large genera, mostly including crustose species that can invade rocks, are represented by the most infrageneric taxa in the study area.

When we analyse the substrata on which the lichen species grow, the saxicolous species are the most common in the area, accounting for 53% of the species (35% on calcareous rocks and 18% on siliceous rocks). This is normal as a large portion of the study area is composed of rocks, mostly limestone, without trees. The species on bark and wood of both deciduous and evergreen trees are the second most common group, comprising 25% (19% on evergreen trees and 6% on deciduous trees). Eight percent of the species are found directly on soil or mosses.

Only 3% of the determined species grow on lichens, which are known as “lichenicolous lichens” apart from lichenicolous fungi (Lawrey & Diederich, 2003). Some species start their life cycle as parasites on other lichen hosts, and after establish their own independent thallus (Hawksworth, 2004). Examples for this life strategy in the study area are *Lecidea tessellata* on *Aspicilia* spp. on calcareous rocks, *Placocarpus schaeferi* on *Prototarmeliopsis muralis*, and most *Toninia* species on cyanolichens, especially *Collema* spp. Species that are always parasitic on other host lichens in the study area are *Acarospora hospitans* on *Aspicilia cinerea*, *Caloplaca inconnexa* on calciphile crustose lichens such as *Aspicilia calcarea* and *Caloplaca variabilis*, *Caloplaca pelodella* on various crustose lichens on calcareous rocks, *Diplotomma nivale* and *Verrucaria latericola* on *Caloplaca* spp. on calcareous rocks, *Rimularia insularis* on *Lecanora bicincta*, and *Verrucaria fuscella* on *Verrucaria nigrescens*. All these observations agree with the results of previous studies

(Poelt, 1974; Purvis et al., 1992; Nimis, 1993; Wirth, 1995).

Of the determined lichenised fungi in Aladağlar National Park, 70% of the lichens are crustose, 19.5% are foliose, 6.5% are squamulose, and 4% are fruticose. It is obvious that crustose lichens are pre-dominant in the study area. Moreover, 81% of the crustose species are epilithic, especially on calcareous rocks (58%), which is the most dominant substratum in Aladağlar National Park for lichen growth. It is also known that water loss is restricted primarily to the upper, exposed surface in crustose lichens (Büdel & Scheidegger, 1996). In the relatively dry Mediterranean climate, it is important for lichens to minimise water loss, and this situation also explains the high diversity of crustose lichens in the study area. Foliose lichens mostly prefer barks (54%) and rocks (42%) in the study area, whereas 64% of the fruticose lichens prefer acidic barks in the forest canopy and 27% prefer soil.

Three fruticose species on soil, namely *Aspicilia hispida*, *Pilophorus cereolous*, and *Xanthoria contortuplicata*, are especially common in uplands (1900-3000 m) in the study area. A lack of fruticose soil lichens such as *Cetraria*, *Flavocetraria*, *Vulpicida*, *Bryoria*, and *Thamnolia* spp. is evident in the study area. Similar observations have been reported in 2 high volcanic mountains in Central Anatolia (Halıcı et al., 2005b). The poor lichen vegetation on soil is caused by dry and hot summers and intensive grazing, especially by huge herds of mountain goats, which are common in Aladağlar National Park. We also observed that *Aspicilia hispida* is also eaten by goats, especially when the plant vegetation finishes in September. Possibly that is one of the reasons why this species was observed only from one locality.

The most common species on calcareous rocks are *Candelariella aurella* (38 localities), *Acarospora cervina* (34 localities), *Caloplaca flavescens* (25 localities), *Lecanora flotowiana*, *Lecidella patavina* (23 localities), *Caloplaca variabilis* (22 localities), *Aspicilia calcarea*, *Lecidella stigmatae* (21 localities), *Staurothele areolata* (19 localities), *Collema cristatum* (18 localities), *Protoparmeliopsis muralis*, *Rinodina immersa* (17 localities), *Aspicilia contorta* subsp. *hoffmaniana*, *Caloplaca agardhiana*, (16 localities), *Lecanora crenulata*, *Verrucaria nigrescens* (14 localities), *Caloplaca lactea* (13 localities), *Dermatocarpon miniatum*, *Lobothallia radiosa* (12 localities), *Aspicilia desertorum*, *Verrucaria fuscella*

(11 localities), *Caloplaca circumalbata* (10 localities), *Caloplaca chalybaea*, *C. dolomiticola*, *Lecanora agardhiana*, *Verrucaria compacta* (9 localities), *Caloplaca crenulatella*, *C. flavovirescens*, *Diplotomma epipolium*, and *Xanthoria elegans* (8 localities). On the vertical faces of large limestone rocks, especially in the crevices, *Collema* spp., *Placidium* spp., *Mycobilimbia lurida*, and *Toninia* spp. have a large cover. All of these species except *Caloplaca circumalbata* are common and have a wide distribution in Europe (Purvis et al., 1992; Wirth, 1995; Hafellner & Türk, 2001). The distribution of *Caloplaca circumalbata* is summarised in the list above.

The most common species on siliceous rocks are *Candelariella vitellina* (8 localities), *Rhizocarpon geographicum* (7 localities), *Aspicilia intermutans* (6 localities), and *Acarospora fuscata*, *Aspicilia cinerea*, and *Physcia dubia* (5 localities). All these species are common and have a wide distribution in Europe (Purvis et al., 1992; Wirth, 1995; Hafellner & Türk, 2001).

On Tahtacı Plateau, there are coal mines between 2600 and 2700 m in the study area. Above these coal mines, *Protoparmeliopsis muralis*, *Lecidea atrobrunnea*, *Acarospora fuscata*, and *Physcia dubia* have a large cover. Especially in the lowest parts of these rocks, *Dermatocarpon miniatum* is very common. It is known that the major part of coal is chemically composed of silicon, aluminium, and iron oxides. *Lecidea lithophila*, a species preferring iron-rich siliceous rocks (Nimis, 1993), was also found over these coal mines in the study area.

The most common species on the acidic bark of evergreen trees such as *Pinus nigra*, *Abies cilicica*, *Cedrus libani*, and *Juniperus* sp. are *Lecidella elaochroma* (13 localities), *Caloplaca cerina* var. *cerina* (11 localities), *Candelariella xanthostigma* (9 localities), *Pseudevernia furfuraceae* var. *furfuraceae* (8 localities), *Lecanora hagenii* var. *hagenii* (7 localities), *Caloplaca flavorubescens* (6 localities), *Melanohalea exasperatula*, *Parmelia saxatilis* (5 localities), *Anaptychia ciliaris*, *Bryoria fuscescens*, *Candelariella aurella*, *Physcia aipolia*, *Ramalina farinacea* (4 localities), and *Letharia vulpina* (3 localities). All these species are common especially on acidic bark in Europe (Purvis et al., 1992; Nimis, 1993; Wirth, 1995).

The most conspicuous lichen species on the basic bark of deciduous trees such as *Populus tremula*, *Juglans regia*, and *Quercus* sp. are *Anaptychia kaspica*, *Arthopyrenia fraxinii*, *Lecanora albella*, *Leptogium saturninum*, and

Leptorhaphis atomaria. These species are known to grow especially on basic barks (Purvis et al., 1992; Nimis, 1993; Wirth, 1995).

Chaenotheca ferruginea, *Leptogium saturninum*, and *Mycocalicium subtile* are indicators of old forests (Purvis et al., 1992). These species were observed on the bark of *Pinus nigra*, *Populus tremula*, and *Abies cilicica* in Hacer Forests but not in the other forests in the study area. These observations prove that the Hacer Forests are the oldest forests in Aladağlar National Park.

The most conspicuous terricolous lichen species are *Anaptychia ciliaris*, *Aspicilia hispida*, *Caloplaca epiphyta*, *Candelariella unilocularis*, *Collema tenax*, *Endocarpon adscendens*, *Mycobilimbia lurida*, *Peltigera rufescens*, *Pilophorus cereolus*, *Placidium rufescens*, *Psora decipiens*, and *Xanthoria contortuplicata* in the study area. *Thrombium epigaeum* is reported from the Mediterranean phytogeographical region of Turkey for the first time under the forest belt in Hacer Forests. According to McCune and Rosentreter (2007), this species especially grows on recently disturbed soil in forested areas. Our observations on this species in Aladağlar National Park are conflicting.

The lichen and lichenicolous specimens were collected between 620 and 3500 m altitudes in the study area. This altitudinal range is suitable for examining the distributions of the species according to altitudes. According to Tüfekçi et al. (2002), the Kapuzbaşı Waterfalls area, situated in the south-east of the park at 620-850 m altitude, is in the warm and real Mediterranean vegetation belt. In this belt, species such as *Aspicilia calcarea*, *A. polychroma*, *Caloplaca erythrocarpia*, *C. lactea*, *C. latzelii*, *C. pelodella*, *C. variabilis*, *C. xantholyta*, *Candelariella aurella*, *Collema nigrescens*, *Dermatocarpon miniatum*, *Lecania rabenhorstii*, *Lecanora flotowiana*, *Lepraria lobificans*, *Lobothallia radiosa*, *Pertusaria aspergilla*, *Protoparmeliopsis muralis*, *Sarcogyne regularis*, *Verrucaria compacta*, *V. dufourii*, *V. marmorea*, *V. nigrescens*, and *V. pingucula* were observed. Of these species, *Caloplaca latzelii*, *C. pelodella*, and *Pertusaria aspergilla* are distributed only in this belt.

The alpine belt starts after approximately 3000 m in the study area. The species observed in the warm and real Mediterranean vegetation belt such as *Aspicilia calcarea*, *A. polychroma*, *Caloplaca lactea*, *C. variabilis*, *Candelariella aurella*, *Dermatocarpon miniatum*, *Lecania*

rabenhorstii, *Lecanora flotowiana*, *Lobothallia radiosa*, *Protoparmeliopsis muralis*, *Sarcogyne regularis*, *Verrucaria compacta*, *V. dufourii*, and *V. nigrescens* are distributed in the alpine belt also. These observations are mostly parallel to the observations reported by Nimis and Martellos (2008) in Italy.

The taxa restricted to the alpine belt of the study area are *Collema texanum* var. *texanum* and *Polysporina simplex*. It is known that these species have a distribution in alpine belt (Degelius, 1954; Nimis & Martellos, 2008).

The species restricted to the montane and alpine vegetation belts (2500-3500 m) are *Caloplaca biatorina*, *Farnoldia hypocrita*, *Lecidea lithophila*, *Lecidea umbonata*, *Melanolecia transitoria*, *Placidium squamulosum*, and *Staurothele frustulenta*. According to Nimis and Martellos (2008), *Caloplaca biatorina* is a species of the mountains of southern Europe and adjoining Asia. This species has a wide distribution in the Mediterranean phytogeographical region of Turkey and is very common in uplands in the study area. Hertel (1967) reported that *Farnoldia hypocrita* has a distribution in the arctic-alpine belt in Europe, although it is not an arctic-alpine element.

Aladağlar National Park is also rather rich in terms of lichenicolous fungi. The highest diversity of lichenicolous fungi is seen on mature lichen communities in undisturbed areas (Lawrey & Diederich, 2003). Because of this reason, Aladağlar National Park is a suitable area where a high diversity of lichenicolous fungi can be expected. Forty-six species of lichenicolous fungi are known from Aladağlar National Park. Twenty-four of these taxa were reported in other publications (the references in the Introduction) and 22 of them are reported for the first time in Aladağlar National Park herein. The host lichen species that harbour the most lichenicolous fungi species are *Caloplaca chalybaea*, *C. crenulatella*, *C. flavescens*, and *Rhizocarpon geographicum*. As saxicolous lichen species are dominant in the study area and those lichen species have a large cover on the rocks, this situation is expected. In the list of the taxa provided above, some new host lichens for lichenicolous fungi in Turkey were given and discussed (Halıcı, 2008a).

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