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Lichens of Erciyes Mountain (Kayseri, Turkey)

Abstract

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215 lichens and 8 lichenicolous fungi, belonging to 63 genera, are reported from Erciyes Mountain in Central Anatolia. Six taxa, *Aspicilia cupreogrisea* (Th. Fr.) Hue, *Aspilidea myrinii* (Fr.) Hafellner, *Lecanora pannonica* Szatala, *Lecidea syncarpa* (Zahlbr.) Boykin & Nash, *Rhizocarpon pusillum* Runemark, *Rinodina insularis* (Arnold) Hafellner, are new to Turkey, and 107 taxa are new to the Kayseri province. The lichen vegetation differs from that of the Toros Mountains in the south and the Black Sea Mountains in the north of Anatolia, but is rather similar to other Central Anatolian volcanoes.

Introduction

The results of the first collection of lichens from Erciyes Mountain in 1902 were published by Steiner (1905); his list of 83 taxa, collected by non-lichenologists, suggests an even richer lichen flora. However, further expeditions to the mountain are very scarce (Güvenç 2001; John 2002). Beginning in 2001, a more detailed study was undertaken (Halıcı 2004). Some of the results are presented here to give an overview on the lichen flora, particularly in respect of altitudinal zonation within a range from about 1000 m to nearly 4000 m. This work is a contribution to the OPTIMA-project (John 1990, 1996a, 1996b; Nimis 1996).

Study area

The study area, located within the boundaries of Kayseri province, ranges in altitude from 1050 m to 3917 m (Fig. 1). The Erciyes Mountain is a stratovolcano formed by the eruption of viscous lava flows, tephra and pyroclastic flows during the Upper Miocene-Quaternary period. A variety of magma types have been erupted, including basalt, andesite, dacite and rhyolite. The stratovolcano consists of many separate vents, some of which have erupted cinder cones and domes on the sides of the volcano. There are 68 small cones (Kılıçdağı & al. 1999).

There are six major soil types in the study area, namely non-calcareous brown, colluvial, brown, organic, alluvial and hydromorphic alluvial soils, the most widespread of which is the non-calcareous brown soil (Tosunlar & al. 1996).

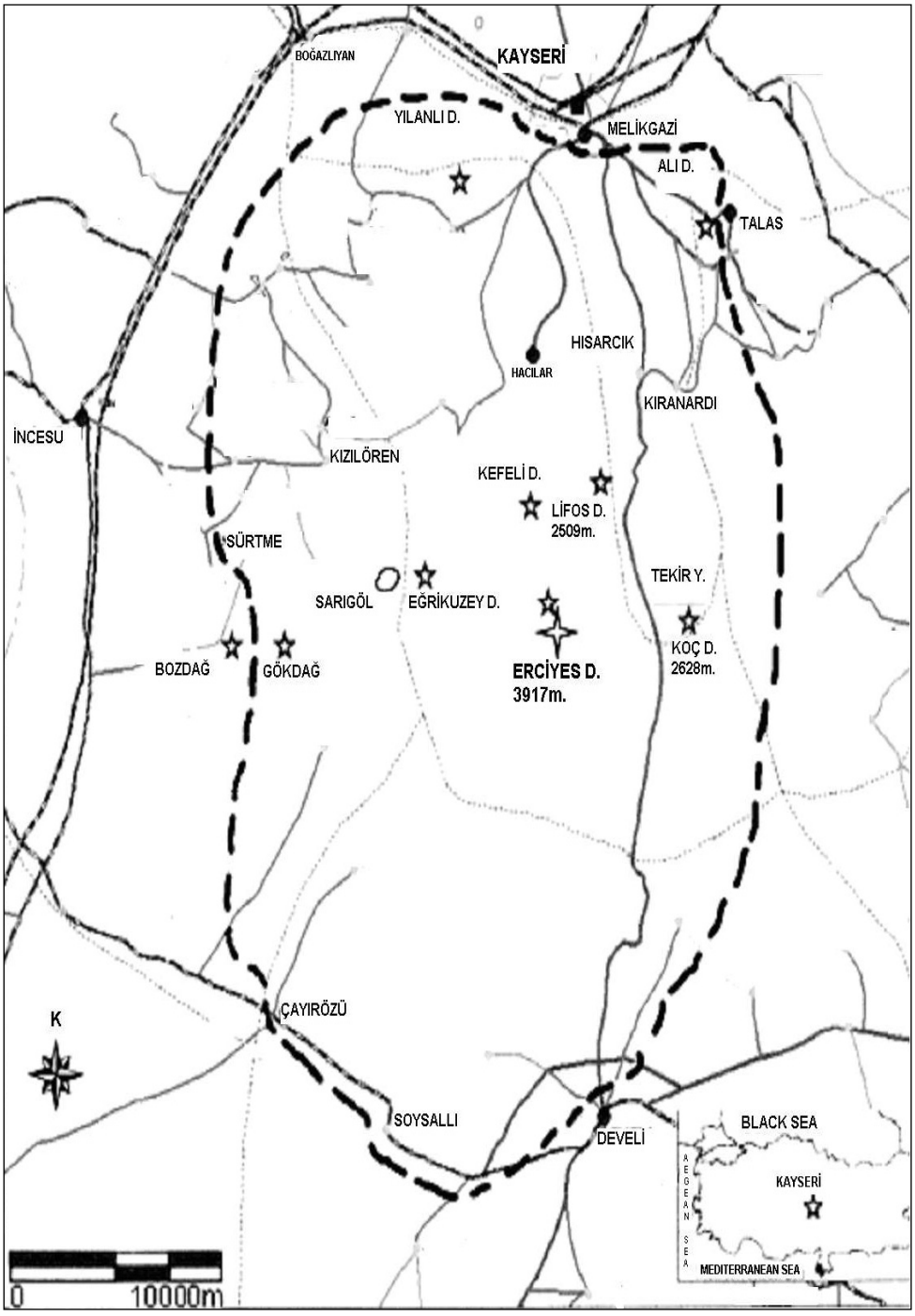

Fig.1. Map of the study area.

Unfortunately, there is no meteorological station in the study area. The nearest stations are located in Kayseri north of the region at an altitude of 1068 m and in Develi south of the region at an altitude of 1180 m. According to measurements from these stations, the study area has a Mediterranean climate characterised by dry summers and warm temperatures. This is a typical second variant of the East Mediterranean climate (Akman 1990). In Kayseri, the annual mean temperature is 10.6 °C; the maximum mean temperature 30.5 °C is in July and August, and the minimum mean temperature -7.6 °C is in January. In Develi, the annual mean temperature is 10.5 °C; the maximum mean temperature 29.5 °C is in

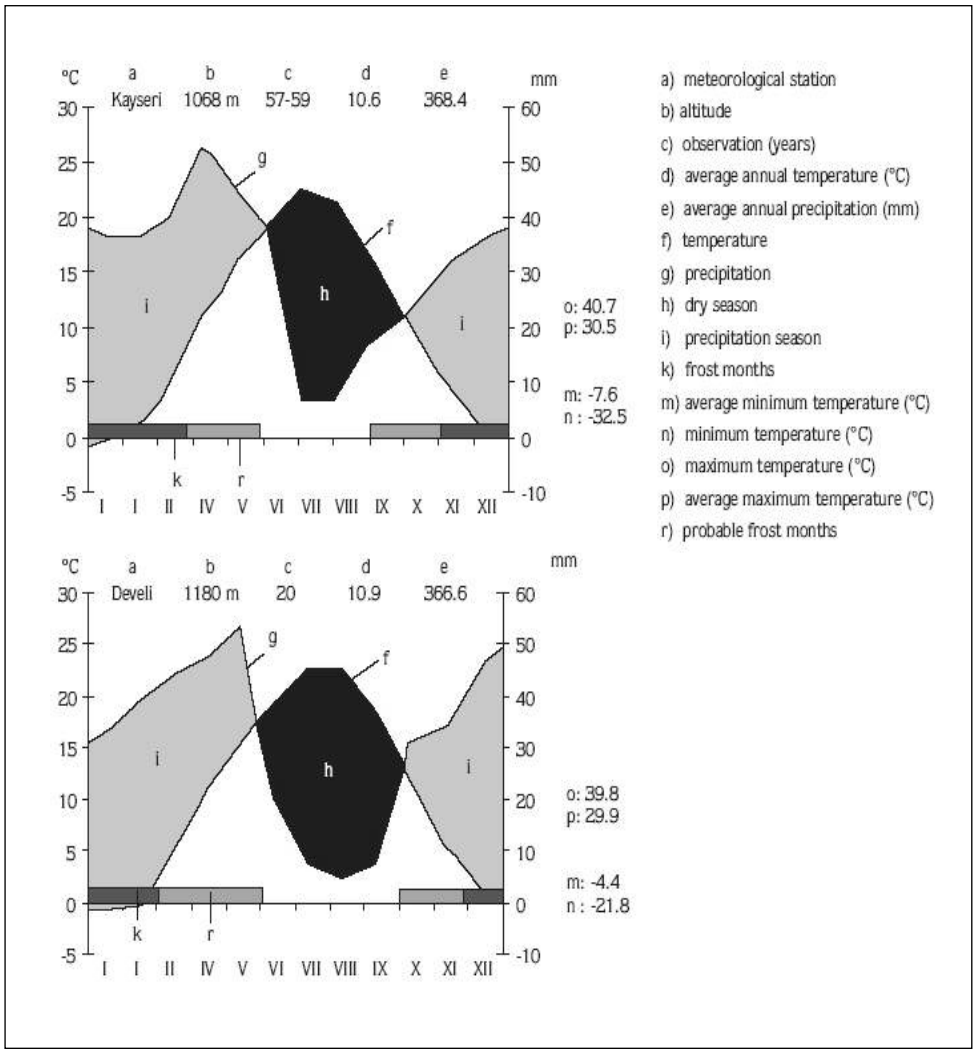

Fig. 2. Ombrothermic diagrams for Kayseri and Develi (from Vural & Aytaç 2005).

July, and the minimum mean temperature -5.6°C is in January. The ombro-thermic diagrams for Kayseri and Develi are provided in Figure 2.

Material and methods

The list of lichens is based on literature data and original collections by the authors from 2001 to 2003. Specimens from localities 1 – 34 and 36 were collected by M.G. Halıcı , and those from 35 by V.John and are stored in the herbaria of Erciyes Üniversitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü, Kayseri and Volker John (most samples in M). The nomenclature is mainly according to Hafellner & Türk (2001) and the author names follow Brummitt & Powell (1992).

Collection sites:

To all localities premise: Turkey, Kayseri (38), Erciyes Mountain;
1. İncesu, Sürtme (North-western part of Erciyes Mountain), 38° 35'N, 35° 36'E, 1100 m, 27.05.2003
2. İncesu, Gökdağ (Western part of Erciyes Mountain), 38° 34'N, 35° 19'E, 1750 m, 24.07.2003
3. İncesu, Gökdağ (Western part of Erciyes Mountain), 38° 33'N, 35° 19'E, 1783 m, 24.07.2003
4. İncesu, Gökdağ (Western part of Erciyes Mountain), 38° 33'N, 35° 19'E, 1852 m, 24.07.2003
5. Western slope of Ali Dağı, in vicinity of Çaybağları, around Dereyatağı, 38° 40'N, 35° 32'E, 1240 m, 15.06.2002
6. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 42'N, 35° 25'E, 1182 m, 29.06.2003
7. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 43'N, 35° 26'E, 1205 m, 29.06.2003
8. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 42'N, 35° 25'E, 1220 m, 29.06.2003
9. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 43'N, 35° 25'E, 1250 m, 29.06.2003
10. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 42'N, 35° 25'E, 1270 m, 29.06.2003
11. Yılanlı Dağı, in the vicinity of Koyunbaba, 38° 42'N, 35° 25'E, 1325 m, 29.06.2003
12. North of Perikartın (Northern slope of Erciyes Mountain), 38° 35'N, 35° 27'E, 2300 m, 15.05.2002 & 23.04.2003
13. North of Perikartın (Northern slope of Erciyes Mountain), 38° 34'N, 35° 32'E, 2500 m, 14.07.2002
14. Western part of Sağsıkallık (Northern slope of Erciyes Mountain), 38° 32'N, 35° 26'E, 2900 m, 14.07.2002
15. South-western slope of Lifos, 38° 36'N, 35° 28'E, 2400 m, 18.06.2003
16. Exit of Hisarcık, Western part of the highway, 38° 37'N, 35° 30'E, 1540 m, 25.08.2002
17. West part of Hisarcık – Ski centre highway, 38° 36'N, 35° 31'E, 1740 m, 21.08.2003
18. Around Hisarcık – Television Station, Eastern valley, *Quercus pubescens* forest, 38° 35'N, 35° 30'E, 1875 m,04.05.2002
19. Hisarcık garden houses (Papatya Street), 1450 m, 25.08.2002
20. Western slope of Koç Dağı, 38° 32'N, 35° 32'E, 2200 – 2300 m, 16.08.2002

21. Western slope of Koç Dağı, 38° 32'N, 35° 31'E, 2300 – 2400 m, 16.08.2002
22. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 31'E, 2200 –2300 m, 03.07.2002 & 19.10.2003
23. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 30'E, 2300 -2400 m, 03.07.2002 & 19.10.2003
24. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 30'E, 2400 –2500 m, 03.07.2002 & 19.10.2003
25. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 30'E, 2500 –2600 m, 03.07.2002 & 19.10.2003
26. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 29'E, 2600 – 2700 m, 03.07.2002 & 19.10.2003
27. Western slope of Erciyes Mountain (along the ski lift), 38° 32'N, 35° 29'E, 2700 –2800 m, 03.07.2002 & 19.10.2003
28. Western slope of Erciyes Mountain (along the ski lift), 38° 31'N, 35° 28'E, 2800 –2900 m, 03.07.2002 & 19.10.2003
29. Western slope of Erciyes Mountain (along the ski lift), 38° 31'N, 35° 27'E, 2900 – 3000 m, 03.07.2002 & 19.10.2003
30. Western slope of Erciyes Mountain (along the ski lift), 38° 30'N, 35° 26'E, 3250 m, 19.10.2003
31. Near Ski Centre - Develi highway, around Adaca Hills, 24 km west of 13th km marker, 2000 m, 24.07.2002
32. Eastern part of Tekir Yaylası – Develi Highway, 38° 32'N, 35° 31'E 2200 m 17.06.2002
33. Western part of Tekir Yaylası – Develi Highway, 38° 26'N, 35° 28'E, 1600 m, 17.06.2002
34. Around Soysallı spring (South of Erciyes Mountain), 38° 23'N, 35° 28'E, 1075 m, 17.06.2003
35. Eastern part of the mountain near Erciyes Ski Centre, 38° 32'N, 35° 29'E, 2850 m,03.08.2002
36. Kıranardı picnic area; 38° 37' N, 35° 31'E, 1570 m, 21.03.2004

List of lichen taxa:

The following information is presented:
* Species according to literature references only
(*) Species also reported in literature
Species new to Turkey
§ Species new to Kayseri province
The numbers refer to the collection sites listed above.

* *Acarospora argaei* J.Steiner (Steiner 1905)
(*) *Acarospora cervina* A.Massal. 1, 5
(*) *Acarospora fuscata* (Schrad.) Th. Fr. 16, 21, 36, (Steiner 1905)
§ *Acarospora laqueata* Stizenb. 7

* *Acarospora smaragdula* (Wahlenb.) A.Massal. (Steiner 1905)
(*) *Acarospora stapfiana* (Müll.Arg.) Hue 35, (John 2002)
§ *Acarospora strigata* (Nyl.) Jatta 1
* *Acarospora subpruinita* J.Steiner (Steiner 1905)
* *Acarospora umbilicata* Bagl. (Steiner 1905)
§ *Acarospora versicolor* Bagl. & Carestia 16
(*) *Anapthychia ciliaris* (L.) Körb. 10, 15, 28, (Güvenç 2001)
§ *Arthonia glaucomaria* Nyl. 3
(*) *Aspicilia caesiocinerea* (Nyl. ex Malbr.) Arnold 1, 4, 13, 15, 27, 28, 30, 32, (Güvenç 2001)
(*) *Aspicilia calcarea* (L.) Mudd 1, (Steiner 1905)
(*) *Aspicilia cinerea* (L.) Körb. 1, 2, 7, 12, 36, (Güvenç 2001)
(*) *Aspicilia contorta* (Hoffm.) Kremp. 1, 16, 22, 36, (Güvenç 2001)
(*) *Aspicilia contorta* (Hoffm.) Kremp. ssp. *hoffmanniana* Ekman & Fröberg 1
§ *Aspicilia cupreograsea* (Th. Fr.) Hue 6, 7, 23, 33
§ *Aspicilia desertorum* (Kremp.) Mereschk. 1, 5
(*) *Aspicilia epiglypta* (Norrl.ex Nyl.) Hue 1, 10, 12, 15, 17, 20, 25, 33, 34, (Güvenç 2001)
* *Aspicilia esculenta* (Pall.) Flagey (Steiner 1905)
(*) *Aspicilia intermutans* (Nyl.) Arnold 2, 7, (Steiner 1905)
* *Aspicilia polychroma* Anzi (Steiner 1905)
* *Aspicilia viridescens* (A.Massal.) Kremp. (Steiner 1905)
# § *Aspilidea myrinii* (Fr.) Hafellner 20
(*) *Bellemerea cinerorufescens* (Ach.) Clauzade & Cl.Roux 23, (Steiner 1905)
* *Bellemerea cupreoatra* (Nyl.) Clauzade & Cl.Roux
§ *Buellia badia* (Fr.) A.Massal. 3, 10, 15
* *Caloplaca aractina* (Fr.) Häyren (Steiner 1905)
* *Caloplaca arenaria* (Pers.) Müll.Arg. (Steiner 1905, Güvenç 2001)
§ *Caloplaca atroflava* Turner 16
§ *Caloplaca cerina* (Ehrh. ex Hedw.) Th. Fr. 1, 2, 7, 12, 15, 16, 28, 29,
(*) *Caloplaca cerina* var. *muscorum* (A.Massal.) Jatta 1,15, (Güvenç 2001)
§ *Caloplaca cerinelloides* (Ercihsen) Poelt 25
(*) *Caloplaca chlorina* (Flot.) H.Olivier 2, (Güvenç 2001)
§ *Caloplaca crenularia* (With.) J.R.Laundon 2, 12, 15, 16, 18, 23, 24, 28
* *Caloplaca decipiens* (Arnold) Blomb. & Forss. (Steiner 1905)
§ *Caloplaca dolomiticola* (Hue) Zahlbr. 1
§ *Caloplaca epithallina* Lynge 23
* *Caloplaca ferruginea* (Huds.) Th. Fr. (Steiner 1905)
§ *Caloplaca flavescens* (Huds.) J.R.Laundon 25, 27
§ *Caloplaca flavorubescens* 36
§ *Caloplaca flavovirescens* (Wulfen) Dalla Torre & Sarnth. 1
(*) *Caloplaca grimmiae* (Nyl.) H.Olivier 1,15, (Steiner 1905)
(*) *Caloplaca holocarpa* (Hoffm.) A.E.Wade 15, 18, 19, 25, 28, (Güvenç 2001)
§ *Caloplaca irrubescens* (Arnold) Zahlbr. 15
* *Caloplaca lactea* (A.Massal.) Zahlbr. (Steiner 1905; Güvenç 2001)

§ *Caloplaca rubelliana* (Ach.) Lojka 17
(*) *Caloplaca saxicola* (Hoffm.) Nordin 5, 36, (Steiner 1905)
* *Caloplaca scotoplaca* (Nyl.) H.Magn. (Steiner 1905)
§ *Caloplaca stillicidiorum* (Vahl) Lynge 28, 29, 36
(*) *Caloplaca teicholyta* (Ach.) J. Steiner 1, (Steiner 1905)
§ *Caloplaca tiroliensis* Zahlbr. 2, 12, 29, 36
(*) *Caloplaca trachyphylla* (Tuck.) Zahlbr. 28, 30, 35, (John 2002)
§ *Calvitimela armeniaca* (DC.) Hafellner 12
§ *Candeleriella aurella* (Hoffm.) Zahlbr. 1, 12, 16, 36
(*) *Candeleriella vitellina* (Hoffm.) Müll.Arg.1, 2, 5, 7, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 24, 25, 26, 27, 28, 32, 34, 36, (Steiner 1905; Güvenç 2001)
(*) *Carbonea vitellineria* (Nyl.) Hertel 21, (Steiner 1905)
* *Cercidospora epipolytropa* (Mudd) Arnold (Steiner 1905)
* *Cercidospora ulothii* Körb. (Steiner 1905)
(*) *Cetraria islandica* (L.) Ach. 12, (Steiner 1905)
§ *Cladonia coccifera* (L.) Willd. 15
(*) *Cladonia fimbriata* (L.) Fr. 6,16, (Steiner 1905)
* *Cladonia furcata* (Hudson) Schrader ssp. *furcata* (Steiner 1905)
(*) *Cladonia pyxidata* (L.) Hoffm. 2, 6, 10, 11, 12, 15, 16, 17, (Güvenç 2001)
§ *Collema auriforme* (With.) Coppins & J. R. Laundon 15
* *Collema tenax* (Sw.) Ach. (Steiner 1905)
* *Dermatocarpon subcompactum* (J.Steiner) Zahlbr. (Steiner 1905)
(*) *Dimaleana oreina* (Ach.) Norman 1, 2, 6, 15, 17, 21, 23, 24, 25, 27, 34, (Steiner 1905)
§ *Diploschistes muscorum* (Scop.) R. Sant 2, 6, 12
(*) *Diploschistes scruposus* (Schreb.) Norman 6, 7, (Güvenç 2001)
* *Diplotomma ambiguum* (Ach.) Flagey (Steiner 1905)
§ *Diplotomma epipolium* (Ach.) Arnold 1, 16
* *Endococcus perpusillus* Nyl. (Steiner 1905)
§ *Fuscidea cyathoides* (Ach.) V. Wirth & Vezda 12
§ *Lecania rabenhorstii* (Hepp) Arnold 1
§ *Lecanora allophana* Nyl. 21
§ *Lecanora argophilis* (Ach.) Ach. 21
* *Lecanora badiella* J.Steiner (Steiner 1905)
(*) *Lecanora bicincta* Ramond 2, 3, 12, 15, 20, 24, 25, 28, 32, (Steiner 1905)
§ *Lecanora bolcana* (Pollini) Poelt 12, 21, 31, 35
§ *Lecanora campestris* (Schaer.) Hue 29, 35
§ *Lecanora carpinea* (L.) Vain. 5
§ *Lecanora cenisia* Ach. 12, 15, 26, 29, 30, 36
§ *Lecanora dispersa* (Pers.) Sommerf. 12, 16, 18, 28
* *Lecanora dispersella* J.Steiner (Steiner 1905)
(*) *Lecanora dispersoareolata* (Schaer.) Lamy 20, 22, 24, 30, (Steiner 1905)
§ *Lecanora gangaleoides* Nyl. 12, 15, 20
* *Lecanora garovaglii* (Körb.) Zahlbr. (Steiner 1905)
(*) *Lecanora hagenii* (Ach.) Ach. 1, 19, (Steiner 1905)

§ *Lecanora pannonica* Szatala 12, 15, 17
(*) *Lecanora polytropa* (Ehrh. ex Hoffm.) Rabenh. 15, 25, 26, 36, (Steiner 1905)
§ *Lecanora pulicaris* (Pers.) Ach. 18
(*) *Lecanora rupicola* (L.) Zahlbr. 2, 3, 4, 6, 10, 12, 13, 15, 16, 17, 22, 23, 24, 25, 26, 27, 29, 35, (Steiner 1905; Güvenç 2001)
§ *Lecanora sulphurea* (Hoffm.) Ach. 15
§ *Lecanora swartzii* (Ach.) Ach. 2, 15
* *Lecanora swartzii* ssp. *caulescens* (J.Steiner) Leuckert & Poelt (Steiner 1905)
(*) *Lecidea atrobrunnea* (Ramond ex Lam. & DC.) Schaer. 12, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, (Steiner 1905; Güvenç 2001)
§ *Lecidea confluens* (Weber) Ach. 15, 16
(*) *Lecidea fuscoatra* (L.) Ach. 2, 5, 16, 27, (Steiner 1905)
* *Lecidea lapicida* (Ach.) Ach. (Steiner 1905)
§ *Lecidea lapicida* (Ach.) Ach. var. *pantherina* Ach. 3, 4, 12
§ *Lecidea plana* (J.Lahm) Nyl. 15, 25, 27, 36
§ *Lecidea promiscens* Nyl. 26, 29
# § *Lecidea syncarpa* Zahlbr. 28
* *Lecidea tesselata* Flörke (Steiner 1905)
(*) *Lecidella carpathica* Körb. 1, 2, 3, 5, 12, 17, 20, 23, 28, 32, 33, (Steiner 1905; Güvenç 2001)
O *Lecidella elaeochroma* (Ach.) M.Choisy 18, 19, 25
(*) *Lecidella stigmatea* (Ach.) Hertel & Leuckert 1, 2, 8, 12, 24, 29, (Steiner 1905; Güvenç 2001)
* *Lepraria caesioalba* (de Lesd.) J.R.Laundon (Güvenç 2001)
§ *Lepraria eburnea* J. R. Laundon 16
§ *Lepraria nivalis* J. R. Laundon 3, 15
* *Leproloma membranaceum* (Dicks.) Vain. (Güvenç 2001)
§ *Leptogium gelatinosum* (With.) J.R.Laundon 12, 15
§ *Leptogium lichenoides* (L.) Zahlbr. 15
§ *Lobothallia alphoplaca* (Wahlenb.) Hafellner 12, 24, 35
(*) *Lobothallia radiosa* (Hoffm.) Hafellner 1, 5, 12, 15, 16, (Steiner 1905)
(*) *Megaspora verrucosa* (Ach.) Hafellner & V. Wirth 10, 12, 15, 28, (Güvenç 2001)
§ *Melanelia disjuncta* (Erichsen) Essl. 5
§ *Melanelia elegantula* (Zahlbr.) Essl. 10
(*) *Melanelia exasparata* (De Not.) Essl. 36, (Steiner 1905)
§ *Melanelia fuliginosa* (Fr. ex Duby) Essl. ssp. *fuliginosa* 7, 10
§ *Melanelia infumata* (Nyl.) Essl. 1, 20, 34
§ *Melanelia stygia* (L.) Essl. 1, 16
§ *Miriquidica deusta* (Stenh.) Hertel & Rambold 2, 3, 6
* *Muellerella pygmaea* (Körb.) D. Hawksw. (Steiner 1905)
* *Muellerella pygmaea* var. *athallina* (Müll. Arg.) Triebel (Steiner 1905)
* *Mycobilimbia lurida* (Ach.) Hafellner & Türk (Güvenç 2001)
* *Mycoporum erodens* J. Steiner (Steiner 1905)
§ *Neofuscelia loxodes* (Nyl.) Essl. 1
* *Neofuscelia perrugata* (Nyl.) Elix (Steiner 1905)

§ *Neofuscelia pokornyi* (Körb.) Essl. 1
(*) *Neofuscelia pulla* (Ach.) Essl. 6, 7, 31, (Steiner 1905)
(*) *Neofuscelia verruculifera* (Nyl.) Essl. 16, (Steiner 1905)
§ *Ochrolechia parella* (L.) A.Massal. 3
§ *Parmelina pastillifera* (Harm.) Hale 7, 16
§ *Parmelina tiliacea* (Hoffm.) Hale 7, 10, 17
(*) *Peltigera rufescens* (Weiss) Humb. 18, 26, 36, (Steiner 1905)
(*) *Peltigera virescens* (J.Steiner) Gyeln. 15, (Steiner 1905)
(*) *Pertusaria aspergilla* (Ach.) J.R.Laundon 2, 7, 10, (Güvenç 2001)
§ *Pertusaria chiodectonoides* Bagl. ex A. Massal. 15
§ *Pertusaria corallina* (L.) Arnold 12, 16
* *Phaeophyscia ciliata* (Hoffm.) Moberg (Steiner 1905)
§ *Phaeophyscia orbicularis* (Neck.) Moberg 18,1 9
* *Phaeophyscia sciastra* (Ach.) Moberg (Steiner 1905)
(*) *Phaeorrhiza nimbosa* (Fr.) H.Mayrhofer & Poelt 16, (Halıcı & Aksoy 2003)
§ *Physcia dubia* (Hoffm.) Lettau 5, 7, 16, 20, 23, 28, 36
§ *Physcia magnussonii* Frey 12, 20
§ *Physcia stellaris* (L.) Nyl. 18, 19
* *Physcia tribacia* (Ach.) Nyl. (Steiner 1905)
§ *Physconia distorta* (With.) J.R.Laundon 15, 36
§ *Physconia enteroxantha* (Nyl.) Poelt 2, 6, 7
§ *Physconia grisea* (Lam.) Poelt 1, 5
(*) *Physconia muscigena* (Ach.) Poelt 1, 2, 6, 7, 10, 15, 16, 34, 36, (Güvenç 2001)
(*) *Physconia perisidiosa* (Erichsen) Moberg 16, (Steiner 1905; Güvenç 2001)
§ *Placidium rufescens* (Ach.) A.Massal. 7
§ *Pleurosticta acetabulum* (Neck.) Elix & Lumbsch 19
§ *Polysporina simplex* (Davies) Vezda 33
§ *Porpidia crustulata* (Ach.) Hertel & Knoph 6, 12
§ *Porpidia speirea* (Ach.) Kremp. 18
§ *Protoparmelia badia* (Hoffm.) Hafellner 1, 12, 15, 17, 23, 25
(*) *Protoparmeliopsis muralis* (Schreb.) M.Choisy 1, 2, 3, 5, 7, 10, 12, 13, 15, 16, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 36, (Steiner 1905; Güvenç 2001)
* *Pseudosagedia aenea* (Wallr.) Hafellner & Kalb (Steiner 1905)
(*) *Psora decipiens* (Hedw.) Hoffm. 12, 14, (Steiner 1905)
* *Ramalina capitata* (Ach.) Nyl. (Steiner 1905)
§ *Ramalina fastigiata* (Pers.) Ach. 15
§ *Ramalina fraxinea* (L.) Ach. 20, 21
* *Ramalina papillifera* J. Steiner (Steiner 1905)
§ *Ramalina pollinaria* (Westr.) Ach.10
(*) *Ramalina polymorpha* (Lilj.) Ach. 10, 17, 20, 30, (Steiner 1905)
§ *Rhizocarpon alpicola* (Anzi) Rabenh. 12, 15
§ *Rhizocarpon disporum* (Naegeli ex Hepp) Müll. Arg 7, 12, 16, 36
(*) *Rhizocarpon geminatum* Körb. 15, 26, 36, (Güvenç 2001)
(*) *Rhizocarpon geographicum* (L.) DC. 1, 2, 3, 4, 5, 6, 7, 12, 15, 16, 17, 20, 23, 24, 25, 27, 28, 29, 32, 35, (Steiner 1905)

§ *Rhizocarpon macrosporum* Räsänen 20
§ *Rhizocarpon obscuratum* (Ach.) A.Massal. 10, 36
# § *Rhizocarpon pusillum* Runemark 15
§ *Rhizocarpon viridiatrum* (Wulfen) Körb. 1, 3
§ *Rhizoplaca chrysoleuca* (Sm.) Zopf 17, 21, 22, 23, 25, 27, 28, 29
(*) *Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt 12, 13, 14, 15, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 32, 34, (Steiner 1905)
§ *Rhizoplaca peltata* (Ramond) Leuckert 15, 21, 24
* *Rinodina calcarea* (Arnold) Arnold (Steiner 1905)
§ *Rinodina gennarii* Bagl. 1, 23
# § *Rinodina insularis* (Arnold) Hafellner 15, 33
(*) *Rinodina milvina* (Wahlenb.) Th. Fr. 3, 12, 17, 20, 28, (Güvenç 2001)
* *Rinodina parasitica* H. Mayrh. & Poelt (Güvenç 2001)
§ *Rinodina pyrina* (Ach.) Arnold 18, 19
§ *Sarcogyne clavus* (DC.) Kremp. 12
(*) *Sporastatia polyspora* (Nyl.) Grummann 12, (Halıcı & Aksoy 2004)
(*) *Sporastatia testudinea* (Ach.) A.Massal 12, 15, 21, 22, 23, 25, 26, 27, 28, (Steiner 1905)
§ *Staurothele ambrosiana* (A. Massal.) Zschacke 2
(*) *Staurothele areolata* (Ach.) Lettau 28, (Steiner 1905)
* *Staurothele clopimoides* (Anzi ex Arnold) J. Steiner (Steiner 1905)
* *Staurothele fissa* (Taylor) Zwackh (Steiner 1905)
§ *Tephromela atra* (Huds.) Hafellner 4, 6, 12, 15
§ *Umbilicaria aprina* Nyl. 10, 15
* *Umbilicaria cinarescens* (Arnold) Frey (Steiner 1905)
(*) *Umbilicaria cylindrica* (L.) Duby 12, 13, 21, 25, 28, 29, 30, (Steiner 1905)
(*) *Umbilicaria decussata* (Vill.) Zahlbr. 15, 21, 25, 27, 30, (Steiner 1905)
§ *Umbilicaria leiocarpa* DC. 12, 15, 17
§ *Umbilicaria nylanderiana* (Zahlbr.) H. Magn. 21
§ *Umbilicaria vellea* (L.) Hoffm. 12,30
§ *Verrucaria caerulea* DC. 16
* *Verrucaria elaeomelaena* (A. Massal.) Arnold (Steiner 1905)
* *Verrucaria lecideoides* (A. Massal.) Trevisan (Steiner 1905)
§ *Verrucaria muralis* Ach. 12
§ *Verrucaria nigrescens* Pers. 15
* *Verrucaria sphaerospora* Anzi (Steiner 1905)
* *Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale (Steiner 1905)
§ *Xanthoparmelia somloensis* (Gyeln.) Hale 6, 13
§ *Xanthoria candeleria* (L.) Th. Fr. 7, 19
(*) *Xanthoria elegans* (Link) Th. Fr. 12, 13, 21, 23, 25, 26, 27, 28, 30, 34, (Steiner 1905)
§ *Xanthoria fulva* (Hoffm.) Poelt & Petutschnig 18, 36

Biogography of the lichens of Erciyes Mountain

Boral, subalpine, alpine and subnival belts are present in Erciyes Mountain (Aksoy & Vural 2003). The elevations of these vegetation belts differ from those in western Europe as used e.g. by Hafellner & Türk (2001) and Wirth (1995). The siliceous rocks of the boreal belt from about 1100 to 2100 m, with *Populus tremula* and various *Quercus* communties, is dominated by associations of *Candelariella vitellina*, *Protoparmeliopsis muralis*, *Rhizocarpon geographicum*, *Lecanora rupicola*, *Physconia muscigena*, *Cladonia pyxidata*, *Dimaleana oreina*, *Lecidella carpathica*, *Aspicilia cinerea*, *A. epiglypta* and *Physcia dubia*. In crevices *Caloplaca cerina*, *Physconia enteroxantha*, *P. muscigena* and *Parmelina tiliaceae* grow on mosses, and *Cladonia pyxidata* and *Peltigera rufescens* are found in shady habitats under big rocks direct on soil. Species communities with *Caloplaca holocarpa*, *Lecanora pulicaris*, *Lecidella elaochroma*, *Phaeophyscia orbicularis*, *Physcia stellaris*, *Rinodina pyrina* and *Xanthoria fulva* are frequent on bark of *Quercus* sp. in this belt. Nitrophytic species such as *Caloplaca holocarpa*, *Physcia stellaris* and *Xanthoria candelaria* are dominant on the bark of fruit trees such as *Armeniaca vulgaris* in anthropogene influenced locations. In humid valleys near water runs and small ponds *Aspicilia epiglypta*, *Caloplaca crenularia*, *Cladonia fimbriata*, *Dimaleana oreina* and *Peltigera rufescens* are associated. All these species are common and far distributed in Europe (Hafellner & Türk 2001; Llimona & Hladun 2001; Nimis 1993; Purvis & al. 1992). The scarce calcareous rocks are dominated by communities of *Acarospora cervina*, *Aspicilia calcarea*, *A. contorta*, *A. desertorum*, *Caloplaca dolomiticola*, *C. flavovirescens*, *C. teicholyta*, *Diplotomma epipolium* and *Lobothallia radiosa*. The continental character of these localities is underlined by the presence of *Aspicilia desertorum*. In this belt the lichenicolous species *Arthonia glaucomaria* and *Buellia badia* are found on *Lecanora bicincta* and *L. rupicola*.

The lichen species arranged according to their frequency in the subalpine belt between 2100 and 2800 m are: *Leci*

dea atrobrunnea, *Candelariella vitellina*, *Protoparmeliopsis muralis*, *Rhizoplaca melanopthalma*, *Lecanora rupicola*, *Rhizocarpon geographicum*, *Sporastatia testudinea*, *Xanthoria elegans*, *Dimaleana oreina*, *Lecanora bicincta*, *Rhizoplaca chrysoleuca, R. peltata*, *Aspicilia caesiocinerea*, *A. epiglypta*, *Caloplaca crenularia*, *Lecidella carpathica*, *Protoparmelia badia*, *Umbilicaria cylindrica* and *U. decussata*. The typical community on volcanic rocks is composed by *Sporastatia testudinea, Lecanora rupicola, Lecidea atrobrunnea, Rhizocarpon geographicum* and *Rhizoplaca melanophthalma.* On vertical parts of these volcanic rocks *Umbilicaria* species grow in high dominance. In the subalpine belt, the few epiphytic species *Caloplaca cerinelloides*, *C. holocarpa* and *Lecidella elaochroma* are restricted to the bark of shrubs like *Cotoneaster* spp. The number of lichenicolous species in the subalpine belt is clearly higher than in lower regions: *Acarospora stapfiana* on *Caloplaca trachyphylla, Caloplaca epithallina* on *Dimaleana oreina*, *Buellia badia* on *Lecanora rupicola*, *Caloplaca grimmae* and *Carbonea vitellineria* on *Candelariella vitellina*, *Rhizocarpon pusillum* on *Sporastatia testudinea*.

The Alpine belt in Erciyes Mountain between 2800 and 3400 m is dominated by *Lecidea atrobrunnea*, *Rhizoplaca melanophthalma*, *Protoparmeliopsis muralis*, *Sporastatia testudinea*, *Umbilicaria cylindrica*, *U. vellea*, *Xanthoria elegans*, *Caloplaca*

trachyphylla, *Ramalina polymorpha, Lecanora cenisia*, *Rhizocarpon geographicum*, *Psora decipiens* and *Lecidea promiscens* on hard siliceous rocks. Of these species, *Lecidea promiscens* and *Rhizocarpon geographicum* are the most resistant species to snow cover in alpine regions (Kappen 1988).

The most conspicuous lichen in the subnivale belt is *Xanthoria elegans*, whereas further species are rather scarce.

A comparision of the lichen vegetation of Erciyes mountain with other mountains in Europe (Bielczyk 2003; Creveld 1981; Egea & Llimona 1987; Hafellner & Türk 2001) results in a high conformity of species. In a similar way most species are connected to an areal in Asia and Northern America. Species representing this distribution pattern are *Acarospora stapfiana*, *Aspicilia dsertorum, Caloplaca trachyphylla*, and *Lecidea syncarpa* (Andreev & al. 1998; Brodo & al. 2001; Golubkova 1983; Khodovtsev 2004; Kopaczevskaja & al. 1971).

Discussion

The natural vegetation of the Erciyes Mountain compex is almost destroyed by goat grazing, tourism, and settlements. The impact of these factors is quite different in various regions of the mountain complex. Communities with trees are mostly found in weather side of the southern and western slopes of the mountain, with relicts of *Quercus* and *Crataegus* in the west. Even in summer this exposition of the top of the mountain bears a white cap of clouds. So epiphytic lichens such as *Lecidella elaochroma, Caloplaca cerinelloides* and *Caloplaca holocarpa* can be found on bark of *Cotonaster* sp. between 2500 to 2600 m. Along the northern slopes of the mountain, *Quercus* and *Juniperus* communities grow between 1800 and 2000 m. Above 2000 m the mountain vegetation is dominated mostly by spinose *Astragalus* and *Acantholimon* species. In the vicinity of Hısarcık, at about 1400 to 1500 m. in the lee of the mountain, many garden houses of Kayseri inhabitants are used to recover from the depressing hot weather in the city, as well as farming as a hobby and cultivating orchards with *Prunus domestica*, *Armeniaca vulgaris*, *Malus domestica* and *Cerasus vulgaris*. Nitrophytic lichens such as *Physcia stellaris*, *Xanthoria candelaria* and *Caloplaca holocarpa* are very common on the barks of these trees. Epiphytic lichens are found up to a height of 2600 m.

Siliceous rocks are predominant on Erciyes Mountain, but calcareous rocks cover only a small area in the western part, where, near Sürtme at 1100 m, *Acarospora cervina, Aspicilia calcarea, A. contorta, Caloplaca flavovirescens, C. teicholyta, Candelariella aurella* and *Lecidella stigmatea* are common. On the exposed volcanic rocks between 1500 to 3000 m *Anaptychia ciliaris, Caloplaca cerina, Dimeleana oreina, Lecidea atrobrunnea* and *Megaspora verrucosa* are frequent, and *Sporastatia testudinea* between 2300 to 2800 m *Caloplaca saxicola*, *Rhizoplaca melanophthalma* and *Xanthoria elegans* have the widest altitudinal range and are found from the lowest part (1075 m) to the highest part (3940 m) of the mountain, followed by *Aspicilia caesiocinerea* and *Candeleriella vitellina*. Most species do not exceed 3000 m. Those lichens filling the altiudinal range from 1000 m to 3000 m include *Protoparmelia badia, Protoparmeliopsis muralis, Psora decipiens* and *Rhizocarpon geographicum*. *Cladonia* and *Lepraria* species are mostly restricted

in the lower altitudes of the mountain. Generally the altitudinal ranges of the lichens found on Erciyes Mountain are comparable with those reported in the literature.

Compared to the Turkish mountains along Mediterranean Sea and Black Sea and other high mountains abroad, the number of 223 taxa of lichenized and lichenicolous fungi in this wide area of Erciyes Mountains is extremely low. Although a high number of additional records is expected, the number of species will not reach that of a comparable size in the Alps. The lack or even extremely low cover of fruticose soil lichens such as *Cetraria*, *Flavocetraria*, *Vulpicida*, *Cladonia, Bryoria* and *Thamnolia* spp. is evident. Those observations have been similarly made in higher altitudes of the neighbouring volcanoes e.g. Hasan Dağ. The poor lichen vegetation on soil is caused by dry and hot continental summers and intensive grazing by huge herds of sheep and goat. Due to the climate the lichen vegetation is impossible to recover from feeding.

Tourism, in form of skiing in winter and trekking in summer is affecting the lichen vegetation, and ski-lifts facilitate access to the higher mountains. Eight lichen collecting stations established along the ski-lift will provide for comparable monitoring in the future.

Six taxa new to Turkey and 107 taxa new to Kayseri province emphasise the need for such studies in Turkey.

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