Additions to the lichen biota of the Kaz Mountains (Çanakkale-Balıkesir, Turkey)

Seyhan Oran

Abstract: Oran, S. 2020. Additions to the lichen biota of the Kaz Mountains (Çanakkale-Balıkesir, Turkey). – Herzogia **33**: 432–446.

In the present paper, 195 lichen taxa and one lichenicolous fungus are reported from the Kaz Mountains. *Rhizocarpon jemtlandicum* and *Rinodina moziana* are new to Turkey.

Zusammenfassung: Oran, S. 2020. Ergänzungen zu den Flechtenbiota des Kaz-Gebirges (Çanakkale-Balıkesir, Türkei). – Herzogia **33**: 432–446.

In der vorliegenden Arbeit werden 195 Flechtentaxa und ein Flechtenpilz aus dem Kaz-Gebirge gemeldet. *Rhizocarpon jemtlandicum* und *Rinodina moziana* sind neu für die Türkei.

Key words: Kazdağı, lichen flora, Mediterranean lichens.

Introduction

Numerous studies on lichens have been conducted in Turkey over the recent decades, as revealed in the latest lichen list (John & Türk 2017); however, there are still some areas that have not yet been studied in detail, one of them are the Kaz Mountains. The Kaz Mountains are a slightly curved mountain range stretching approximately 60 km west to east in Western Anatolia and separating the Marmara and Aegean Regions of Turkey. It is an important floristic site harbouring c. 73 endemic plants, and it was designated as a National Park in 1994 (Özhatay et al. 2005). Consequently, this region caught the interest of numerous botanists, and some records of lichen taxa in the Kaz Mountains have also been published. The first lichen records from the Kaz Mountains were provided by Karamanoğlu (1964), followed by Culberson & Culberson (1968), Karamanoğlu (1971), Schindler (1975), John (1992), Şenkardeşler (2009), Oran & Öztürk (2010) and Özdemir Türk et al. (2015). In these studies, a few lichen taxa were recorded from the Kaz Mountains. A more detailed lichenological study including 75 taxa from Gürgen Mount in the northeast of the Kaz Mountains was conducted by Çobanoğlu & Sevgi (2006). Furthermore, a more recent list based on more intense fieldwork was published by Oran et al. (2018), reporting 184 infrageneric taxa in the Kaz Mountains from the Balıkesir Province. A study from a region close to the Kaz Mountains was carried out by Karabulut et al. (2004) and in this study, 124 lichen taxa were published from Karadağ and Şap Mountain (Çanakkale province).

In the present article, I aimed to include further records from different parts of the Kaz Mountains as additions to the checklist created by John & Türk (2017).

Study Area

Kaz Mountains are situated in the north of the Gulf of Edremit, forming a natural border between the provinces of Çanakkale and Balıkesir on the southern edge of the Biga Peninsula. The highest points of the mountains are the Karataş Hill (1774 m), Baba Hill (1765 m) and Sarıkız Hill (1726 m). A large part of the mountains consists of schist, marble, gneiss and tuff sediments (Özhatay et al. 2005).

According to Emberger classification, a characteristic Mediterranean climate is noted in the Kaz Mountains region (Akman 1990). Besides, in the Kaz Mountains and their surroundings, climatic conditions change at short distances in horizontal and vertical directions, as usual for most of mountainous areas (Hepbilgin & Koç 2018). The southern slopes of the mountains are mainly covered with red pine (*Pinus brutia* Ten.) and black pine forests (*Pinus nigra* Arnold subsp. *pallasiana* (Lamb.) Holmboe), as well as maquis typical for the Mediterranean climate. The more humid northern slopes are mostly covered with Kazdağı fir (*Abies nordmanniana* (Steven) Spach subsp. *equi-trojani* (Asc. & Sint. ex Boiss.) Coode & Cullen) and oriental beech (*Fagus orientalis* Lipsky) forests as well as different oak and hornbeam forest communities encompassing *Quercus cerris* L. var. *cerris* L., *Q. frainetto* Ten., *Q. petraea* subsp. *iberica* (Steven ex. M.Bieb.) Krassiln and *Carpinus betulus* L. (Dirmenci et al. 2007, Özhatay et al. 2005).

The mean annual temperature and the mean annual rainfall in Edremit (Balıkesir Province), which represents the south-facing slopes of the Kaz Mountains, are 16.1 °C and 666.9 mm, respectively, whereas the mean annual temperature and the mean annual rainfall in Bayramiç (Çanakkale province), which represents the northern slopes of the Kaz Mountains, are 14.5 °C and 655.1 mm, respectively (Cürebal et al. 2002).

Materials and Methods

Samples were collected from 37 different localities (from 78 m to 811 m) in 2013 and 2014 (Fig. 1). The morphological and anatomical characteristics of the samples were examined with dissecting microscope (Leica EZ4) and compound microscope (Olympus CX21). Standart chemi-

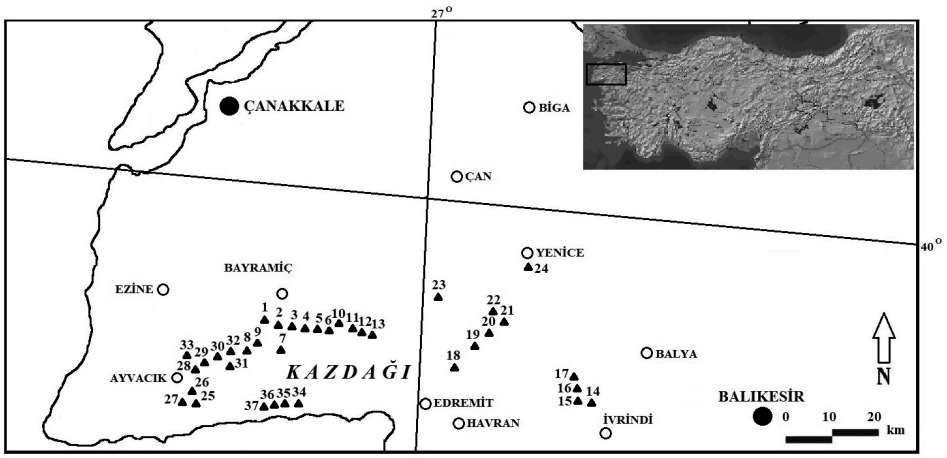


Fig. 1. Map of collecting sites, Kaz Mountains (Çanakkale-Balıkesir).

cal spot tests (C, K, KC, N, Pd, I) were carried out on the thallus cortex and medulla, apothecial disc and apothecial margin, and the color reaction was observed. The anatomical sections were examined in water, 10% KOH or Lugol's solutions. When required ultra violet light (UV) tests were performed and fluorescence properties of the samples after application of K reagent (KUV) tests were observed for some species. Samples were determined with the aid of the following literature: Clauzade & Roux (1985), Giralt (2001), Hafellner & Catalayud (1999), Nash III et al. (2002), Smith et al. (2009), Wirth (1995), Wirth et al. (2013), Kocakaya et al. (2018), Sabrina et al. (2019), and Tsurykau et al. (2019). Voucher samples are preserved in the herbarium of the Biology Department at Bursa Uludağ University (BULU).

List of collection localities

1. Çanakkale, Bayramiç, between Kutluoba and Çaldağ, 1st km, pine and rocky area, 213 m, 39°45′58″N/26°35′00″E, 4.07.2013. (Fig. 2A)
2. Çanakkale, Bayramiç, east part of Çaldağ village, forest road, 2nd km, pine forest, 524 m, 39°44′26″N/26°35′09″E, 4.07.2013.
3. Çanakkale, Bayramiç, east part of Çaldağ village, forest road, between 4th and 5th km, pine forest, 549 m, 39°44′23″N/26°36′25″E, 4.07.2013.
4. Çanakkale, Bayramiç, east part of Çaldağ village, forest road, 8th km, pine forest, 553 m, 39°44′38″N/26°37′24″E, 4.07.2013.
5. Çanakkale, Bayramiç, east part of Çaldağ village, forest road, 11th km, pine forest, 779 m, 39°43′44″N/26°36′22″E, 4.07.2013.
6. Çanakkale, Bayramiç, southern side of Kumludüz Fire Department, 2. km, pine forest, 705 m, 39°42′53″N/26°37′08″E, 4.07.2013.
7. Çanakkale, Bayramiç, Dededağ, forest road, 802 m, 39°40′57″N/26°37′58″E, 4.07.2013.
8. Çanakkale, Bayramiç, between Kısacık and Dağahmetçe, 3rd km, oak and pine area, 332 m, 39°40′03″N/26°31′52″E, 4.07.2013.
9. Çanakkale, Bayramiç, between Alakeçi and Çaldağ, 3rd km, pine forest, 504 m, 39°43′37″N/26°34′29″E, 4.07.2013.
10. Çanakkale, Bayramiç, between Yassıbağ and Daloba, around marble quarry, pine and rocky area, 396 m, 39°44′50″N/26°39′31″E, 5.07.2013. (Fig. 2B)
11. Çanakkale, Bayramiç, southern part of Serhat village, forest road, pine forest, 504 m, 39°42′59″N/26°42′58″E, 5.07.2013.
12. Çanakkale, Bayramiç, southern part of Serhat village, forest road, oak and rocky area, 796 m, 39°43′26″N/26°44′29″E, 5.07.2013. (Fig. 2C)
13. Çanakkale, Bayramiç, southern part of Serhat village, forest road, in valley, forest of chestnut and pine, 811 m, 39°43′17″N/26°45′12″E, 5.07.2013. (Fig. 2D)
14. Balıkesir, İvrindi, northern part of Hüseyinbeyobası village, pine forest, 490 m, 39°37′34,9″N/27°22′20,1″E, 9.11.2013.
15. Balıkesir, Havran, northern part of Küçükşapçı village, pine forest, 696 m, 39°38′26,3″N/27°21′00,7″E, 9.11.2013.
16. Balıkesir, İvrindi, between Küçükşapçı and Çamucu, forest road, pine forest, 799 m, 39°39′02,4″ N 27°21′24,2″E, 9.11.2013.
17. Balıkesir, İvrindi, between Küçükşapçı and Çamucu forest road, pine forest with oak trees, 767 m, 39°39′56,9″N/27°20′32,4″E, 9.11.2013.
18. Balıkesir, Edremit, between Edremit and Kalkım, near to Talimalanı picnic area, pine forest, 427 m, 39°40′23,8″N/27°07′01,8″E, 10.11.2013.
19. Balıkesir, Edremit, between Edremit and Kalkım, near to Çanakkale border, pine forest, 658 m, 39°42′27,3″N/27°10′16,4″E, 10.11.2013.
20. Çanakkale, Yenice, between Edremit and Kalkım, in valley, mixed forest, 414 m, 39°43′38,1″N/27°11′15,7″E, 10.11.2013.
21. Çanakkale, Yenice, Karaaydın village crossroad, pine forest, 256 m, 39°47′01,6″N/27°13′58,7″E, 10.11.2013.
22. Çanakkale, Yenice, between Kalkım and Akköy, oak area, 272 m, 39°48′28,8″N/27°11′07,8″E, 10.11.2013.

23. Çanakkale, Yenice, between Oğlanalanı and Kızılelma, forest road, pine forest with oaks, 435 m, 39°49′08,0″N/27°03′37,0″E, 10.11.2013.

24. Çanakkale, Yenice, between Namazgah and Yenice, 2 km to Yenice (18 Mart Avenue), pine and oak area, 416 m, 39°55′00,5″N/27°16′57,7″E, 10.11.2013.

25. Çanakkale, Ayvacık, Nusretli village, village square, 272 m, 39°33′45″N/26°31′01″E, 4.10.2014.

26. Çanakkale, Ayvacık, Kızılyer junction, 444 m, 39°34′59″N/26°31′45″E, 4.10.2014.

27. Çanakkale, Ayvacık, 500 m after junction to Arıklı village, pine forest, 423 m, 39°34′54″N/26°30′24″E, 4.10.2014.

28. Çanakkale, between Ayvacık and Tartışık, next to cemetery, 321 m, 39°37′06″N/26°27′29″E, 5.10.2014.

29. Çanakkale, Ayvacık, Dibekli village, 376 m, 39°37′28″N/26°28′33″E, 5.10.2014.

30. Çanakkale, Ayvacık, 11 km after Güzelköy, around the Kaz Mountains Resort village, pine forest, 632 m, 39°41′38″N/26°36′57″E, 5.10.2014.

31. Çanakkale, Ayvacık, between Uzunalan and Güzelköy, 3 km to Güzelköy junction, pine and oak forest, 361 m, 39°39′57″N/26°34′01″E, 5.10.2014.

32. Çanakkale, Ayvacık, entrance to Misvak village, 161 m, 39°40′14″N/26°27′38″E, 5.10.2014.

33. Çanakkale, Ayvacık, between Ayvacık and Süleyman, 2nd km, 279 m, 39°37′09″N/26°25′30″E, 5.10.2014.

34. Balıkesir, Edremit, entrance to Doyran village, olive plantations, 216 m, 39°35′08″N/26°42′14″E, 6.10.2014.

35. Çanakkale, Küçükkuyu, entrance to Adatepebaşı village, next to cemetery, pine forest, 291 m, 39°35′41″N/26°38′15″E, 6.10.2014.

36. Çanakkale, Küçükkuyu, after Adatepe village, pine forest, 255 m, 39°35′41″N/26°38′15″E, 6.10.2014.

37. Çanakkale, Küçükkuyu, around Küçükçetmi village, next to Afrodit Thermal Spring, olive area, 78 m, 39°34′24″N/26°37′16″E, 7.10.2014.

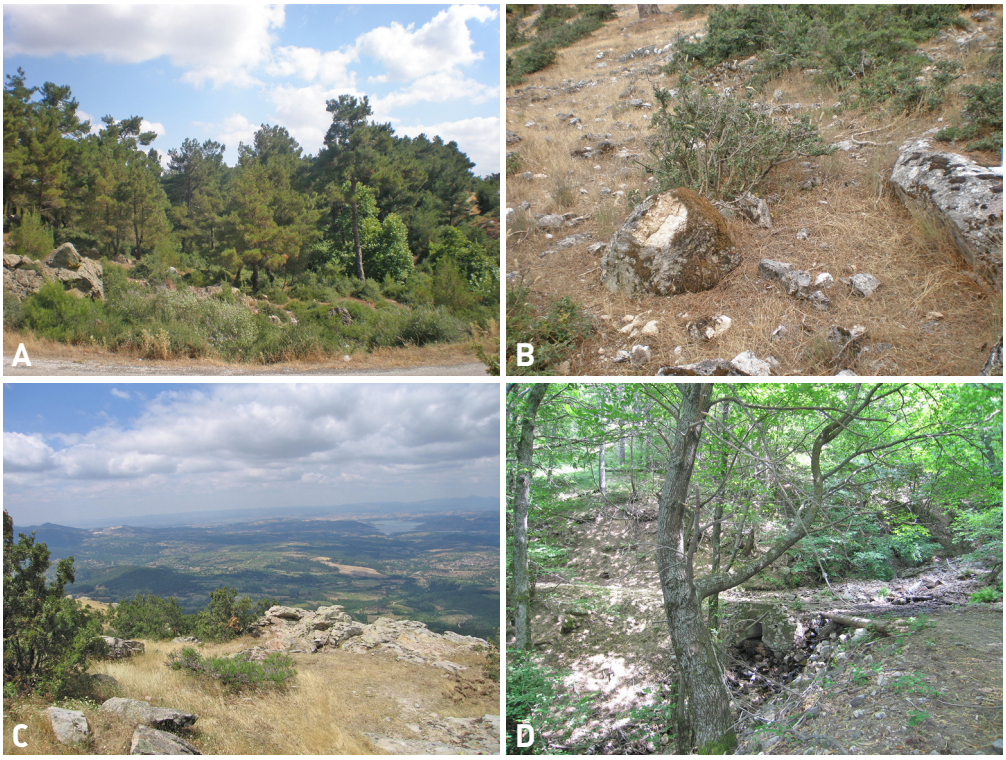


Fig. 2. A. Pine forest (locality 1., 213 m); **B.** Around marble quarry (locality 10., 396 m); **C.** A view from Bayramiç dam (locality 12., 796 m); **D.** Chesnut and pine forest (locality 13., 811 m).

Results

This study reports 195 lichenized fungi and one lichenicolous fungus, three of which have been recorded for the first time in Turkey and 66 of which have been recorded for the first time in the Kaz Mountains. The taxa are listed in alphabetic order with locality numbers, substrates and Herbarium numbers in BULU.

+ = new to Turkey, * = new to the Kaz Mountains

Acarospora fuscata (Nyl.) Th.Fr. – **12, 34**: siliceous rock (18827, 19374).

****Acarospora impressula*** Th. Fr. – **32**: siliceous rock (19349).

Amandinea punctata (Hoffm.) Coppins & Scheid. – **1**: *Pinus brutia* (18568), **14**: *Pinus* sp., *Phillyrea latifolia*, siliceous rock (18894, 18895, 18896), **16, 24**: *Quercus* sp. (18972, 19212), **33, 36**: *Pinus* sp. (19359, 19402).

****Anaptychia ciliaris*** (L.) Körb. ex A.Massal. – **17**: *Quercus* sp. (19016).

Arthonia punctiformis Ach. – **5**: *Pinus brutia* (18680).

Aspicilia cinerea (L.) Körb. – **12**: siliceous rock (18828).

Aspicilia epiglypta (Norrl. ex Nyl.) Hue – **14, 15, 16, 17, 27**: siliceous rock (18897, 18941, 18974, 19018, 19255).

Aspicilia intermutans (Nyl.) Arnold – **11, 17**: siliceous rock (18794, 19019).

****Athallia cerinella*** (Nyl.) Arup, Frödén & Søchting – **31**: *Quercus* sp. (19340).

Athallia holocarpa (Hoffm.) Arup, Frödén & Søchting – **2**: siliceous rock with limestone (18601), **23**: siliceous rock (19172), **10, 37**: calcareous rock (18772, 19407).

Athallia pyracea (Ach.) Arup, Frödén & Søchting – **1, 4**: *Pinus brutia* (18571, 18647), **24**: *Quercus* sp. (19215), **28**: *Pistacia* sp. (19278), **29**: *Prunus amygdalus* (19310).

****Bacidia rubella*** (Hoffm.) A.Massal. – **27**: *Pinus* sp. (19256).

Bagliettoa parmigera (J.Steiner) Gams – **10, 37**: calcareous rock (18770, 19404).

Biatora globulosa (Flörke) Fr. – **7**: *Pinus brutia* (18725).

Blastenia crenularia (With.) Arup, Søchting & Frödén – **5, 17, 18, 23, 27**: siliceous rock (18684, 19021, 19074, 19171, 19258), **28, 34**: siliceous rock with limestone (19277, 19378), **29**: stonewall (19309).

Blastenia ferruginea (Huds.) A.Massal. – **4**: *Prunus domestica* (18646), **8, 12**: *Quercus cerris* (18741, 18834), **11**: *Quercus frainetto* (18796), **14**: *Pinus* sp., *Juniperus* sp. (18902, 18903), **15**: *Quercus* sp. (18945).

Blastenia herbidella (Hue) Servit – **13**: *Castanea* sp. (18882).

Bryoria capillaris (Ach.) Brodo & D.Hawksw. – **4**: *Prunus domestica* (18645), **6**: *Pinus brutia* (18709).

Bryoria fuscescens (Gyeln.) Brodo & D.Hawksw. – **6**: *Pinus brutia* (18710), **17, 23**: *Pinus* sp. (19020, 19170).

****Buellia aethalea*** (Ach.) Th.Fr. – **12**: siliceous rock (18829).

Buellia erubescens Arnold – **12**: *Pinus* sp. (18831), **14**: *Juniperus* sp., (18898), **15**: *Quercus* sp. (18943).

Buellia griseovirens (Turner & Borrer ex Sm.) Almb. – **1, 5, 6, 7**: *Pinus brutia* (18570, 18682, 18711, 18726), **12**: *Pinus* sp. (18832), **13**: *Castanea* sp. (18881), **14**: *Pinus* sp., on *Juniperus* sp. (18899, 18900), **15, 16, 20**: *Quercus* sp. (18944, 18976, 19115).

****Buellia leptocline*** (Flot.) A.Massal. – **1**: siliceous rock (18571).

Calicium glaucellum Ach. – **3, 6, 7**: *Pinus brutia* (18619, 18712, 18727), **14**: *Pinus* sp. (18901).

Caloplaca atroflava (Turner) Mong. – **12, 27, 32, 34**: siliceous rock (18833, 19257, 19351, 19377).

Caloplaca erythrocarpa (Pers.) Zwackh – **2, 3, 37**: calcareous rock (18600, 18621, 19406).

Caloplaca irrubescens (Arnold) Zahlbr. – **26**: siliceous rock with limestone (19247), **34**: calcareous rock (19379).

Candelariella aurella (Hoffm.) Zahlbr. – **3**: calcareous rock (18623).

Candelariella vitellina (Hoffm.) Müll.Arg. – **1, 5, 12, 16, 17, 27, 28, 30, 32**: siliceous rock (18573, 18685, 18835, 18977, 19022, 19259, 19279, 19327, 19352, 19380, 19395), **29**: stonewall (19311), **31**: *Quercus* sp. (19341).

Candelariella xanthostigma (Pers. ex Ach.) Lettau – **10**: *Phillyrea latifolia* (18774), **29**: *Prunus amygdalus* (19312).

Catillaria atomarioides (Müll.Arg.) H.Kilias – **12**: siliceous rock (18836). It was reported from Turkey only once (KINALIOĞLU & APTROOT 2006, from Giresun province).

Catillaria chalybeia A.Massal. – **3**: calcareous rock (18624), **27**: siliceous rock with limestone (19260).

Circinaria caesiocinerea (Nyl. ex Malbr.) A.Nordin et al. – **1, 17, 32**: siliceous rock (18569, 19017, 19350), **28, 34**: siliceous rock with limestone (19276, 19375), **29**: stonewall (19307).

Circinaria calcarea (L.) A.Nordin, Savić & Tibell – **3**: calcareous rock (18617), **26**: siliceous rock with limestone (19245).

Circinaria contorta subsp. ***hoffmanniana*** S.Ekman & Fröberg ex R.Sant. – **3**: calcareous rock (18618), **5**: siliceous rock (18681), **26**: siliceous rock with limestone (19246).

Cladonia coniocraea (Flörke) Spreng. – **19**: *Pinus* sp. (19094).

Cladonia convoluta (Lam.) Anders – **10**: calcareous rock with moss (18775), **14**: siliceous rock (18904).

Cladonia fimbriata (L.) Fr. – **1, 2, 12**: siliceous rock (18575, 18602, 18837), **11**: *Pinus nigra*, siliceous soil (18798, 18797), **14**: soil (18905), **16**: *Pinus* sp., siliceous rock (18978, 18979), **19, 21, 23**: *Pinus* sp. (19095, 19138, 19174), **24**: *Quercus* sp. (19216).

Cladonia foliacea (Huds.) Willd. – **1, 14, 23**: siliceous rock (18574, 18906, 19173), **7, 21**: soil (18728, 19139), **10**: calcareous rock (18776), **17**: siliceous rock, siliceous soil (19023, 19024).

Cladonia furcata (Huds.) Schrad. – **14, 21**: soil (18907, 19140), **17**: siliceous soil (19025).

Cladonia parasitica (Hoffm.) Hoffm. – **6, 7**: *Pinus brutia* (18713, 18729), **15, 16, 17, 18, 19, 21, 23**: *Pinus* sp. (18946, 18980, 19026, 19075, 19096, 19141, 19175).

According to literature, *Cladonia parasitica* is usually found on rotting pine and oak wood and occasionally on the bark or basal part of old trunks (BRODO et al. 2001, NASH III et al. 2002). In the current study, this species was found near the basal parts of old pine trees.

Cladonia pyxidata (L.) Hoffm. – **1, 2, 11, 16**: siliceous rock (18576, 18603, 18799, 18981), **3, 10, 37**: calcareous rock (18625, 18777, 19409), **5, 7, 12**: soil (18686, 18731, 18838), **9**: *Pinus brutia*, soil (18756, 18757), **14**: *Pinus* sp., soil (18908, 18909), **15, 23**: siliceous soil (18947, 19176), **18, 19**: *Pinus* sp. (19076, 19097).

Cladonia rangiformis Hoffm. – **1**: siliceous rock (18577), **2, 7, 21**: soil (18604, 18730, 19142), **10**: calcareous rock with moss (18778), **15**: siliceous soil (18948), **17**: siliceous rock, siliceous soil (19027, 19028).

Collema nigrescens (Huds.) DC. – **23**: *Quercus frainetto* (19177).

Collema subflaccidum Degel. – **24**: *Quercus* sp. (19217), **35**: calcareous rock (19397).

Collema subnigrescens Degel. – **34**: *Olea* sp. (19381).

****Dimelaena oreina*** (Ach.) Norman – **1**: siliceous rock (18578).

****Diploschistes gypsaceus*** (Ach.) Zahlbr. – **10**: calcareous rock (18780).

****Diploschistes muscorum*** (Scop.) R.Sant. – **16**: siliceous rock with moss and *Cladonia* squamules (18982).

Diploschistes scruposus (Schreb.) Norman – **14, 17, 18**: siliceous rock (18910, 19029, 19077).

****Diplotomma alboatrum*** (Hoffm.) Flot. – **27, 32**: siliceous rock (19261, 19353), **29**: stonewall (19313).

Evernia prunastri (L.) Ach. – **1, 2, 6, 9**: *Pinus brutia* (18579, 18605, 18714, 18758), **4**: *Pinus brutia*, *Prunus domestica* (18648, 18649), **5, 28**: *Quercus cerris* (18687, 19280), **11**: *Pinus nigra* (18800), **15, 16, 17, 22**: *Quercus* sp. (18949, 18983, 19030, 19155), **18, 19, 21, 27**: *Pinus* sp. (19078, 19098, 19143, 19262), **20**: *Quercus* sp., log (19116, 19117), **23**: *Quercus frainetto*, *Pinus* sp. (19178, 19179), **24**: *Acer* sp., *Quercus* sp. (19218, 19219).

Flavoplaca citrina (Hoffm.) Arup, Frödén & Søchting – **29**: stonewall (19308).

Gyalolechia flavorubescens (Huds.) Søchting, Frödén & Arup – **10**: *Phillyrea latifolia* (18771).

Hafellia disciformis (Fr.) Marbach & H.Mayrhofer – **4**: *Prunus domestica* (18644), **11**: *Quercus frainetto* (18795), **12**: *Quercus cerris* (18830), **15, 16, 22**: *Quercus* sp. (18942, 18975, 19154), **24**: *Acer* sp., *Quercus* sp. (19213, 19214).

Hypocenomyce scalaris (Ach. ex Lilj.) M.Choisy – **3, 4, 6, 9**: *Pinus brutia* (18626, 18650, 18715, 18759), **11**: *Pinus nigra* (18801), **15, 16, 17, 30**: *Pinus* sp. (18950, 18984, 19031, 19331).

Hypogymnia farinacea Zopf – **2, 6, 7, 9**: *Pinus brutia* (18606, 18716, 18732, 18760), **11**: *Pinus nigra* (18802), **12, 14, 16, 17, 18, 19, 23, 27, 30**: *Pinus* sp. (18839, 18911, 18985, 19032, 19079, 19099, 19180, 19263, 19328), **15**: *Pinus* sp., siliceous rock (18951, 18952).

Hypogymnia physodes (L.) Nyl. – **2, 4, 6, 7, 9**: *Pinus brutia* (18607, 18651, 18717, 18733, 18761), **3**: *Pinus brutia*, *Pinus* log (18627, 18628), **5**: *Pinus brutia*, on *Quercus cerris* (18688, 18689), **11**: log, *Pinus nigra*, siliceous rock (18803, 18804, 18805), **14**: *Pinus* sp., *Phillyrea latifolia* (18912, 18913), **15, 16**: *Pinus* sp., *Quercus* sp., siliceous rock (18953, 18954, 18955, 18986, 18987, 18988), **17, 30**: *Pinus* sp., siliceous rock (19033, 19034, 19329, 19330), **19, 21**: *Pinus* sp. (19100, 19144), **20**: log (19118), **23**: *Quercus frainetto*, *Pinus* sp. (19181, 19182), **24**: *Acer* sp., *Quercus* sp. (19220, 19221).

Hypogymnia tubulosa (Schaer.) Hav. – **5**: *Pinus brutia*, *Quercus cerris* (18690, 18691), **6**: *Pinus brutia* (18718), **11**: *Pinus nigra* (18806), **12**: *Quercus cerris* (18840), **14**: *Pinus* sp., *Juniperus* sp. (18914, 18915), **15, 19, 27**: *Pinus* sp. (18956, 19101, 19264), **17**: *Pinus* sp., *Quercus* sp., siliceous rock (19035, 19036, 19037).

****Lasallia pustulata*** (L.) Mérat – **12**: siliceous rock (18841).

Lathagrium cristatum (L.) Otálora, P.M.Jørg. & Wedin – **10, 35, 37**: calcareous rock (18779, 19396, 19410).

Lecania naegelii (Hepp) Diederich & van den Boom – **7**: *Pinus brutia* (18734), **10**: *Phillyrea latifolia* (18781).

Lecanora campestris (Schaer.) Hue – **2, 23, 32**: siliceous rock (18608, 19183, 19355), **29**: stonewall (19314), **37**: calcareous rock (19411).

Lecanora carpinea (L.) Vain. – **4**: *Prunus domestica* (18652), **8, 12**: *Quercus cerris* (18742, 18843), **16, 24, 31**: *Quercus* sp. (18989, 19222, 19342), **29**: *Prunus amygdalus* (19315).

****Lecanora cenisia*** Ach. – **1**: siliceous rock (18580).

Lecanora chlarotera Nyl. – **8, 12**: *Quercus cerris* (18743, 18844), **10**: *Phillyrea latifolia* (18783), **11**: *Quercus frainetto* (18807), **13**: *Castanea* sp. (18883), **15, 16, 22, 31**: *Quercus* sp. (18957, 18990,

19156, 19343), **24**: *Acer* sp., on *Quercus* sp. (19223, 19224), **25**: *Morus* sp. (19241), **28**: *Pistacia* sp. (19282), **29**: *Prunus amygdalus* (19316).

Lecanora expallens Ach. – **1**: siliceous rock (18581), **3**: *Pinus brutia* (18631), **14**: *Pinus* sp., *Phillyrea latifolia* (18917, 18918), **22**: *Quercus* sp. (19157), **27**: *Pinus* sp. (19265).

Lecanora intumescens (Rebent.) Rabenh. – **12**: *Quercus cerris* (18845), **22**: *Quercus* sp. (19158).

Lecanora polytropa (Ehrh. ex Hoffm.) Rabenh. – **12, 32**: siliceous rock (18846, 19357).

****Lecanora rupicola*** subsp. ***rupicola*** (L.) Zahlbr. – **5, 17**: siliceous rock (18691, 19039).

Lecanora rupicola subsp. ***subplanata*** (Nyl.) Leuckert & Poelt – **1, 11, 12**: siliceous rock (18583, 18808, 18847).

****Lecanora varia*** (Hoffm.) Ach. – **1, 4, 9**: *Pinus brutia* (18582, 18653, 18762), **3**: *Pinus brutia*, *Pinus* log (18632, 18633), **18, 36**: *Pinus* sp. (19080, 19403), **37**: *Celtis* sp. (19412).

Lecidea fuscoatra (L.) Ach. – **11, 12, 14, 17, 18, 23, 30, 35**: siliceous rock (18809, 18848, 18919, 19040, 19081, 19184, 19332, 19399).

Lecidea lapicida (Ach.) Ach. – **5**: siliceous rock (18692).

Lecidella carpathica Körb. – **2, 12, 35**: siliceous rock (18609, 18849, 19400).

Lecidella elaeochroma (Ach.) M.Choisy – **8, 12, 28, 33**: *Quercus cerris* (18744, 18850, 19283, 19360), **10, 14**: *Phillyrea latifolia* (18784, 18920), **11**: *Quercus frainetto* (18810), **13**: *Castanea* sp. (18884), **15, 16, 17, 22, 31**: *Quercus* sp. (18959, 18991, 19041, 19159, 19345), **19**: *Castanea* sp., *Pinus* sp. (19102, 19103), **20**: *Quercus* sp., log (19119, 19120), **24**: *Acer* sp., *Quercus* sp. (19225, 19226), **29**: *Prunus amygdalus* (19317).

Lecidella stigmatea (Ach.) Hertel & Leuckert – **5, 27**: siliceous rock (18693, 19266).

Lepra albescens (Huds.) Hafellner – **4**: *Prunus domestica* (18663), **11**: *Pinus nigra* (18822), **13**: *Castanea* sp. (18890), **16, 17**: *Quercus* sp., siliceous rock (18999, 19000, 19051, 19052), **18**: *Pinus* sp. (19087), **22**: *Quercus* sp. (19161), **23**: *Quercus frainetto* (19190), **28**: *Quercus cerris* (19288), **33**: *Pinus* sp., *Quercus cerris* (19364, 19365).

Lepra amara (Ach.) Hafellner – **6**: *Pinus brutia* (18722), **16**: *Pinus* sp., on *Quercus* sp. (19001, 19002), **20, 24**: *Quercus* sp. (19126, 19231), **21**: *Pinus* sp. (19147).

Lepra leucosora (Nyl.) Hafellner – **1, 12, 14**: siliceous rock (18591, 18860, 18927).

****Lepra ophthalmiza*** (Nyl.) Hafellner – **13**: *Castanea* sp. (18891).

****Lepraria caesioalba*** (B. de Lesd.) J.R.Jaundon – **14, 17**: siliceous rock (18921, 19042).

****Lepraria eburnea*** J.R.Laundon – **1**: *Pinus brutia* (18584).

****Lepraria incana*** (L.) Ach. – **2, 5, 7, 9**: *Pinus brutia* (18610, 18694, 18735, 18763), **11**: *Pinus nigra* (18811), **14, 19, 21**: *Pinus* sp. (18922, 19104, 19145), **20**: *Quercus* sp. (19121), **24**: *Acer* sp. (19227), **27, 30**: siliceous rock (19267, 19333).

Lichenostigma cosmopolites Hafellner & Calat. – **1**: on thallus of *Xanthoparmelia protomatrae* (18585), **34**: on thallus of *Xanthoparmelia stenophylla* (19383).

Lobaria pulmonaria (L.) Hoffm. – **4**: *Prunus domestica* (18654).

Lobothallia radiosa (Hoffm.) Hafellner – **34**: calcareous rock (19384).

****Melanelixia fuliginosa*** (Fr. ex Duby) O.Blanco et al. – **11, 15, 16**: siliceous rock (18812, 18960, 18992).

Melanelixia glabra (Schaer.) O.Blanco et al. – **4**: *Prunus domestica* (18655), **34**: *Olea* sp. (19385).

Melanelixia glabratula (Lamy) Sandler & Arup – **9**: *Pinus brutia* (18764), **11**: *Pinus nigra* (18813), **12, 18, 23**: *Pinus* sp. (18851, 19082, 19185), **13**: *Castanea* sp. (18885), **16**: *Quercus* sp. (18993).

Melanelixia subaurifera (Nyl.) O.Blanco et al. – **4**: *Pinus brutia* (18656), **5**: *Pinus brutia*, *Quercus cerris* (18695, 18696), **13**: *Castanea* sp. (18886), **15, 24**: *Quercus* sp. (18961, 19228), **20**: *Quercus* sp., log (19122, 19123).

Melanohalea exasperata (De Not.) O.Blanco et al. – **12**: *Quercus cerris* (18852).

Melanohalea exasperatula (Nyl.) O.Blanco et al. – **2**: *Pinus brutia* (18611).

****Melanohalea laciniatula*** (Flagey ex H.Olivier) O.Blanco et al. – **12**: *Pinus* sp. (18853).

****Moelleropsis nebulosa*** (Hoffm.) Gyeln. – **11**: siliceous soil (18814).

It was recorded from Turkey only once (Şenkardeşler & Sukatar 2006, from Denizli province).

Monerolechia badia (Fr.) Kalb – **18**: *Pinus* sp. (19083), **34**: calcareous rock (19376).

****Myriolecis albescens*** (Hoffm.) Śliwa, Zhao Xin & Lumbsch – **3, 10**: calcareous rock (18629, 18782).

Myriolecis dispersa (Pers.) Śliwa, Zhao Xin & Lumbsch – **34, 35**: calcareous rock (19382, 19398).

Myriolecis hagenii (Ach.) Śliwa, Zhao Xin & Lumbsch – **15, 31**: *Quercus* sp. (18958, 19344).

****Myriolecis semipallida*** (H.Magn.) Śliwa, Zhao Xin & Lumbsch – **3**: calcareous rock (18630).

****Myriospora smaragdula*** (Wahlenb.) Nägeli ex Uloth – **1, 16**: siliceous rock (18567, 18973).

Ochrolechia arborea (Kreyer) Almb. – **1, 5, 6, 9**: *Pinus brutia* (18586, 18697, 18719, 18765), **10**: *Phillyrea latifolia* (18785), **11**: *Pinus nigra* (18815), **14**: *Pinus* sp., *Phillyrea latifolia* (18923, 18924).

Ochrolechia microstictoides Räsänen – **6, 7**: *Pinus brutia* (18720, 18736), **11**: *Pinus nigra* (18816), **16, 19, 23, 30**: *Pinus* sp. (18994, 19105, 19186, 19334).

****Ochrolechia pallescens*** (L.) A.Massal. – **13**: *Castanea* sp. (18887), **33**: *Quercus cerris* (19361).

Ochrolechia parella (L.) A.Massal. – **14**: siliceous rock (18925), **28**: siliceous rock with limestone (19284).

****Ochrolechia subviridis*** (Høeg) Erichsen – **19**: *Pinus* sp. (19106).

****Ochrolechia turneri*** (Sm.) Hasselrot – **8, 28**: *Quercus cerris* (18745, 19285), **10**: *Phillyrea latifolia* (18786), **16**: *Pinus* sp. (18995).

****Parmelia barrenoae*** Divakar, M.C.Molina & A.Crespo – **19**: *Castanea* sp. (19109).

This species differs from *P. sulcata* in that having simple to furcate rhizines and revolute older lobes (Divakar et al. 2005). It was reported from Turkey only once (Kocakaya et al. 2018, from Çorum province).

+*Parmelia* cf. ***serrana*** A.Crespo, M.C.Molina & D.Hawksw. – **1**: *Pinus brutia*, siliceous rock (18587, 18588), **2, 6, 7, 9**: *Pinus brutia* (18612, 18721, 18737, 18766), **3**: *Pinus brutia*, *Pinus* log (18634, 18635), **11, 17, 18, 23**: *Pinus* sp., siliceous rock (18817, 18818, 19046, 19047, 19084, 19085, 19187, 19188), **12**: *Pinus* sp., soil with moss (18854, 18855), **13**: *Castanea* sp. (18888), **15**: siliceous rock (18962), **16**: *Quercus* sp., siliceous rock (18996, 18997), **19**: *Castanea* sp., *Pinus* sp. (19107, 19108), **21**: *Pinus* sp. (19146).

Parmelia serrana, a Mediterranean species was described to be morphologically similar to *P. saxatilis* (Molina et al. 2004). However recent molecular data showed that *P. serrana* was a distinct taxon (Ossowska et al. 2014, Thell et al. 2008). To date, only *P. saxatilis* has been known to be found in Turkey (John & Türk 2017).

In *P. saxatilis*, isidia are thick, simple, cylindrical and are frequently found in central parts of the thallus wheras in *P. serrana*, isidia are thin, simple, or branched and are mainly found along ridges (Tsurykau et al. 2019). *P. serrana* produces fatty acids while *P. saxatilis* produces lobaric acid (Ossowska et al. 2016). In this study, when evaluating the morphological features of the collected samples, it seemed that the material rather belonged to *P. serrana*. However, since molecular studies and TLC were not performed, this is given as cf.

Parmelia sulcata Taylor – **4**: *Pinus brutia*, *Prunus domestica* (18657, 18658), **5, 8**: *Quercus cerris* (18698, 18746), **11**: siliceous rock (18819), **13**: *Castanea* sp. (18889), **16**: *Quercus* sp. (18998), **17**: *Pinus* sp., *Quercus* sp. (19048, 19049), **20**: *Quercus* sp., log (19124, 19125), **23**: *Quercus frainetto* (19189), **24**: *Acer* sp., *Quercus* sp. (19229, 19230), **27**: *Pinus* sp. (19268).

Parmelina carporrhizans (Taylor) Hale – **4**: *Prunus domestica* (18659).

****Parmelina pastillifera*** (Harm.) Hale – **4**: *Pinus brutia* (18660), **12**: *Quercus cerris* (18856).

Parmelina quercina (Willd.) Hale – **12**: *Quercus cerris* (18857).

Parmelina tiliacea (Hoffm.) Hale – **1**: *Pinus brutia*, siliceous rock (18589, 18590), **3**: *Pinus brutia* (18636), **4**: *Pinus brutia*, *Prunus domestica* (18661, 18662), **8, 26**: *Quercus cerris* (18747, 19248), **18, 27**: *Pinus* sp. (19086, 19269), **22**: *Quercus* sp. (19160), **28**: siliceous rock with limestone, *Quercus cerris* (19286, 19287), **33**: *Pinus* sp., *Quercus cerris* (19362, 19363).

****Peltigera malacea*** (Ach.) Funck – **12**: siliceous rock with moss (18858).

Peltigera membranacea (Ach.) Nyl. – **11**: soil with moss (18820).

****Peltigera ponojensis*** Gyeln. – **17**: siliceous soil (19050).

Peltigera praetextata (Flörke ex Sommerf.) Zopf – **12**: siliceous rock with moss (18859).

****Pertusaria flavida*** (DC.) J.R.Laundon – **22**: *Quercus* sp. (19162), **33**: *Pinus* sp. (19366).

****Pertusaria hymenea*** (Ach.) Schaer. – **22**: *Quercus* sp. (19163), **33**: *Quercus cerris* (19367).

Pertusaria leioplaca DC. – **14**: *Phillyrea latifolia* (18926), **20**: *Quercus* sp. (19128).

Pertusaria pertusa (L.) Tuck. – **5**: *Pinus brutia*, *Quercus cerris* (18699, 18700), **10**: *Phillyrea latifolia* (18787), **13, 19**: *Castanea* sp. (18892, 19111), **16, 17, 24**: *Quercus* sp. (19005, 19053, 19232).

****Pertusaria pustulata*** (Ach.) Duby – **8**: *Quercus cerris* (18748).

Phaeophyscia ciliata (Hoffm.) Moberg – **26**: *Quercus cerris* (19249).

Phaeophyscia orbicularis (Neck.) Moberg – **8, 26**: *Quercus cerris* (18749, 19250), **25**: *Morus* sp. (19242), **28**: siliceous rock with limestone, *Quercus cerris* (19289, 19290).

****Phlyctis agelaea*** (Ach.) Flot. – **20**: *Quercus* sp. (19129).

Phlyctis argena (Ach.) Flot. – **12**: *Quercus cerris* (18861), **13, 19**: *Castanea* sp. (18893, 19112), **17, 20, 22, 24**: *Quercus* sp. (19054, 19130, 19164, 19233), **21, 33**: *Pinus* sp. (19148, 19368), **23**: *Quercus frainetto* (19191).

Physcia adscendens (Fr.) H.Olivier – **4**: *Prunus domestica* (18665), **8**: *Quercus cerris* (18750), **29**: *Prunus amygdalus* (19318).

Physcia aipolia (Ehrh. ex Humb.) Fürnr. – **4**: *Prunus domestica* (18666), **8, 26**: *Quercus cerris* (18751, 19251), **25**: *Morus* sp. (19243), **29**: *Prunus amygdalus* (19319).

Physcia caesia (Hoffm.) Hampe ex Fürnr. – **12, 17, 18, 23**: siliceous rock (18862, 19055, 19088, 19192).

Physcia leptalea (Ach.) DC. – **12**: *Quercus cerris* (18863), **28**: *Pistacia* sp. (19291).

Physcia stellaris (L.) Nyl. – **4**: *Prunus domestica* (18667), **12**: *Quercus cerris* (18864), **31**: *Quercus* sp. (19346), **34**: *Olea* sp. (19386), **37**: *Celtis* sp. (19414)

****Physcia tenella*** (Scop.) DC. – **4**: *Prunus domestica* (18668).

Physconia distorta (With.) J.R.Laundon – **12**: *Quercus cerris* (18865), **17**: *Quercus* sp. (19056), **23**: *Quercus frainetto* (19193), **29**: *Prunus amygdalus* (19320).

Physconia enteroxantha (Nyl.) Poelt – **4**: *Prunus domestica* (18669), **8**: *Quercus cerris* (18752), **17**: *Quercus* sp. (19057), **28**: siliceous rock with limestone, *Pistacia* sp., *Quercus cerris* (19292, 19293, 19294), **33**: *Pinus* sp. (19369), **34**: *Prunus amygdalus* (19387).

****Physconia grisea*** (Lam.) Poelt – **28**: *Quercus cerris* (19295).

****Physconia perisidiosa*** (Erichsen) Moberg – **17**: *Quercus* sp. (19058), **26**: *Quercus cerris* (19252).

Physconia servitii (Nádv.) Poelt – **8, 28, 33**: *Quercus cerris* (18753, 19296, 19370), **34**: *Prunus amygdalus* (19388).

****Placopyrenium fuscellum*** (Turner) Gueidan & Cl.Roux – **3**: calcareous rock (18641).

Placynthium nigrum (Huds.) Gray – **34, 37**: calcareous rock (19389, 19413).

Platismatia glauca (L.) W.L.Culb. & C.F.Culb. – **5, 6, 7, 9**: *Pinus brutia* (18701, 18723, 18738, 18767), **11**: *Pinus nigra* (18823), **12, 16, 17, 18, 19, 21, 23, 27**: *Pinus* sp. (18866, 19006, 19059, 19089, 19113, 19149, 19194, 19270), **15**: *Pinus* sp., on siliceous rock (18963, 18964).

Pleurosticta acetabulum (Neck.) Elix & Lumbsch – **4**: *Pinus brutia* (18664), **12, 26, 28**: *Quercus cerris* (18867, 19253, 19297), **17**: *Quercus* sp. (19060), **20**: log (19131), **23**: *Quercus frainetto* (19195).

Polysporina simplex (Taylor) Vězda – **12**: siliceous rock (18868).

Porpidia crustulata (Ach.) Hertel & Knoph – **2, 14**: siliceous rock (18613, 18928).

Porpidia macrocarpa (DC.) Hertel & A.J.Schwab – **2, 27**: siliceous rock (18614, 19271).

Protoparmeliopsis bolcana (Pollini) Lumbsch – **1, 12, 14, 17, 32**: siliceous rock (18592, 18842, 18916, 19038, 19354), **28**: siliceous rock with limestone (19281).

****Protoparmeliopsis muralis*** (Schreb.) M.Choisy – **32**: siliceous rock (19356).

Pseudevernia furfuracea var. ***furfuracea*** (L.) Zopf – **3, 6, 7**: *Pinus brutia* (18637, 18724, 18739), **4**: *Pinus brutia*, *Prunus domestica* (18670, 18671), **5**: *Pinus brutia*, *Quercus cerris* (18702, 18703), **11**: *Pinus nigra* (18824), **12, 16, 18, 19, 21, 27, 30**: *Pinus* sp. (18869, 19007, 19090, 19114, 19150, 19272, 19336), **14**: *Pinus* sp., *Phillyrea* sp., *Juniperus* sp. (18929, 18930, 18931), **15**: *Pinus* sp., *Quercus* sp. (18965, 18966), **17**: *Pinus* sp., siliceous rock (19061, 19062), **23**: *Quercus frainetto*, *Pinus* sp. (19196, 19197), **24**: *Quercus* sp. (19234).

Pseudevernia furfuracea has two chemical races including var. *furfuracea* (physodic acid) and var. *ceratea* (olivetoric acid) found in Turkey and worldwide. However, only var. *furfuracea* was observed in the study area. This result is similar to the study conducted by Oran et al. (2018).

****Psora decipiens*** (Hedw.) Hoffm. – **10**: calcareous rock (18788).

Pyrenodesmia variabilis (Pers.) A.Massal. – **3, 10, 37**: calcareous rock (18622, 18773, 19408).

Ramalina calicaris (L.) Röhl. – **17, 20, 22**: *Quercus* sp. (19063, 19132, 19165), **23**: *Quercus frainetto*, *Pinus* sp. (19198, 19199).

Ramalina farinacea (L.) Ach. – **4**: *Prunus domestica* (18672), **17, 20, 22**: *Quercus* sp. (19064, 19133, 19166), **21**: *Pinus* sp. (19151), **23**: *Quercus frainetto*, *Pinus* sp. (19201, 19202), **24**: *Acer* sp. (19235).

Ramalina fastigiata (Pers.) Ach. – **4**: *Prunus domestica* (18673), **5**: *Pinus brutia*, *Quercus cerris* (18704, 18705), **12, 33**: *Quercus cerris* (18870, 19371), **14**: *Phillyrea latifolia* (18932), **17, 22**: *Quercus* sp. (19065, 19167), **20**: log (19134), **21, 23, 27**: *Pinus* sp. (19152, 19200, 19273), **24**: *Acer* sp., *Quercus* sp. (19236, 19237), **28**: *Pistacia* sp. (19298), **29**: *Prunus amygdalus* (19321).

Ramalina fraxinea (L.) Ach. – **4**: *Prunus domestica* (18674), **17**: *Quercus* sp. (19066), **29**: *Prunus amygdalus* (19322).

****Ramalina roesleri*** (Hochst. ex Schaer.) Nyl. – **4**: *Prunus domestica* (18675).

Rhizocarpon distinctum Th.Fr. – **15**: siliceous rock (18967).

Rhizocarpon geographicum (L.) DC. – **1, 12, 17, 23**: siliceous rock (18593, 18871, 19067, 19203).

+*Rhizocarpon jemtlandicum* Malme – **1**: siliceous rock (19417). conf. V. John

Rhizocarpon lavatum (Fr.) Hazsl. – **12, 16, 17, 23**: siliceous rock (18872, 19008, 19068, 19204).

Rhizocarpon lecanorinum Anders – **14**: siliceous rock (18933).

Rhizocarpon polycarpum (Hepp) Th.Fr. – **16**: siliceous rock (19009).

Rinodina aspersa (Borrer) J.R.Laundon – **14, 16**: siliceous rock (18934, 19010).

Rinodina capensis Hampe – **1, 4**: *Pinus brutia* (18594, 18676), **8**: *Quercus cerris* (18754), **17**: *Quercus* sp. (19069), **29**: *Prunus amygdalus* (19323).

Rinodina exigua (Ach.) Gray – **4**: *Prunus domestica* (18677), **28**: *Quercus cerris* (19299), **33**: *Pinus* sp. (19372), **34**: *Prunus amygdalus* (19390).

+*Rinodina moziana* (Nyl.) Zahlbr. – **34**: siliceous rock (19391). conf. J. Sheard

Rinodina oleae Bagl. – **3**: calcareous rock (18638), **27, 32**: siliceous rock (19274, 19358), **28**: siliceous rock with limestone (19300), **29**: stonewall (19324).

Rinodina sophodes (Ach.) A.Massal. – **11**: *Quercus frainetto* (18825), **12**: *Quercus cerris* (18873), **15, 31**: *Quercus* sp. (18968, 19347), **28**: *Pistacia* sp. (19301).

Rufoplaca arenaria (Pers.) Arup, Søchting & Frödén – **5**: siliceous rock (18683).

Scoliciosporum umbrinum (Ach.) Arnold – **1**: *Pinus brutia*, siliceous rock (18595, 18596), **12**: *Quercus cerris* (18874), **14**: *Pinus* sp., *Phillyrea* sp, *Juniperus* sp. (18935, 18936, 18937), **15, 22**: *Quercus* sp. (18969, 19168).

Scytinium palmatum (Huds.) Gray – **17**: siliceous soil (19043).

Squamarina cartilaginea (With.) P.James – **10, 37**: calcareous rock (18789, 19415).

Squamarina lentigera (Weber) Poelt – **10**: calcareous rock (18790).

Tephromela atra (Huds.) Hafellner – **1, 5, 11, 12, 17**: siliceous rock (18597, 18706, 18826, 18875, 19070), **14**: *Phillyrea* sp. (18938), **16**: *Quercus* sp., siliceous rock (19011, 19012), **28**: siliceous rock with limestone (19302), **29**: stonewall (19325).

Toninia sedifolia (Scop.) Timdal – **10**: calcareous rock (18791).

Trapelia coarctata (Turner) M.Choisy – **9**: siliceous rock, brick (18768, 18769), **18, 23**: siliceous rock (19091, 19205).

Tuckermannopsis chlorophylla (Willd.) Hale – **23**: *Pinus* sp. (19206).

Umbilicaria crustulosa (Ach.) Lamy – **12**: siliceous rock (18876).

Umbilicaria polyphylla (L.) Baumg. – **12**: siliceous rock (18877).

Umbilicaria torrefacta (Lightf.) Schrad. – **12**: siliceous rock (18878). It was recorded from Turkey only once (Kinalioğlu & Uzun 2016, from Giresun-Şebinkarahisar province).

Usnea dasopoga (Ach.) Nyl. – **4**: *Prunus domestica* (18678), **20, 22**: *Quercus* sp. (19135, 19169), **24**: *Acer* sp., *Quercus* sp. (19238, 19239).

Usnea fulvoreagens (Räsänen) Räsänen – **23**: *Quercus frainetto* (19208).

Usnea hirta (L.) Weber ex F.H.Wigg. – **7**: *Pinus brutia* (18740), **21**: *Pinus* sp. (19153).

Usnea intermedia (A.Massal.) Jatta – **20**: log (19136), **23**: *Quercus frainetto* (19207), **24**: *Acer* sp. (19240).

***Varicellaria hemisphaerica** (Flörke) I.Schmitt & Lumbsch – **11**: *Pinus nigra* (18821), **16**: *Pinus* sp., *Quercus* sp. (19003, 19004), **19**: *Pinus* sp. (19110), **20**: *Quercus* sp. (19127).

***Variospora dolomiticola** (Hue) Arup, Søchting & Frödén – **3, 37**: calcareous rock (18620, 19405).

Verrucaria muralis Ach. – **3**: calcareous rock (18642), **23**: siliceous rock (19209).

Verrucaria nigrescens Pers. – **2, 3, 10, 35, 37**: calcareous rock (18616, 18643, 18793, 19401, 19416).

Xanthocarpia lactea (A.Massal.) A.Massal. – **35**: calcareous rock (19394).

Xanthoparmelia conspersa (Ehrh. ex Ach.) Hale – **3, 12, 14, 15, 16, 18, 30**: siliceous rock (18639, 18879, 18939, 18970, 19013, 19092, 19337).

Xanthoparmelia** cf. **perrugata (Nyl.) O.Blanco et al. – **12, 15, 16, 17**: siliceous rock (18880, 18971, 19014, 19071), **28**: siliceous rock with limestone (19303).

Xanthoparmelia pulla and *X. perrugata* are morphologically related taxa produce similar secondary metabolic substances. They have been reported as two chemotypes of *X. pulla*, chemotype *perrugata* and chemotype *pulla* (Sabrina et al. 2019). In this study, since TLC or HPLC are not applied to the samples, they were given as cf.

Xanthoparmelia protomatrae (Gyeln.) Hale – **1**: siliceous rock (18598).

Xanthoparmelia** cf. **pulla (Ach.) O.Blanco et al. – **5, 14, 23**: siliceous rock (18707, 18940, 19210).

TLC or HPLC analyses are not applied to the samples, therefore they were given as cf.

Xanthoparmelia stenophylla (Ach.) Ahti & D.Hawksw. – **2, 5, 16, 23, 30**: siliceous rock (18615, 18708, 19015, 19210, 19338), **34**: calcareous rock (19393).

Xanthoparmelia tinctina (Maheu & A.Gillet) Hale – **1, 18, 27, 30**: siliceous rock (18599, 19093, 19275, 19339).

Xanthoparmelia verruculifera (Nyl.) O.Blanco et al. – **17**: siliceous rock (19072).

Xanthoria parietina (L.) Th.Fr. – **3**: calcareous rock (18640), **4**: *Prunus domestica* (18679), **8, 26, 33**: *Quercus cerris* (18755, 19254, 19373), **10**: *Phillyrea latifolia* (18792), **17, 31**: *Quercus* sp. (19073, 19348), **20**: log (19137), **25**: *Morus* sp. (19244), **28**: siliceous rock with limestone, *Pistacia* sp., *Quercus cerris* (19304, 19305, 19306), **29, 34**: *Prunus amygdalus* (19326, 19392).

Discussion

When evaluating the lichen flora of the Kaz Mountains, coniferous and deciduous forests and rocky areas turn out as significant lichen habitats. Consequently, the highest species diversity was found in localities where several of these principal substrates (coniferous and broad-leaved trees, rocks, and soil) occur simultaneously, as localities 12 and 17.

There are also some special local habitats that provide conditions for the growth of species that are not found elsewhere in the study area. For example, several taxa which prefer siliceous rocks wetted by rain, *Catillaria atomarioides*, *Buellia aethalea*, *Lasallia pustulata*, *Umbilicaria crustulosa*, *U. polyphylla* and *U. torrefacta* were found only at loc. 12. Locality 10 is located near a marble quarry and is distinguished by calciferous species such as *Bagliettoa parmigera*, *Diploschistes gypsaceus*, *Lathagrium cristatum*, *Myriolecis albescens*, *Pyrenodesmia variabilis*, *Squamarina cartilaginea* and *Verrucaria nigrescens*.

Differentiation of the lichen flora depending on exposition and altitude would deserve further studies. In this study, no samples were collected in the beech and fir forests that are generally found on the north-facing slopes of Kaz Mountains. In a previous study, Oran et al. (2018)

reported six lichen species on *Abies* sp.. In the study presented here, *Hypocenomyce scalaris*, *Hypogymnia farinacea* and *Platismatia glauca* were observed only on pine trees which are found usually southern slopes of the mountains.

An important factor affecting lichen distribution is eutrophication (Wirth et al. 2013). In this study, species with eutrophication indicator values ranging from 3 to 5 (weak to very high eutrophication) according to the classification of Nimis & Martellos (2016) such as *Xanthoria parietina*, *Phaeophyscia orbicularis*, *Physcia adscendens*, *P. aipolia*, *P. caesia*, *P. tenella*, *Physconia enteroxantha*, and *Ph. grisea* were generally observed near agricultural fields and cemeteries, on the edges of forests adjacent to agricultural areas, roadsides and near settlements, on well-lit trees (for example, at the collection sites 20, 25, 26, 28, 29, 31, 33, 34). Indeed, also solar irradiation values ranging from 3 to 5 (sites with scarce to very high direct solar irridation) are given for these same taxa (Nimis & Martellos 2016). Thus, the role of eutrophication for their occurrence in the study area cannot be fixed with certainty.

Together with previous taxon records, from the studies cited above, in total, one lichenicolous and 264 lichenized fungi belonging to 94 genera are known from the Kaz Mountains now.

Acknowledgements

The author is indebted to Prof. John Sheard for confirming *Rinodina moziana*, and to Dr. Volker John for confirming *Rhizocarpon jemtlandicum*. Also the author is grateful to Dr. Volker John for suggestions to improve the manuscript, to Prof. Mark Seaward for the linguistic revision and helpful criticism and to Prof. Dr. Şule Öztürk for help during field studies. This study was financially supported by the Bursa Uludağ University, Scientific Research Projects Unit (Project No: 2013/26).

References

Akman, Y. 1990. İklim ve Biyoiklim. − Ankara: Palme Yayın Dağıtım.

Brodo, I. M., Sharnoff, S. D. & Sharnoff, S. 2001. Lichens of North America. − New Haven and London: Yale University Press.

Clauzade, G. & Roux, C. 1985. Likenoj de Okcidenta Eŭropo. Ilustrita Determinlibro. − Bulletin de la Société Botanique du Centre-Quest Nauvelle série-Numéro Spécial: **7**: 1–893.

Culberson, W. L. & Culberson, C. F. 1968. The Lichen Genera *Cetrelia* and *Platismatia* (Parmeliaceae). − Contr. U.S. Nat. Herb. **34**(7): 449–558.

Cürebal, İ., Efe, R., Sönmez, S. & Soykan, A. 2012. Kazdağları Ekosistemi ve Ekolojisi. − Balıkesir: Kazdağları Ulusal Çalıştayı, Bildiriler Kitabı: 93–110.

Çobanoğlu, G. & Sevgi, O. 2006. Contribution to the Lichen Flora of Gürgen Dağı (Çanakkale). − Turkish Journal of Botany **30**: 47−54.

Dirmenci, T., Satil, F. & Tümen, G. 2007. Kazdağı Milli Parkı Çiçekli Bitkileri − Balıkesir: Dileksan Kağıtçılık Tic. San. Ltd. Şti. 192.

Divakar, P. K., Molina, M. C., Lumbsch, H. T. & Crespo, A. 2005. *Parmelia barrenoae*, a new lichen species related to *Parmelia sulcata* (Parmeliaceae) based on molecular and morphological data. − The Lichenologist **37**(1): 37–46.

Giralt, M. 2001. The Lichen Genera *Rinodina* and *Rinodinella* (Lichenized Ascomycetes, Physciaceae) in the Iberian Peninsula. − Bibliotheca Lichenologica **79**: 1–160.

Hafellner, J. & Catalayud, V. 1999. *Lichenostigma cosmopolites*, a common lichenicolous fungus on *Xanthoparmelia* species. − Mycotaxon **72**: 107−114.

Hawksworth, D. L. & Chapman, D. S. 2001. *Pseudevernia furfuracea* (L.) Zopf and its chemical races in the British Isles. − Lichenologist **5**: 51–58.

Hepbilgin, B. & Koç, T. 2018. Bölgesel Sıcaklık ve Yağış Verilerine Göre Kazdağı ve Yakın Çevresinin İkliminde Öngörülen Değişiklikler (2000-2099). − Marmara Coğrafya Dergisi / Marmara Geographical Review **37**: 253–270.

John, V. 1992. Flechten der Turkei. III. Die Flechten der Pilotkartierung für Europa in der Türkei. – Bad Dürkheim: Pollichia.

John, V. & Türk, A. 2017. Türkiye Likenleri Listesi. – İstanbul: ANG Vakfı, Nezahat Gökyiğit Botanik Bahçesi Yayını.
Karabulut, Ş. N., Özdemir-Türk, A. & John, V. 2004. Lichens to monitor afforestation effects in Çanakkale, Turkey. − Cryptogamie, Mycologie **25**(4): 333−346.
Karamanoğlu, K. 1964. Edremit Kazdağı (İda) Bitkileri. − Ormancılık Araştırma Enstitüsü Dergisi **10**(1): 3−35.
Karamanoğlu, K. 1971. Türkiye'nin Önemli Liken Türleri. − Ankara Eczacılık Fakültesi Mecmuası **1**: 53−75.
Kinalioğlu, K. & Aptroot, A. 2006. *Catillaria*, *Cladonia*, *Strigula*, and *Cresporhaphis* species new to Turkey and Asia. − Mycotaxon **114**: 329–332.
Kinalioğlu, K. & Uzun, G. 2016. Şebinkarahisar (GİRESUN) İlçesinden Liken ve Likenikol Mantar Kayıtları. − Afyon Kocatepe Üniversitesi Fen ve Mühendislik Bilimleri Dergisi **16**: 16−25.
Kocakaya, M., Kocakaya, Z., Kaya, D. & Barak, M. Ü. 2018. A new lichen record for the Asia: *Parmelia barrenoae* Divakar, M.C.Molina & A.Crespo, supported by molecular data from Turkey. − Biological Diversity and Conservation **11**(3): 197−201.
Molina, M. C., Crespo, A., Blanco, O., Lumbsch, H. T. & Hawksworth, D. L. 2004. Phylogenetic relationships and species concepts in *Parmelia* s.str. (Parmeliaceae) inferred from nuclear ITS rDNA and tubulin sequences. − Lichenologist **36**(1): 37–54.
Nash III, T. H., Ryan, B. D., Gries, C. & Bungartz, F. (eds.) 2002. Lichen Flora of the Greater Sonoran Desert Region. Vol 1. − Tempe: Arizona State University Lichen Herbarium.
Nimis, P. L. & Martellos, S. 2016. ITALIC – The Information System on Italian Lichens. Version 5.0. University of Trieste, Department of Biology (http://dryades.units.it/italic)
Oran, S. & Öztürk, Ş. 2010. Three lichenized fungi new to Turkey. − Mycotaxon **112**: 389−392.
Oran, S., Özyiğitoğlu, G. & Öztürk, Ş. 2018. Lichenized and lichenicolous fungi records from Kazdağı (Balıkesir, Turkey). − Mantar Dergisi/The Journal of Fungus **9**(1): 39−49.
Ossowska, E., Szymczyk, R., Bohdan, A. & Kukwa, M. 2014. The lichen family Parmeliaceae in Poland. III. *Parmelia serrana*, new to Poland. – Acta Societatis Botanicorum Poloniae **83**(1): 81– 84.
Ossowska, E., Szczepańska, K. & Kossowska, M. 2016. New records of *Parmelia ernstiae* and *P. serrana* (Ascomycota, Parmeliaceae) in Poland. – Acta Mycologica **50**(2): 1065−1070.
Özhatay, N., Byfield, A. & Atay, S. 2005. Türkiye'nin 122 Önemli Bitki Alanı. – İstanbul: WWF, Mas Matbaacılık.
Özdemir Türk, A., Halici, M. G., Candan, M. & Yavuz, Y. 2015. The lichenized fungus genus *Peltigera* in Turkey. − Biological Diversity and Conservation **8**(2): 146−156.
Sabrina, H., Uriac, P., Le Dévehat, F., Sauvager, A., Jéhan, P., Zebboudj, A., Boustie, J. & Esnault, J. 2019. A chemotaxonomic study of the *Xanthoparmelia pulla* group in Algeria. – Herzogia **32**: 485 –502.
Schindler, H. 1975. Über die Flechte *Parmelia contorta* Bory und ihre bisher bekannnte Verbreitung. − Herzogia **3**: 347−364.
Smith, C. W., Aptroot, A., Coppins, B. J., Fletcher, A., Gilbert, O. L., James, P. W. & Wolseley, P. A. 2009. The lichens of Great Britain and Ireland. – London: British Lichen Society.
Şenkardeşler, A. 2009. Lichens from Turkey collected by V. Vašák. − Acta Botanica Hungarica **51**(3-4): 427−436.
Şenkardeşler, A. & Sukatar, A. 2006. Lichens of Denizli Province − Ege University, Journal of Faculty of Science **29**: 52−66.
Thell, A., Elix, J. A., Feuerer, T., Hansen, E. S., Kärnefelt, I., Schüler, N. & Westberg, M. 2008. Notes on the systematics, chemistry and distribution of European *Parmelia* and *Punctelia* species. (lichenized ascomycetes). – Sauteria **15**: 545−559.
Tsurykau, A., Bely, P., Golubkov, V., Persson, P.-E. & Thell, A. 2019. − The lichen genus *Parmelia* (Parmeliaceae, Ascomycota) in Belarus. – Herzogia **32**: 375 –384.
Wirth, V. 1995. Die Flechten-Baden Württembergs. – Stuttgart: Ulmer.
Wirth, V., Hauck, M. & Schultz, M. 2013. Die Flechten Deutschlands. – Stuttgart: Ulmer.

Manuscript accepted: 21 September 2020.

Communicated by: Volker Otte

Address of the author

Seyhan Oran, Bursa Uludağ University, Faculty of Arts & Sciences, Department of Biology, Bursa, Turkey. E-mail: seyhana@uludag.edu.tr