

Lichens from the Mediterranean phytogeographical region of Turkey

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Abstract – 154 lichen taxa are reported from 17 sampling localities in Saimbeyli, Tufanbeyli (Adana) and Develi Districts (Kayseri). Of these, 76 taxa are new for Adana and 12 taxa are new for Kayseri provinces. Besides, 23 of the reported taxa are new for the Mediterranean region of Turkey. Seven taxa namely; *Acarospora badiofusca* subsp. *badiorubra* Clauzade & Cl.Roux, *Aspicilia recedens* (Taylor) Arnold, *Buellia pulverulenta* (Anzi) Jatta, *Endocarpon pulvinatum* Th.Fr., *Leproloma diffusum* J.R.Laundon var. *diffusum*, *Verrucaria dolosa* Hepp and *V. tristis* Hepp are new record for Turkey. For each taxon, habitat and distributional data are provided.

Ascomycota / biodiversity / biota / lichenized fungi

INTRODUCTION

In-depth investigations of Turkish lichens have an extremely short history covering no more than two decades, but recently detailed studies have been conducted by both Turkish and other researchers (Özdemir, 1991; John & Nimis, 1998; Karabulut & Türk, 1998; Öztürk & Güvenç, 2003; John & Breuss, 2004; Halıcı *et al.*, 2005; Tufan *et al.*, 2005). The Mediterranean phytogeographical region is one of the lichenologically better studied areas of Turkey (e.g. Pisut, 1970; Güner & Özdemir, 1986; Güvenç & Öztürk, 1998; John & Nimis, 1998; Nimis & John, 1998; Öztürk *et al.*, 1998; John *et al.*, 2000; John, 2003; Breuss & John, 2004; Tufan *et al.*, 2005; Çobanoğlu & Sevgi, 2006; Halıcı & Aksoy, 2006). Besides, a preliminary catalogue of lichenized and lichenicolous fungi of Mediterranean Turkey was presented by John (1996). There are five papers related to the lichen biota of Adana province (John, 1996; Güvenç & Öztürk, 1998; Nimis & John, 1998; Güvenç, 2001; Güvenç, 2002) and five papers related to the lichens of Kayseri province (Steiner, 1905; Güvenç, 2001; Halıcı *et al.*, 2005, 2006; Halıcı & Aksoy, 2006). This paper aims to contribute further to our knowledge of the lichens of the Mediterranean phytogeographical region of Turkey.

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MATERIAL AND METHODS

Lichens were collected from six localities in Saimbeyli District (Adana) in 2002, and four localities in Tufanbeyli District (Adana) and seven localities in Develi District (Kayseri) in 2004. The lichen samples are stored in the reference collections of BULU (Uludağ University, Biology Department, Bursa). The taxa are listed in alphabetical order followed by the collection locality numbers and substrata. The nomenclature follows Hafellner & Türk (2001) and other recent taxonomic treatments (e.g. Blanco *et al.*, 2004). Author abbreviations after scientific names are according to Brummitt & Powell (1992). Lichen taxa new to Turkey are indicated by #, those new to provinces by *, and those new to the Mediterranean region of Turkey by ◻.

STUDY AREA

The study area is located in the East Mediterranean Region of Turkey between 38° 03' to 38° 22' N and 35° 33' to 36° 14' E (Fig. 1).

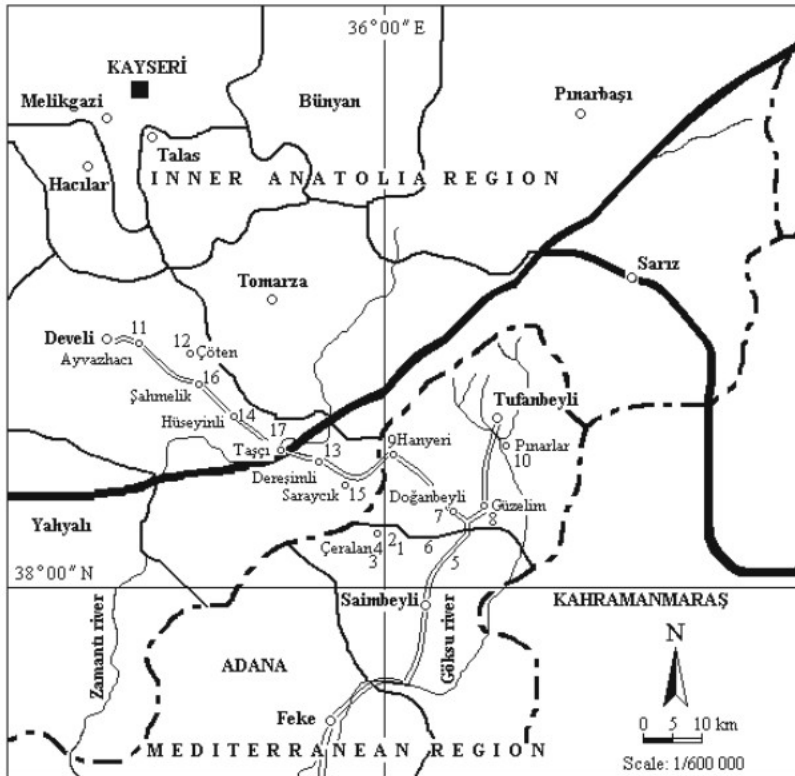


Fig. 1. Map of the study area.

The collecting localities were as follows:

1. ADANA: Saimbeyli; Çerelan Village, Upper parts of Upper Water Mill in Kösedede Stream, 38°05'30"N, 36°00'27"E, 1400m, 25.Aug. 2002.
2. ADANA: Saimbeyli; Çerelan Village, Karadaşlar location, 38°05'21"N, 36°00'17"E, 1400m, 25.Aug. 2002.
3. ADANA: Saimbeyli; Çerelan Village – on the way to Elpen Village, Daşlık, 25.Aug. 2002.
4. ADANA: Saimbeyli; Çerelan Village, Near the castle, 38°05'36"N, 35°59'33"E, 1240m, 28.Aug. 2002.
5. ADANA: Saimbeyli; Obruk gate, in vicinity of Çatlı çeşmesi, 38°03'N, 36°03'E, 1240m, 29.Aug. 2002.
6. ADANA: Saimbeyli; Saimbeyli- Tufanbeyli highway, Dumlupınar locality, 38°07'39"N, 36°05'04"E, 1410m, 29.Aug. 2002.
7. ADANA: Tufanbeyli; Doğanbeyli Village, 1433m, 38°07'52"N, 36°08'31"E, 23.Apr. 2004.
8. ADANA: Tufanbeyli; Güzelim Village, 1486m, 38°09'33"N, 36°11'11"E, 23.Apr. 2004.
9. ADANA: Tufanbeyli; Hanyeri Village, 1667m, 38°13'05"N, 36°02'08"E, 23. Apr. 2004.
10. ADANA: Tufanbeyli; Pınarlar Village, 1373m, 38°14'35"N, 36°14'28"E, 23. Apr. 2004.
11. KAYSERİ: Develi; Ayvazcı Village, 1441m, 38°22'26"N, 35°33'06"E, 23. Apr. 2004.
12. KAYSERİ: Develi; Çöten Village, 1390m, 38°22'34"N, 35°38'57"E, 23. Apr. 2004.
13. KAYSERİ: Develi; Dereşimli Village, 1479m, 38°12'07"N, 35°54'08"E, 23. Apr. 2004.
14. KAYSERİ: Develi; Hüseyinli Village, 1379m, 38°16'06"N, 35°44'45"E, 23. Apr. 2004.
15. KAYSERİ: Develi; Saraycık Village, 1688m, 38°11'04"N, 35°56'00"E, 23. Apr. 2004.
16. KAYSERİ: Develi; Şahmelik Village, 1324m, 38°18'38"N, 35°41'00"E, 23. Apr. 2004.
17. KAYSERİ: Develi; Taşçı Village, 1340m, 38°13'29"N, 35°49'06"E, 23. Apr. 2004.

Develi District is located in the south of Kayseri; connecting Kayseri and Adana provinces at an altitude of 1180 m. In Develi, the annual mean temperature is 10.5 °C. The maximum mean temperature is 29.5 °C, in July. The minimum mean temperature is – 5.6 °C, in January. Develi has a Mediterranean climate characterised by dry summers and warm temperatures, and precipitation mainly during the winter months. The ranked seasonal precipitation regime during the year is spring, winter, autumn, and summer (SWAS). This is the typical second variant of the East Mediterranean climate type (Akman, 1990).

Saimbeyli (1100 m) and Tufanbeyli (1410 m) Districts, belonging to Adana province, are located inland and far from the shore effects of East Taurus Mountains. The annual mean precipitation is 857 mm in Saimbeyli and 516 mm in Tufanbeyli. Tufanbeyli is in the steppe borders, and *Pinus nigra* subsp. *pallasiana* is dominant in Saimbeyli. The ranked seasonal precipitation regime during the year here is winter, spring, autumn and summer (WSAS). This is the first type of East Mediterranean precipitation regime. The annual mean temperature is 15-19 °C, the maximum mean temperature of the hottest month is 34-36 °C (August), and the minimum mean temperature of the coldest month is – 5 °C (January). According to Emberger's Mediterranean Bioclimate layers classification; this area is upper semi-arid, very cold and Mediterranean (Akman, 1995).

The Mediterranean bioclimatic zones are characterised by the vegetation types. In the Mediterranean climate, vegetation zones are related to differences in altitude, temperature, and precipitation. Two zones are found in the study area (Akman, 1995):

1. Submediterranean belt (1000-1500 m): Characterised by deciduous oaks such as *Quercus cerris* and *Q. infectoria*.
2. Mediterranean-montane belt (1500-2000 m): Characterised by *Pinus nigra* subsp. *pallasiana*, *Cedrus libani* and *Abies cilicica*.

The study area is geologically very interesting, and Tchihatcheff (1866) accepted some of the formations in the vicinity of Gezbel, Feke, Saimbeyli and Belenköy as Devonian and others as Carboniferous. Upper Devonian rocks are present in the vicinity of Alaylı and Beydağları, situated in the east of Bakırdağları (Develi), while Silurian exposures are present in the vicinity of Feke and Saimbeyli with graptolite schists (Ünsalaner, 1945). Cambrian formations cover a large area in the vicinity of Mansurlu and Feke, and exposures of these decrease towards the north-east and are completely covered by other formations between Tufanbeyli and Sarız. The Cambrian deposits generally consist of carbonate and fragmented rocks.

RESULTS

In this study, 336 lichen specimens are collected from 17 different localities of Develi District in the borders of Kayseri province and Saimbeyli and Tufanbeyli Districts in the borders of Adana province: 211 of these were from Adana and 125 from Kayseri. The identification of the lichen specimens was made with the aid of several lichen books, and in total 156 lichenized taxa were determined.

Taxa recorded

#*Acarospora badiofusca* subsp. *badiorubra* Clauzade & Cl.Roux 1981 **11**: On siliceous rock (BULU 10181).

A. cervina* A.Massal. 1852 **3, 4, 6, 10, 13, 15, 17: On calcareous rock (BULU 10288, 10266, 10233, 10161, 10140, 10069, 10111); **7**: On partly calcified siliceous rock (BULU 10133)

A. fuscata (Nyl.) Arnold 1870 **11, 12**: On siliceous rock (BULU 10183, 10208).

A. hospitans* H.Magn. 1924 **14: Parasitic on *Aspicilia intermutans* (BULU 10041).

A. impressula* Th.Fr. 1871 **14: On calcareous rock (BULU 10031).

A. smaragdula* (Wahlenb.) A.Massal. 1852 **7, 12, 16: On siliceous rock (BULU 10127, 10200, 10021).

A. versicolor Bagl. & Carestia 1863 **14**: A parasite on *Aspicilia contorta* (BULU 10053).

Anaptychia ciliaris (L.) Körb. 1853 **1**: On *Cedrus* sp. and *Pinus nigra* (BULU 10340, 10341); **6**: On *Pinus* sp. (BULU 10245); **8**: On *Pinus sylvestris* (BULU 10084).

Arthonia lapidicola* (Taylor) Branth & Rostr. 1869 **4: On calcareous rock (BULU 10276).

Aspicilia caesiocinerea (Nyl. ex Malbr.) Arnold 1886 **12**: On siliceous rock (BULU 10195).

A. calcarea (L.) Mudd 1859 **1, 3, 4, 5, 9, 10, 14, 15, 17**: On calcareous rock (BULU 10328, 10285, 10274, 10258, 10148, 10165, 10043, 10061, 10108).

A. cinerea* (L.) Körb. 1855 **2, 6, 8, 9, 11, 12: On siliceous rock (BULU 10300, 10246, 10090, 10142, 10179, 10198).

A. contorta* (Hoffm.) Kremp. subsp. *contorta* 1861 **3, 5, 10: On calcareous rock (BULU 10279, 10250, 10176); **12, 14**: On partly calcified siliceous rock (BULU 10212, 10045).

A. contorta subsp. *hoffmanniana* Ekman & Fröberg 1989 **12**: On siliceous rock (BULU 10205).

A. desertorum (Kremp.) Mereschk. 1911 **15, 17**: On calcareous rock (BULU 10056, 10102).

A. farinosa* (Flörke) Motyka 1972 **1, 3, 17: On calcareous rock (BULU 10313, 10287, 10123).

A. intermutans* (Nyl.) Arnold 1887 **1, 14: On siliceous rock (BULU 10342, 10037).

#*A. recedens* (Taylor) Arnold 1896 **11**: On siliceous rock (BULU 10186).

Bagliettoa parmigera* (J.Steiner) Gams 1967 **1, 15: On calcareous rock (BULU 10348, 10068).

#*Buellia pulverulenta* (Anzi) Jatta 1900 **11**: On *Physcia dubia* (BULU 10190).

Caloplaca biatorina* (A.Massal.) J.Steiner 1910 **10: On calcareous rock (BULU 10172).

C. cerina (Ehrh. ex Hedw.) Th.Fr. var. *cerina* 1861 **1**: On *Pinus nigra* (BULU 10349); **8**: On *Pinus sylvestris* (BULU 10075).

○ *C. cerina* .. var. *muscorum* (A.Massal.) Jatta 1932 **14**: On mosses (BULU 10039).

C. chalybaea* (Fr.) Müll.Arg. 1862 **5, 17: On calcareous rock (BULU 10262, 10121).

C. citrina* (Hoffm.) Th.Fr. 1860 **16: On partly calcified siliceous rock (BULU 10016) and among mosses (BULU 10024).

○ *C. congregiens* (Nyl.) Zahlbr. 1930 **2**: On mosses between crevices of siliceous rocks (BULU 10302).

C. crenularia* (With.) J.R.Laundon 1984 **6, 11, 14: On siliceous rock (BULU 10229, 10184, 10052); **12**: On partly calcified siliceous rock (BULU 10210).

C. crenulatella* (Nyl.) H.Olivier 1909 **4, 10: On calcareous rock (BULU 10269, 10164); **16**: On siliceous rock (BULU 10022).

○ *C. decipiens* (Arnold) Blomb. & Forssell 1931 **7**: On partly calcified siliceous rock (BULU 10132); **10, 12, 14, 16**: On calcareous rock (BULU 10160, 10201, 10046, 10013).

○ *C. demissa* (Körb.) Arup & Grube 1999 **14**: On siliceous rock (BULU 10025).

C. dolomiticola (Hue) Zahlbr. 1931 **3, 10, 17**: On calcareous rock (BULU 10293, 10178, 10118).

C. erythrocarpa* (Pers.) Zwackh 1862 **5: On calcareous rock (BULU 10259).

C. flavescens* (Huds.) J.R.Laundon 1984 **3: On calcareous rock (BULU 10294).

- **C. flavorubescens* (Huds.) J.R.Laundon 1976 **1**: On *Pinus nigra* (BULU 10334); **8**: On *Pinus sylvestris* (BULU 10096).
- C. flavovirescens* (Wulfen) Dalla Torre & Sarnth. 1902 **15**: On calcareous rock (BULU 10058).
- C. grimmiae* (Nyl.) H.Oliver 1909 **12**: A parasite on *Candelariella vitellina* (BULU 10196).
- **C. haematites* (Chaub. ex St.Aman) Zwackh 1862 **1, 6**: On *Pinus nigra* (BULU 10335, 10244); **8**: On *Pinus sylvestris* (BULU 10091).
- C. holocarpa* (Hoffm.) A.E.Wade 1965 **1**: On *Cedrus* sp. (BULU 10323); **8**: On *Pinus sylvestris* (BULU 10099).
- **C. lactea* (A.Massal.) Zahlbr. 1901 **10**: On calcareous rock (BULU 10170).
- C. saxicola* (Hoffm.) Nordin 1972 **4, 14**: On calcareous rock (BULU 10273, 10047); **6**: On siliceous rock (BULU 10249).
- *C. scopularis* (Nyl.) Lettau 1912 **7**: On siliceous rock (BULU 10131).
- C. variabilis* (Pers.) Müll.Arg. 1862 **1, 9, 13, 15, 17**: On calcareous rock (BULU 10337, 10152, 10136, 10057, 10112).
- **C. xantholyta* (Nyl.) Jatta 1902 **3, 5**: On calcareous rock (BULU 10283, 10257).
- **Candelariella aurella* (Hoffm.) Zahlbr. 1928 **1, 9, 10, 12, 14, 15, 17**: On calcareous rock (BULU 10330, 10153, 10163, 10203, 10027, 10071, 10125).
- *C. reflexa* (Nyl.) Lettau 1912 **8**: On *Pinus sylvestris* (BULU 10098).
- C. vitellina* (Hoffm.) Müll.Arg. 1894 **6, 7, 11, 16**: On siliceous rock (BULU 10236, 10128, 10182, 10020); **8**: On *Pinus sylvestris* (BULU 10094); **12**: On partly calcified siliceous rock (BULU 10211).
- **C. xanthostigma* (Pers. ex Ach.) Lettau 1912 **6**: On *Pinus* sp. (BULU 10225).
- **Catapyrenium lachneum* (Ach.) R.Sant. 1980 (syn. *Placidium lachneum* (Ach.) de Lesd.) **5**: On humus (BULU 10265).
- *Cecidonia umbonella* (Nyl.) Triebel & Rambold 1988 **15**: On calcareous rock (BULU 10062).
- **Cladonia convoluta* (Lam.) Cout. 1913 **6**: Among mosses in soil (BULU 10234); **8**: On siliceous soil (BULU 10078).
- **C. pocillum* (Ach.) O.J.Rich. 1803 **1**: On mosses in calcareous soil (BULU 10331).
- **Collema auriforme* (With.) Coppins & J.R.Laundon 1984 **1, 17**: On calcareous rock (BULU 10332, 10105).
- **C. crispum* (L.) Weber ex F.H.Wigg. 1780 **6, 7, 16, 17**: On siliceous soil (BULU 10231, 10129, 10023, 10126); **13, 15**: Among mosses on surface of calcareous rock (BULU 10138, 10060); **14**: Among mosses on siliceous soil (BULU 10038).
- C. cristatum* (L.) Weber ex F.H.Wigg. 1780 **10, 17**: On calcareous rock (BULU 10154, 10110).
- **C. flaccidum* (Ach.) Ach. 1810 **9**: On siliceous rock (BULU 10144).
- **C. parvum* Degel. 1954 **3**: On calcareous rock (BULU 10282).
- **C. tenax* (Sw.) Ach. 1810 **3**: On calcareous soil (BULU 10290).
- **Dermatocarpon miniatum* (L.) W.Mann 1825 **2**: On siliceous rock (BULU 10304).
- **Dimelaena oreina* (Ach.) Norman 1852 **9, 12, 14**: On calcified siliceous rock (BULU 10143, 10215, 10044).
- **Diplotomma alboatrum* (Hoffm.) Flot. 1849 **6**: On *Pinus* sp. (BULU 10350); **8**: On *Pinus sylvestris* (BULU 10088).

- D. epipolium* (Ach.) Arnold 1869 **4, 9, 10, 13, 14, 15**: On calcareous rock (BULU 10270, 10151, 10171, 10139, 10028, 10063).
- #*Endocarpon pulvinatum* Th.Fr. 1861 **10**: On calcareous rock (BULU 10159).
- **Fulgensia schistidii* (Anzi) Poelt 1965 **1, 3, 5, 16**: On mosses in between crevices of calcareous rock (BULU 10336, 10291, 10255, 10015).
- **Hypogymnia farinacea* Zopf 1907 **1**: On *Pinus nigra* (BULU 10310).
- **Immersaria athroocarpa* (Ach.) Rambold & Pietschm. 1989 **6**: On siliceous rock (BULU 10247).
- **Lecania fuscella* (Schaer.) A.Massal. 1853 **8**: On *Pinus sylvestris* (BULU 10073).
- #*L. nylanderiana* A.Massal. 1856 **14**: On calcareous rock (BULU 10032).
- Lecanora achariana* A.L.Sm. 1918 **7**: On partly calcified siliceous rock (BULU 10135).
- **Lecanora argentata* (Ach.) Malme 1897 **1**: On *Cedrus* sp. (BULU 10322); **8**: On *Pinus sylvestris* (BULU 10089).
- **L. crenulata* (Dicks.) Hook. **10, 15**: On calcareous rock (BULU 10157, 10070).
- **L. dispersa* (Pers.) Röhl. **6, 16**: On siliceous rock (BULU 10218, 10018); **9, 10, 12**: On calcareous rock (BULU 10150, 10177, 10204).
- **L. hagenii* (Ach.) Ach. 1810 **6**: On *Pinus* sp. (BULU 10220); **8**: On *Pinus sylvestris* (BULU 10093), **16**: On *Juniperus* sp. wood (BULU 10014).
- **L. pruinosa* Chaub. 1821 **4**: On calcareous rock (BULU 10268).
- L. pulicaris* (Pers.) Ach. 1814 **5**: On *Pinus* sp. (BULU 10254).
- L. rupicola* . subsp. *subplanata* (Nyl.) Leuckert & Poelt 1989 **6, 11, 12**: On siliceous rock (BULU 10242, 10191, 10207).
- **L. varia* (Hoffm.) Ach. 1810 **1**: On *Pinus nigra* (BULU 10339); **8**: On *Pinus sylvestris* (BULU 10082).
- Lecidea atrobrunnea* (Ramond) Schaer. 1828 **14**: On siliceous rock (BULU 10049).
- L. confluens* (Weber) Ach. 1803 **1**: On siliceous rock (BULU 10338).
- **L. fuscoatra* (L.) Ach. 1803 **2, 6, 14**: On siliceous rock (BULU 10303, 10219, 10054).
- **L. plana* J.Lahm **6**: On siliceous rock (BULU 10248).
- **Lecidella carpathica* Körb. 1861 **1, 2, 6, 8, 9, 11**: On siliceous rock (BULU 10299, 10316, 10299, 10241, 10092, 10145, 10193); **10**: On calcareous rock (BULU 10175); **12**: On partly calcified siliceous rock (BULU 10214).
- L. elaeochroma* (Ach.) M.Choisy 1950 **1**: On *Cedrus* sp. and *Pinus nigra* (BULU 10321, 10333); **5, 6**: On *Pinus* sp. (BULU 10252, 10223); **8**: On *Pinus sylvestris* (BULU 10074).
- **L. patavina* (A.Massal.) Knoph & Leuck. 1990 **7**: On calcareous rock (BULU 10130).
- **L. stigmatea* (Ach.) Hertel & Leuck. 1969 **7**: On siliceous rock (BULU 10134); **9, 10, 15, 17**: On calcareous rock (BULU 10149, 10156, 10064, 10107).
- #*Leproloma diffusum* J.R.Laundon var. *diffusum* 1989 **1**: On mosses in calcareous soil (BULU 10309).
- **Leptogium gelatinosum* (With.) J.R.Laundon 1984 **1**: On mosses on calcareous soil (BULU 10329).
- **Letharia vulpina* (L.) Hue 1899 **1**: On *Pinus nigra* (BULU 10305).
- °*Lobothallia praevalida* (Nyl.) Hafellner 1991 **14**: On mosses in between crevices of calcareous rock (BULU 10035).

- L. radiosa* (Hoffm.) Hafellner 1991 **4, 10, 14, 17**: On calcareous rock (BULU 10272, 10155, 10030, 10122); **6**: On siliceous rock (BULU 10230).
- Megaspora verrucosa* (Ach.) Hafellner & V. Wirth 1987 **15**: On *Juniperus* sp. (BULU 10067).
- *Melanelia stygia* (L.) Essl. 1978 **2, 6**: On siliceous rock (BULU 10296, 10222).
- * *Melanohalea elegantula* (Zahlbr.) O. Blanco *et al.* 2004 **6**: On *Pinus* sp. (BULU 10221).
- * *M. exasperata* (De Not.) O. Blanco *et al.* 2004 **1**: On *Cedrus* sp. and *Pinus nigra* (BULU 10320, 10308); **8**: On *Pinus sylvestris* (BULU 10083).
- M. exasperatula* (Nyl.) O. Blanco *et al.* 2004 **1**: On *Cedrus* sp. (BULU 10319); **8**: On *Pinus sylvestris* (BULU 10101); **12**: On siliceous rock (BULU 10213).
- * *Mycobilimbia lurida* (Ach.) Hafellner & Türk 2001 **1**: On mosses on surface of calcareous rock (BULU 10346) **3**: On calcareous rock (BULU 10284).
- * *Myxobilimbia lobulata* (Sommerf.) Hafellner 2001 **1**: On mosses on calcareous soil (BULU 10327).
- * *Ochrolechia pallescens* (L.) A. Massal. 1853 **1**: On *Cedrus* sp. (BULU 10315).
- * *Parmelia saxatilis* (L.) Ach. 1803 **1**: On *Pinus nigra* (BULU 10325).
- * *Parmelina pastillifera* (Harm.) Hale 1976 **6**: On mosses in between crevices of siliceous rock (BULU 10243).
- * *P. tiliacea* (Hoffm.) Hale 1974 **6**: On *Pinus* sp. (BULU 10239).
- Parmeliopsis ambigua* (Wulf.) Nyl. 1863 **1**: On *Pinus nigra* (BULU 10318).
- * *Peltigera rufescens* (Weiss) Humb. 1793 **1, 6**: On mosses in calcareous soil (BULU 10326, 10224).
- Phaeophyscia orbicularis* (Neck.) Moberg 1977 **4, 10**: On calcareous rock (BULU 10277, 10162).
- Physcia adscendens* (Th. Fr.) H. Oliver 1882 **6**: On *Pinus* sp. (BULU 10227); **8**: On *Pinus sylvestris* (BULU 10081).
- *P. dimidiata* (Arnold) Nyl. 1881 **10**: On mosses on surface of calcareous rock (BULU 10169).
- * *P. dubia* (Hoffm.) Lettau 1912 **10, 17**: On calcareous rock (BULU 10158, 10119); **11, 12**: On siliceous rock (BULU 10189, 10199); **14**: On partly calcified siliceous rock (BULU 10026).
- * *P. stellaris* (L.) Nyl. 1856 **6**: On *Pinus* sp. (BULU 10217); **8**: On *Pinus sylvestris* (BULU 10095); **15**: On *Juniperus* sp. (BULU 10066).
- P. tenella* (Scop.) DC. 1805 **8**: On *Pinus sylvestris* (BULU 10076).
- * *Physconia perisidiosa* (Erichsen) Moberg 1977 **4, 5**: On mosses in between crevices of calcareous rock (BULU 10271, 10253); **6**: On *Pinus* sp. and mosses (BULU 10235, 10351).
- Placidium rufescens* (Ach.) A. Massal. 1856 **2**: On soil between crevices of siliceous rock (BULU 10295).
- Placocarpus schaeferi* (Fr.) Breuss 1985 **4, 10, 17**: On calcareous rock (BULU 10267, 10166, 10114).
- * *Placynthium nigrum* (Huds.) Gray 1821 **1, 3**: On calcareous rock (BULU 10314, 10286).
- Pleurosticta acetabulum* (Neck.) Elix & Lumbsch 1988 **1, 6**: On *Pinus nigra* (BULU 10317, 10226).
- * *Protoblastenia rupestris* (Scop.) J. Steiner 1930 **3**: On calcareous rock (BULU 10281); **5**: On siliceous rock (BULU 10256).

Protoparmeliopsis muralis (Schreb.) M.Choisy 1929 **1, 6, 8, 11, 12, 14, 16**: On siliceous rock (BULU 10344, 10228, 10079, 10180, 10202, 10042, 10017); **9**: On silicified calcareous rock (BULU 10141); **10, 14, 17**: On calcareous rock (BULU 10174, 10048, 10109).

Pseudevernia furfuracea* var. *ceratea* (Ach.) D. Hawksw. 1969 **1: On *Pinus nigra* (BULU 10311); **8**: On *Pinus sylvestris* (BULU 10077).

Ramalina capitata (Ach.) Nyl. 1879 **12**: On siliceous rock (BULU 10209).

Rhizocarpon geographicum (L.) DC. 1805 **1, 2, 6, 9, 11, 12**: On siliceous rock (BULU 10307, 10297, 10238, 10146, 10194, 10206).

R. obscuratum* (Ach.) A.Massal. 1852 **1: On siliceous rock (BULU 10306).

Rhizoplaca melanophthalma (DC.) Leuckert 1977 **11**: On siliceous rock (BULU 10192).

Rinodina bischoffii* (Hepp) A.Massal. 1855 **1, 15, 17: On calcareous rock (BULU 10312, 10059, 10106).

R. calcarea* (Arnold) Arnold 1879 **10: On calcareous rock (BULU 10173).

○*R. immersa* (Körb.) Arnold 1884 **17**: On calcareous rock (BULU 10117).

R. lecanorina* (A.Massal.) A.Massal. 1854 **4, 10, 17: On calcareous rock (BULU 10278, 10168, 10116).

R. milvina* (Wahlenb.) Th.Fr. 1861 **9: On siliceous rock (BULU 10147).

R. pyrina (Ach.) Arnold 1881 **8**: On *Pinus sylvestris* (BULU 10086).

Sarcogyne clavus* (DC.) Kremp. 1861 **1: On siliceous rock (BULU 10343).

○*S. privigna* (Ach.) A.Massal. 1854 **17**: On calcareous rock (BULU 10103).

S. regularis* Körb. 1855 **5: On calcareous rock (BULU 10263).

Squamarina cartilaginea* (With.) P.James 1980 **3, 5: On mosses in soil in between crevices of calcareous rock (BULU 10289, 10261).

○*Staurothele areolata* (Ach.) Lettau 1912 **14**: On calcareous rock (BULU 10050).

Synalissa symphorea* (Ach.) Nyl. 1856 **13, 17: On calcareous rock (BULU 10137, 10120).

Tephromela atra* (Huds.) Hafellner 1983 **6: On siliceous rock (BULU 10232).

Toninia candida* (Weber) Th.Fr. 1867 **1: On mosses on surface of calcareous rock (BULU 10345); **5**: On calcareous soil in between crevices of calcareous rock (BULU 10260).

T. sedifolia (Scop.) Timdal 1991 **1, 6**: On mosses in calcareous soil (BULU 10324, 10237). **3**: On calcareous rock (BULU 10292).

Tornabea scutellifera (With.) J.R.Laundon 1984 **6**: On *Pinus* sp. (BULU 10240); **8**: On *Pinus sylvestris* (BULU 10100).

○*Umbilicaria grisea* Hoffm. 1796 **4**: On calcareous rock (BULU 10275).

○*U. hirsuta* (Sw. ex Westr.) Hoffm. 1796 **2**: On siliceous rock (BULU 10301).

Verrucaria calciseda DC. 1805 **1**: On calcareous rock (BULU 10347).

○*V. compacta* (A.Massal.) Jatta 1900 **11**: On siliceous rock (BULU 10185); **14**: On partly calcified siliceous rock (BULU 10036).

#*V. dolosa* Hepp 1860 **14**: On siliceous rock (BULU 10034).

V. fuscella* (Turner) Winch 1807 **14: A parasite on *Aspicilia contorta* (BULU 10051).

- *V. glaucina* Ach. 1810 **17**: On calcareous rock (BULU 10115).
V. muralis Ach. 1803 **14**: On calcareous rock (BULU 10029).
V. nigrescens Pers. 1795 **17**: On calcareous rock (BULU 10104).
○ *V. pinguicula* A.Massal. 1856 **3**: On calcareous rock (BULU 10280).
V. subfuscella* Nyl. 1861 **14: On siliceous rock (BULU 10033).
#*V. tristis* Hepp 1854 **17**: On calcareous rock (BULU 10113).
V. viridula* (Schrad.) Ach. 1803 **5: On siliceous rock (BULU 10251);
15: On calcareous rock (BULU 10055).
Xanthoparmelia pulla (Ach.) O.Blanco *et al.* 2004 **11**: On siliceous rock (BULU 10187).
X. tinctina (Maheu & A.Gillet) Hale 1974 **2**: On siliceous rock (BULU 10298).
Xanthoria parietina (L.) Th.Fr. 1860 **6**: On *Pinus* sp. (BULU 10216);
8: On *Pinus sylvestris* (BULU 10097); **15**: On *Juniperus* sp. (BULU 10065).
X. elegans* (Link) Th.Fr. 1860 **10, 17: On calcareous rock (BULU 10167, 10124); **11, 12, 14, 16**: On siliceous rock (BULU 10188, 10197, 10040, 10019).
○ *X. polycarpa* (Hoffm.) Rieber 1891 **8**: On *Pinus sylvestris* (BULU 10072).

Of these 156 taxa; seven taxa, namely; *Acarospora badiofusca* subsp. *badiorubra*, *Aspicilia recedens*, *Buellia pulverulenta*, *Endocarpon pulvinatum* *Leproloma diffusum* var. *diffusum*, *Verrucaria dolosa* and *V. tristis* are new records for the whole of Turkey.

DISCUSSION

In the study area; species showing the widest distribution range are: *Protoparmeliopsis muralis* (11 localities); *Aspicilia calcarea* (9 localities); *Acarospora cervina*, *Lecidella carpathica* (8 localities), *Candelariella aurella*, *Collema crispum* (7 localities); *Aspicilia cinerea*, *Candelariella vitellina*, *Diplotomma epipolium*, *Rhizocarpon geographicum*, and *Xanthoria elegans* (6 localities). All these species are common and widely distributed in Europe (Hafellner & Türk, 2001; Nimis, 1993; Purvis *et al.*, 1992).

Submediterranean and Mediterranean-montane zones are present in the study area (Akman, 1995). However, the elevations of these vegetation zones differs from those in western Europe, as used by, for example, Hafellner & Türk (2001) and Wirth (1995). The submediterranean belt from about 1000 to 1400 m, with deciduous *Quercus* communities is most frequently characterized by calcareous rocks with associations of, *Acarospora cervina*, *Candelariella aurella*, *Diplotomma epipolium*, *Protoparmeliopsis muralis* and *Xanthoria elegans*. *Lecidella stigmatae* and *Protoblastenia rupestris* are useful indicators of weakly calcareous rocks (Purvis *et al.*, 1992), so the rocks of the localities from which these species were collected evidently have weak calcareous content. The siliceous rocks are mostly dominated by crustose species such as *Aspicilia cinerea*, *Protoparmeliopsis muralis*, *Candelariella vitellina*, *Rhizocarpon geographicum*, *Lecidella carpathica*, *Caloplaca crenularia*, *Dimelaena oreina*, *Physcia dubia*, and *Acarospora smaragdula*. On the top of siliceous somewhat nutrient-enriched boulders, fruticose *Ramalina capitata* has a large cover. The Mediterranean montane belt from about 1400 to 2000 m, with *Pinus* and *Cedrus* communities, are

mostly dominated by acidiphilic epiphytic species such as *Anaptychia ciliaris*, *Caloplaca cerina* var. *cerina*, *Lecanora argentata*, *Letharia vulpina*, *Melanohalea exasperata*, *M. exasperatula*, *Physcia adscendens*, *Pleurosticta acetabulum*, and *Pseudevernia furfuracea* var. *ceratea* which grow optimally on the acidic barks of these trees. *Candelariella vitellina*, which is usually found on siliceous rocks, was also collected from acidic bark of *Pinus sylvestris* from one locality. *Tornabea scutellifera*, which usually grows on rocks, sand, trunks of old trees and sides of old barns in coastal districts (Purvis *et al.*, 1992) was collected from the bark of *Pinus* in Saimbeyli, the closest district to Mediterranean Sea in the study area. *Parmelina pastillifera*, which is more common on smooth bark, was collected from mosses in the crevices of siliceous rocks. The continental character of these localities is underlined by the presence of *Aspicilia desertorum*.

Terricolous lichens such as *Catapyrenium lachneum*, *C. rufescens*, *Cladonia convoluta*, *C. pocillum*, *Collema crispum*, *C. tenax*, *Leprolomma diffusum* var. *diffusum*, *Leptogium gelatinosum*, *Myxobilimbia lobulata*, *Peltigera rufescens*, and *Toninia candida* are mostly present in the Mediterranean-montane belt in the study area. *Leprolomma diffusum* var. *diffusum*; collected on mosses over calcareous soil, is a new record for the country.

In the study area; we observed some lichenicolous species, such as *Acarospora versicolor* and *Verrucaria fuscella* on *Aspicilia contorta*, *Placocarpus schaeferi* on *Protoparmeliopsis muralis* (especially in its young stages) and *Buellia pulverulenta* on *Physcia dubia*. *Buellia pulverenta*, one of the new records for Turkey, is a holarctic endoparasitical lichen especially characteristic of thalli of *Physconia perisidiosa* (Diederich, 2003), but was found on *Physcia dubia* on siliceous rocks in the study area.

Dense agricultural activities carried around the villages are responsible for luxuriant developments of nitrophilous genera such as *Caloplaca*, *Physcia*, *Physconia*, and *Xanthoria*. Lichen collecting stations established along the villages in the study area will provide comparable monitoring in the future.

Seven taxa new to Turkey, 23 taxa new to the Mediterranean region of Turkey, 76 taxa new to Adana province, and 12 taxa new to Kayseri province emphasize the need for such studies in Turkey.

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