



The lichenized fungus genus *Peltigera* in Turkey

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Abstract

In this study, we evaluate the *Peltigera* specimens collected from different habitats in 198 localities from Turkey and 22 *Peltigera* species are determined. Of these species; *Peltigera extenuata* (Nyl. ex Vain.) Lojka is new to Turkey. A detailed description of this species is provided. Besides, an identification key to the *Peltigera* species of Turkey is provided.

Key words: Turkey, *Peltigera*, lichenized fungi, biodiversity

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Türkiye'deki likenleşmiş mantar cinsi *Peltigera*

Özet

Türkiye'deki 198 lokaliteden toplanan *Peltigera* örnekleri değerlendirilmiş ve 22 tür teşhis edilmiştir. Bu türlerden Türkiye için yeni kayıt olan *Peltigera extenuata* (Nyl. ex Vain.) Lojka'nın deskripsiyonu verilmiştir. Ayrıca, Türkiye'de yayılış gösteren *Peltigera* türleri için bir teşhis anahtarı da hazırlanmıştır.

Anahtar kelimeler: Türkiye, *Peltigera*, liken oluşturan mantar, biyoçeşitlilik

1. Introduction

Peltigera is one of the earliest generic lichen names which was proposed by Willdenow (1787). Later, this name was used as a synonym for *Peltidea* by some authors like Acharius (1794). Nylander (1863, 1866), Duby (1830) and Fries (1831) contributed further to the taxonomy of *Peltigera* and allied genera. An important change in the taxonomy of *Peltigera* was introduced by Gyelnik who listed 69 species in 1933. Furthermore, Thomson (1950) revised the genus *Peltigera* of North America (Vitikainen, 1994). A comprehensive revision on *Peltigera* genus was undertaken by Vitikainen (1994) and reported 22 *Peltigera* species recorded from Europe with an identification key in addition to taxonomy, general ecology and distribution of the species. Besides the taxonomic studies mentioned above, the floristic studies on *Peltigera* species have been carried out almost throughout the world. Ahti and Vitikainen (1977) reported 25 species from Newfoundland. Vitikainen (1985, 1986) described three new *Peltigera* species from Europe, Asia and North America, and a new species from China and Nepal in respective years. He also discussed the distribution of *P. polydactylon* group in another paper (Vitikainen, 1987). Goffinet and Hastings (1995) described three new sorediate species of *Peltigera* from East Africa, North America, China and Europe. A noteworthy study on the genus *Peltigera* by Martinez et al. (2003) reported the distribution of 66 *Peltigera* species in 230 biogeographic provinces or 40 regions in the world.

Members of *Peltigera* have foliose thalli, forming compact to very wide spread rosettes. The size of thallus varies, with the age of the individual and also with the quality of the habitat and well-being of the lichen. For the reliable identification of the species level; well-developed material is required because of the taxonomy based on the

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vegetative characters. One of the most important taxonomical characters are structures of the upper and lower surface of the lobes. Also the veining and morphology of rhizines are important diagnostic characters. Chemistry is another essential taxonomic significance just as in many lichen genera. While some *Peltigera* species have Cyanobacteria (*Nostoc*) some of them have green algae (*Coccomyxa*) as primary photobiont. In the cephalodiate species, *Nostoc* is the third biont.

In the literature, there are about 250 records for 22 *Peltigera* species from almost every region of Turkey. Most of these records are in the articles of in the floristic studies which were carried out to determine the lichen diversity of Turkey (e.g. John, 1996; John and Breuss, 2004; Halıcı et al., 2009). Here we extend the study on the *Peltigera* species and report their distribution and taxonomical characters in Turkey. We also provided distribution maps for all the species known from Turkey.

2. Materials and methods

During this study fresh materials were collected during our project (TUBİTAK TBAG 108T556) between 2009-2011 (Figure 1).

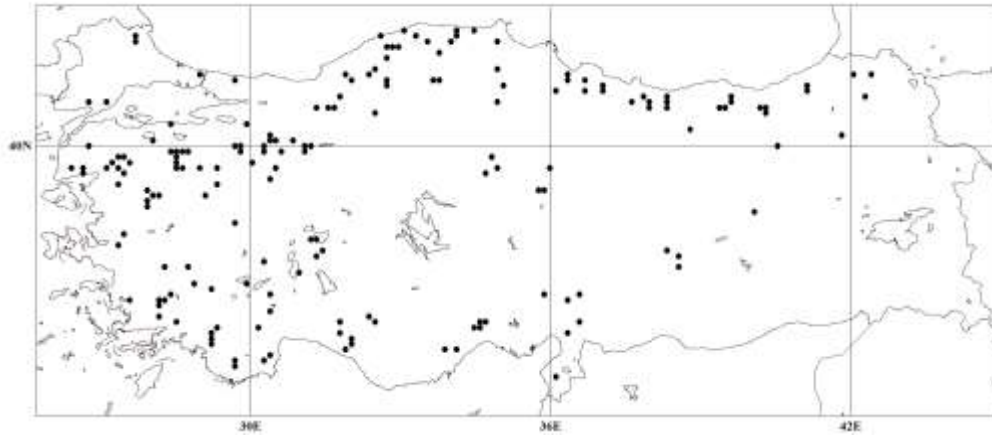


Figure 1. The collection sites of the *Peltigera* specimens

Detailed information of the localities is given in Table 1.

Table 1. Descriptions of the localities

	Locality	Altitude	Coordinates	Date
1.	Adana, Kozan, N of Dağlıca	645 m	37°36'30" N 35°50'45" E	09.08.2009
2.	Adıyaman, Sincik, W of Serince	1400-1450 m	38°03'N 38°35'40.7" E	29.07.2004
3.	Afyon, Dinar, SW of Karabedir	1200 m	38°08'22" N 30°17'38" E	01.08.2009
4.	Afyon, Sultandağı, <i>Quercus vulcanica</i> forest	1622-1690 m	38°28'35" N 31°10'48" E	11.05.2010
5.	Amasya, Kılıçarslan pass, SE of Cüceler	943 m	40°52'48" N 36°04'43" E	08.09.2009
6.	Ankara, Çamlidere, Çamkoru Forest	1300 m	40°32'33" N 32°29'21" E	12.10.2009
7.	Ankara, Nallıhan, W of Osman village	550 m	40°04'10"N 30°54'43" E	28.07.2010
8.	Antalya, Akseki, S of Mahmutlar Town	620 m	36°54'56" N 31°45'57" E	04.08.2009
9.	Antalya, Akseki-Seydişehir, N of Akseki	1275 m	37°07'07" N 31°47'00" E	04.08.2009
10.	Antalya, Alanya, N of Güzelbağ Town	770-870 m	36°44'42" N 31°58'02" E	04.08.2009
11.	Antalya, NW of Gündoğmuş Town	900 m	36°49'05" N 31°58'37" E	04.08.2009
12.	Antalya, Elmalı, SE of Gömbe	1200 m	36°32'19" N 29°42'33" E	02.08.2009
13.	Antalya, Elmalı-Kaş, NW of Çeşme	1000 m	36°23'54" N 29°42'05" E	02.08.2009
14.	Antalya, Elmalı, S of Sinekli	1450 m	36°27'35" N 29°39'03" E	02.08.2009
15.	Antalya, Korkuteli-Elmalı	1167 m	37°01'14" N 30°10'33" E	01.08.2009
16.	Antalya, Tahtalı Mountains, S of Karacaağaç	725 m	36°29'44" N 30°19'33" E	03.08.2009
17.	Antalya, Tahtalı M., E of Altınyaka	1170 m	36°37'24" N 30°23'05" E	03.08.2009
18.	Artvin, Ardanuç, Artvin-Şavşat	472 m	41°13'52" N 42°05'31" E	31.08.2009
19.	Artvin, Şavşat, Şavşat-Ardahan	1360 m	41°13'17" N 42°22'58" E	31.08.2009
20.	Aydın, Bozdoğan, S of Altıntaş	800 m	37°35'40" N 28°21'00" E	15.06.2009
21.	Aydın, Çine, SE of Söğütçük	397 m	37°28'20" N 28°07'49" E	14.06.2009
22.	Aydın, Çine, Around Byzantine Bridge	176 m	37°28' N 28°09' E	25.06.2009
23.	Aydın, Nazilli, NE of Samailli	850 m	38°01'12" N 28°18'24" E	15.06.2009

Table 1. devam ediyor

24.	Balıkesir, Balya-Yenice	225 m	39°45'20" N 27°32'11" E	20.07.2010
25.	Balıkesir, NE of Dursunbey Town	581 m	39°36'52" N 28°38'53" E	19.07.2010
26.	Balıkesir, Dursunbey, NE of Gölcük	770 m	39°39'38" N 28°28'48" E	22.11. 2008
27.	Balıkesir, Kazdağı, around Darıdere	635-720 m	39°39'21" N 26°42'20" E	18.06.2009
28.	Balıkesir, Alaçam, İstasyon-Dursunbey (V.J.)	700 m	39°39' N 28°38' E	27.04.1992
29.	Balıkesir, İvrindi, S of Hüseyinbeyobası	410 m	39°36'43" N 27°22'21" E	18.06.2009
30.	Balıkesir, Altınoluk, W of Narlı	308 m	39°35'08" N 26°40'42" E	18.06.2009
31.	Balıkesir, Havran	430 m	39°40'14" N 27°06'31" E	20.06.2010
32.	Balıkesir, İvrindi, N of Okçular	380 m	39°32'09" N 27°26'58" E	17.06.2009
33.	Balıkesir, Manyas, W of Yeniköy	40 m	40°06'39" N 28°03'28" E	20.11.2008
34.	Balıkesir, Sındırgı, Kertil Recreation Area	375 m	39°12'51" N 28°07'10" E	17.06.2009
35.	Balıkesir, Sındırgı, E of Kertil	605 m	39°12'19" N 28°06'53" E	17.06.2009
36.	Bartın, Kurucaşile, W of Curunlu	210 m	41°49'35" N 32°38'45" E	30.07.2010
37.	Bartın, Ulus, Dereli-Gökpınar	553-855 m	41°38'53" N 32°48'18" E	29.05.2009
38.	Bartın, Ulus, W of Gökpınar	978 m	41°38'52" N 32°49'37" E	29.05.2009
39.	Bartın, Ulus, Hasanören, Soğucaksu	1010 m	41°37'36" N 32°47'47" E	29.05.2009
40.	Bartın, Ulus, Ulukaya, A. Yazıcıoğlu Pass	366 m	41°40'24" N 32°45'50" E	29.05.2009
41.	Bilecik, Bozüyük, Mezit Boğazı	715 m	39°55'29" N 29°45'40" E	18.11.2008
42.	Bilecik, Gölpazarı, W of Kümbet	755 m	40°12'58" N 30°21'55" E	17.11.2008
43.	Bilecik, Osmaneli-Adapazarı-Iznik junction	150 m	40°21'28" N 29°55'42" E	17.11.2008
44.	Bilecik, Pazaryeri, W of Kınık	810 m	40°00'20" N 29°49'33" E	18.11.2008
45.	Bilecik, Söğüt, NW of Dudaş	573 m	40°01'36" N 30°14'17" E	16.11.2008
46.	Bilecik, Söğüt, N of Oluklu	930 m	39°56'23" N 30°13'47" E	16.11.2008
47.	Bilecik, Yenipazar, S of Kuşca	1000 m	40°07'49" N 30°29'25" E	16.11.2008
48.	Bilecik, Yenipazar, E of Muratça	956 m	40°06'58" N 30°27'13" E	16.11.2008
49.	Bilecik, S of Yenipazar	936 m	40°08'51" N 30°31'02" E	17.11. 2008
50.	Bolu, E of Abant Lake	1085-1230 m	40°36'35" N 31°16'54" E	28.05.2009
51.	Bolu, Bolu-Gölcük, S of Karacasu	1200-1300 m	40°40'54" N 31°37'38" E	14.06.2010
52.	Bolu, Bolu-Gölcük	1238 m	40°39'40" N 31°38'44" E	11.10.2009
53.	Bolu, Mengen, NW Gökçesuyu	670 m	40°49'04" N 31°47'46" E	29.07.2010
54.	Bolu, N of Mengen	520 m	41°04'19" N 32°03'06" E	29.07.2010
55.	Bolu, Şerif Yüksel Research Forest	1215 m	40°38'02" N 31°33'15" E	11.10.2009
56.	Burdur, E of Beşkavak	1270 m	37°35'44" N 30°22'33" E	01.08.2009
57.	Burdur, Bucak, W of Kızılkaya	806 m	37°18'03" N 30°25'47" E	01.08.2009
58.	Burdur, W of Ulupınar	1560 m	37°44'59" N 29°58'09" E	10.06.2009
59.	Burdur, Yeşilova, Elden	1350-1370 m	37°44'01" N 29°56'28" E	10.06.2009
60.	Bursa, Karacabey, Bayramdere	80 m	40°22'31" N 28°23'06" E	19.11. 2008
61.	Bursa, W of Harmançık	484 m	39°38'36" N 29°01'08" E	19.07.2010
62.	Bursa, İnegöl around Bahçesultan	967 m	40°02'02" N 29°47'07" E	18.11. 2008
63.	Bursa, İnegöl, N of Güzelyurt	630 m	40°02'23" N 29°42'44" E	18.11. 2008
64.	Bursa, Mustafakemalpaşa, S of Alpagut	460 m	39°51'22" N 28°34'53" E	22.11. 2008
65.	Bursa, S of Çakallar	605-855 m	39°50'18" N 28°34'11" E	22.11. 2008
66.	Bursa, around Çivilicam	900-910 m	39°53'03" N 28°40'33" E	21.11. 2008
67.	Bursa, E of Eskibalçık	760 m	39°53'33" N 28°39'21" E	21.08. 2008
68.	Bursa, around Suuçtu waterfall	390-480 m	39°54'40" N 28°23'07" E	22.11. 2008
69.	Bursa, E of Yaylaçayır	890 m	39°45'28" N 28°31'57" E	22.11. 2008
70.	Bursa, E of Yoncağaç	140 m	39°55'08" N 28°34'54" E	22.11. 2008
71.	Çanakkale, Yenice, E of Alancık	580 m	39°47'17" N 27°25'44" E	20.07.2010
72.	Çanakkale, Yenice, Gürgen Mountain	450 m	39°43'24" N 27°11'02" E	20.07.2010
73.	Çanakkale, Yenice, W of Kalkım	230 m	39°46'01" N 27°13'12" E	20.07.2010
74.	Çanakkale, Yenice, E of Kayatepe	200 m	39°50'53" N 27°19'55" E	20.07.2010
75.	Çanakkale, NW of Ayvacık	280 m	39°37' N 26° 24' E	21.07.2010
76.	Çanakkale, Çan-Çanakkale, 40. km	450 m	40°01'40" N 26°48'07" E	20.07.2010
77.	Çanakkale, Gelibolu, NW of Adilhan	300 m	40°42'26" N 26°47'00" E	22.07.2010
78.	Çankırı, Ilgaz, Ilgaz Mountain	1750-1885 m	41°03'36" N 33°44'19" E	02.08.2010
79.	Çorum, S of Gümüşhasan	630 m	40°59'14" N 35°01'55" E	09.09.2009
80.	Çorum, SW of Laçın	705 m	40°46'17" N 34°53'12" E	09.09.2009
81.	Denizli, Babadağ, E of Kelleci	858-880 m	37°47'52" N 28°53'42" E	11.06.2009
82.	Denizli, Buldan, E of Süleymanlı	1140 m	38°02'35" N 28°47'22" E	11.06.2009
83.	Denizli, Çameli, SE of Sofular	1361 m	37°00'26" N 29°18'36" E	12.06.2009
84.	Denizli, E of Kızılyayla	1350 m	36°59'24" N 29°16'42" E	12.06.2009

Table 1. devam ediyor

85.	Denizli, SE of Cankurtaran	1219 m	37°39'41" N 29°14' 43" E	11.09.2009
86.	Denizli, SE of Cankurtaran	1721 m	37°41'04" N 29°15'24" E	11.06.2009
87.	Elazığ, Karakoçan, SW of Yenice	1180 m	38°54'42" N 40°03'12" E	06.08.2004
88.	Erzurum, Aşkale, N of Bozburun	2000 m	40°00'04" N 40°32'26" E	29.08.2009
89.	Erzurum, Narman, S of Göllü	2000 m	40°13'19" N 41°52'29" E	29.08.2009
90.	Erzurum, Olur, SE of Yukarıkaracasu	1800 m	40°49'26" N 42°17'11" E	30.08.2009
91.	Eskişehir, Alpu, Çatacık Forest	1530 m	39°57'43" N 31°08'06" E	13.08.2010
92.	Eskişehir, Alpu, around Karacaören	890-1256 m	40°02'05" N 31°04'13" E	13.08.2010
93.	Eskişehir, Alpu, Sündiken Mountains	1369 m	39°59'12" N 31°03'58" E	13.08.2010
94.	Eskişehir, Mihalliççık, Sündiken Mountains	1310 m	39°58'07" N 31°10'43" E	13.08.2010
95.	Eskişehir, Sarıcakaya, Şoförler Çeşmesi	1200 m	39°57'05" N 30°40'15" E	02.10.2010
96.	Eskişehir, İnönü, S of Erenköy	1100 m	39°44' N 30°01' E	02.05.2010
97.	Eskişehir, Odunpazarı, Türkmen M.	1320-1355 m	39°29' N 30°21' E	24.03.2009
98.	Giresun, Alucra, NW of Alucra	1477 m	40°19'43" N 38°44'48" E	28.08.2009
99.	Giresun, N of Çaldağ	234 m	40°47'59" N 38° 18' 25" E	05.09.2009
100.	Giresun, Dereli, Kulakkaya Plateau	1670-1790 m	40°41'33" N 38°19'08" E	05.09.2009
101.	Giresun, Dereli, N of Süllü	1253 m	40°40'15" N 38°21'11" E	05.09.2009
102.	Gümüşhane, Torul, NE of Zigana	1019 m	40°38'04" N 39°23'12" E	04.09.2009
103.	Gümüşhane, Torul, NE of Zigana	2100 m	40°38'28" N 39°23'50" E	04.09.2009
104.	Gümüşhane, east of Zigana Pass (V.J.)	ca.2350 m	40°37'54" N 39°25'57" E	02.08.1997
105.	Hatay, Antakya, NW of Kisecik	360 m	36°15'45" N 36°04'29" E	12.08.2009
106.	Isparta, Eğirdir, NE of Mahmatlar	940 m	37°57'11" N 30°56'41" E	31.07.2009
107.	Isparta, Yalvaç, E of Başkonak	1325 m	38°13'13" N 31°17'37" E	31.07.2009
108.	İstanbul , Şile, N of Yaylalı	200 m	41°06'25" N 29°40'22" E	26.07.2010
109.	İstanbul , Sarıyer, Belgrad Forest	65-120 m	41°12'05" N 28°57'41" E	25.07.2010
110.	İzmir, Kemalpaşa, Nif Mountain	710-869 m	38°24'50" N 27°23'40" E	16.06.2009
111.	İzmir, Yamanlar Mountain, Emiralem-Karagöl (V.J.)	550-750 m	38°35' N 27°09' E	23.05.1995
112.	Kahramanmaraş, Andırın, W of Darıovası	700 m	37°31'22" N 36°22'16" E	14.08.2009
113.	Kahramanmaraş, Çevrepınar Mountain	1210 m	37°33'57" N 36°33'29" E	14.08.2009
114.	Kahramanmaraş, SE of Yaylaüstü	1320 m	37°34'02" N 36°35'00" E	14.08.2009
115.	Karabük, Büyükdüz Research Forest	800 m	41°15' N 32°33' E	13.10.2009
116.	Karabük, Karatepe	1450 m	41°02'18" N 32°43'25" E	13.10.2009
117.	Karabük, Karatepe	980 m	41°03'28" N 32°42'41" E	13.10.2009
118.	Karabük, Safranbolu, NW of İnceçay	641 m	41°24'17" N 32°43'09" E	01.06.2009
119.	Karabük, Yenice, Şeker Canyon	230 m	41°11'26" N 32°21'35" E	01.06.2009
120.	Kastamonu, Azdavay, SW of Sada	830 m	41°43'45" N 33°29'04" E	30.07.2010
121.	Kastamonu, Çatalzeytin, Küre Mountains	1120 m	41°52'22" N 34°06'29" E	31.07.2010
122.	Kastamonu, Cide, S of Velioglu	830 m	41°51'10" N 33°04'03" E	30.07.2010
123.	Kastamonu, Devrakani, SE of Çatak	1265-1315 m	41°42'57" N 33°59'31" E	31.07.2010
124.	Kastamonu, Devrakani, S of Sarıyonca	1200 m	41°34'26" N 33°46'43" E	30.07.2010
125.	Kastamonu, Devrakani, SE of Yarılgöz	1340 m	41°46'21" N 34°04'08" E	31.07.2010
126.	Kastamonu, Ilgaz Mountain	1800 m	41°04'26" N 33°44' 45" E	02.08.2010
127.	Kastamonu, Ilgaz Mountain	1553 m	41°05'50" N 33°41'48" E	02.08.2010
128.	Kastamonu, Pınarbaşı, W of Kayabükü	850 m	41° 36' 29" N 33°00'17" E	29.05.2009
129.	Kastamonu, Şenpazar, W of Kalaycı	450 m	41°49'42" N 33°16'54" E	30.07.2010
130.	Kırklareli, W of Demirköy	420-500 m	41°48'32" N 27°44'43" E	23.07.2010
131.	Kırklareli, Pınarhisar, NE of Yenice	800-860 m	41°45'17" N 27°40'50" E	23.07.2010
132.	Konya, Akşehir, SE of Değirmen	990 m	38°26'30" N 31°19'31" E	31.07.2009
133.	Konya, Doğanhisar-Hüyük (V.J.)	1600 m	38°01' N 31°26" E	08.04.1983
134.	Konya, Bozkır, SW of Aydıncısla	1400 m	37°13'21" N 32°21'27" E	05.08.2009
135.	Konya, Hadım, E of Balat	1411 m	37°05'00" N 32°27'19" E	05.08.2009
136.	Kütahya, Emet, E of Köprücek	1130 m	39°22'55" N 29°20'44" E	23.11. 2008
137.	Kütahya, Simav, Gölcük Plateau	1340-1450 m	39°09'38" N 29°05'05" E	23.11. 2008
138.	Kütahya, Tavşanlı, W of Derbent	1000 m	39°37'44" N 29°19'22" E	19.07.2010
139.	Malatya, Yaygın, Yaygın Plateau	1620 m	38°14'40" N 38°32'30" E	11.07.2010
140.	Manisa, Akhisar, SE of Dingiller	410 m	38°59'15" N 27°54'51" E	17.06.2009
141.	Manisa, Akhisar, W of İsaca	490 m	39°09'35" N 28°01'29" E	17.06.2009
142.	Manisa, Kırkağaç, N of Çobanlar	409 m	39°15'32" N 27°53'26" E	17.06.2009
143.	Manisa, Soma, W of Kiraz	600 m	39°20'54" N 27°24'17" E	17.06.2009
144.	Manisa, Spil Mountain National Park	1170-1267 m	38°32'33" N 27°26'58" E	16.06.2009

Table 1. devam ediyor

145.	Mersin, Çamlıyayla, around Atdağı	1130-1250 m	37°09'17" N 34°40'12" E	08.08.2009
146.	Mersin, Çamlıyayla, NE of Çamlıyayla	1350 m	37°10'40" N 34°37'50" E	08.08.2009
147.	Mersin, Erdemli, NW of Aslanlı	950 m	36°41'28" N 34°10'00" E	07.08.2009
148.	Mersin, Toroslar, Ayvagediği	1070 m	37°01'55" N 34°34'58" E	07.08.2009
149.	Mersin, Toroslar, S of Güzelyayla	840 m	37°02'40" N 34°29'45" E	07.08.2009
150.	Mersin, Silifke, S of Kocaoğluk	1420 m	36°42'10" N 33°53'58" E	06.08.2009
151.	Muğla, Dalaman, N of Söğütü	1508 m	36°52'46" N 29°10'09" E	12.06.2009
152.	Muğla, Fethiye, S of Arpacık	1030 m	36°47'48" N 29°11'09" E	12.06.2009
153.	Muğla, N of Kavaklıdere	800 m	37°27'39" N 28°20'39" E	15.06.2009
154.	Muğla, Milas, SE of Bafa Lake	13 m	37°29'45" N 27°32'10" E	13.06.2009
155.	Muğla, Ula, NE of Gölcük	1010 m	37°08'45" N 28°33'32" E	12.06.2009
156.	Muğla, W of Çaybükü	500 m	37°14'27" N 28°07'58" E	13.06.2009
157.	Muğla, Yatağan, SW of Kavakköy	500 m	37°22' N 28°10' E	15.06.2009
158.	Muğla, Yatağan, NW of Elmacık	323 m	37°25'34" N 28°08'52" E	15.06.2009
159.	Muğla, Narhisar-Çukurköy	800 m	37°28' N 27°42' E	25.03.1983
160.	Nevşehir, Nevşehir-Ürgüp	1450 m	38°36' N 34°48' E	09.07.2001
161.	Ordu, Çaybaşı, N of İlküvez	980m	40°56'58" N 37°00'43" E	07.09.2009
162.	Ordu, Çaybaşı, S of Köklük	1060 m	40°58'24" N 37°01'25" E	07.09.2009
163.	Ordu, Gökçöy	900 m	40°41'11" N 37°37'30" E	06.09.2009
164.	Ordu, Kabadüz, NE of Turnalık	1600 m	40°43'23" N 37°56'35" E	06.09.2009
165.	Ordu, Kabadüz, Susuz Plateau	1664 m	40°39'25" N 37°56'30" E	06.09.2009
166.	Ordu, Kabadüz, Dışkaya-Akgüney	1015-1222 m	40°48' 52" N 37°54' 22" E	06.09.2009
167.	Osmaniye, Hasanbeyli, W of Hasanbeyli	800 m	37°07'28" N 36°34'02" E	13.08.2009
168.	Osmaniye, Zorkun Plateau	1400-1500 m	36°59'04" N 36°21'44" E	14.08.2009
169.	Rize, Çamlıhemşin, Ayder Plateau	1406-1550 m	40°57'27" N 41°07'06" E	01.09.2009
170.	Rize, Çamlıhemşin, Ayder Plateau	1030-1300 m	40°57'31" N 41°04'54" E	01.09.2009
171.	Samsun, Ayvacık, E of Uğurlu	80 m	40°56'33" N 36°38'21" E	07.09.2009
172.	Samsun, Ayvacık, N of Hasan Uğurlu Dam	60 m	41°04'44" N 36°40'14" E	07.09.2009
173.	Samsun, Canik, S of Gökçepınar	666 m	41°10'51" N 36°20'13" E	08.09.2009
174.	Samsun, Canik, N of Gödekli	850 m	41°05'48" N 36°17'12" E	08.09.2009
175.	Sinop, Ayancık, E of Büyükdüz	115 m	41°52'51" N 34°30'48" E	31.07.2010
176.	Sinop, N of Eymir	575 m	41°43'42" N 34°57'11" E	01.08.2010
177.	Sinop, Saraydüzü, SE of Akbelen	300 m	41°18'29" N 34°54'02" E	01.08.2010
178.	Tokat, Çamlıbel Geçidi	1600 m	39°58' N 36°31' E	15.07.2001
179.	Tekirdağ, Şarköy, W of İshaklı	270 m	40°44'44" N 27°04'50" E	24.07.2010
180.	Trabzon, Çaykara, E of Çamlıbel	575 m	40°40'44" N 40°14'14" E	02.09.2009
181.	Trabzon, Çaykara, SW of Çamlıbel	810 m	40°39'17" N 40°12'36" E	02.09.2009
182.	Trabzon, Çaykara, N of Taşkiran	602 m	40°40'38" N 40°15'24" E	02.09.2009
183.	Trabzon, Çaykara, Uzungöl-Yaylaönü	1250-1400 m	40°35' N 40°19' E	02.09.2009
184.	Trabzon, Maçka, Sümela Monastery	1230 m	40°41'16" N 39°39'37" E	03.09.2009
185.	Trabzon, Maçka, S of Sümela Monastery	520 m	40°45'29" N 39°36'47" E	03.09.2009
186.	Trabzon, Maçka, W of Örnekalın	1005 m	40°50'18" N 39°35'20" E	03.09.2009
187.	Trabzon, Maçka, around Hamsiköy	1637-1846 m	40°40'24" N 39°25'22" E	04.09.2009
188.	Trabzon, SE Uzungöl (V.J.)	1200 m	40°36'49" N 40°18'50" E	24.07.1997
189.	Trabzon, Kemerdağ, SW Soğanlı Geçidi (V.J.)	2550 m	40°33' N 40°09' E	11.08.1990
190.	Uşak, Banaz, S of Burhaniye	1330 m	38°46'02" N 29°39'51" E	09.06.2009
191.	Yozgat, E of Akdağmadeni	1603 m	39°40'00" N 35°56'07" E	26.08.2009
192.	Yozgat, Çayıralan, Çat Forest	1650 m	39°19'30" N 35°50'17" E	27.08.2009
193.	Yozgat, Çamlık National Park	1390-1556 m	39°48'13" N 34°48'42" E	26.08.2009
194.	Yozgat, Şefahtli, E of Caferli	857 m	39°32'15" N 34°43'11" E	26.08.2009
195.	Yozgat, W of Osmanpaşa	1015 m	39°37'13" N 34°56'53" E	25.08.2009
196.	Zonguldak, Devrek, W of Sofular	300 m	41°09'17" N 31°51'11" E	16.6.2010
197.	Zonguldak, Devrek, NW of İsabeyli	600 m	41°13'23" N 31°52'57" E	29.07.2010
198.	Zonguldak, Devrek-Mengen, N of the tunnels (V.J.)	900 m	41°02' N 32°02" E	04.05.1992

Also herbarium materials from ANES, H, BULU and the personal collections of some lichenologists (Volker John, Gülşah Çobanoğlu, Ali Aslan, Kenan Yazıcı, Özge Tufan Çetin) were studied. The specimens are stored in ANES (Anadolu University Faculty of Science Herbarium). Duplicates of the specimens are also stored in the lichen herbarium of Erciyes University. Specimens were examined under stereomicroscope and light microscope and their microscopy observations were made TLC was performed to detect the lichen substances when necessary. The authors (MGH and

MC) visited H, checked some identifications with the type samples, and discussed the taxonomically problematic specimens with Dr. Orvo Vitikainen. A key to the genus *Peltigera* was prepared based on the materials examined.

3. Results

The number of *Peltigera* species recorded from Turkey is now 22 with this study. *P. extenuata* is reported from Turkey for the first time. Detailed information about the localities is given in the Table 1 and 2.

3.1. A key to the genus *Peltigera* in Turkey

1. Photobiont chlorococcoid, bright green when wet 2
1. Photobiont cyanobacterial (*Nostoc*), not bright green when wet 4
2. Thallus larger, in general lobes wider 3
2. Thallus small, about 2 cm in width, lobes rounded to fan shaped or arising singly, 5 mm in width, 20 mm in length; margins smooth or slightly denticulate. Apothecia always present, one or more per lobe, disc red to reddish dark brown, globose, oval or smooth..... *P. venosa*
3. Thallus up to 20 cm in diam., thick (-500 μ), lobes 1.5-3 (-5) cm in width, upper surface erect tomentose at the margin, less tomentose towards to center; smooth to warted, cephalodia firmly attached, up to 2 mm in diam.; lower surface whitish in margin, immediately blackens towards center, with a few indistinct veins or without veins; rhizines scattered, simple to fasciculate, dark to black, up to 5 mm *P. aphthosa*
3. Thallus moderately large, up to 30 cm in diam., thin, with entire to crenate edges, upper surface gray or bluish gray to brown when dry, bright green when wet; entire, wrinkled especially in the mature thalli, opaque to partly bright, tomentose towards margins, tomentose structure is more clear in the young thalli, cephalodia convex to cerebriform, veins smooth, whitish in the margins, brown or black in the centre, rhizines simple to tufted, whitish in the margin, turning black in the centre, up to 5 mm in length..... *P. leucophlebia*
4. With soredia 5
4. Without soredia 7
5. Soredia laminal; thallus tomentose 6
5. Soredia marginal, rarely corticated, laminal soralia may be present; thallus non-tomentose *P. collina*
6. Soredia C and KC (-), rhizines arising singly, whitish or brownish..... *P. didactyla*
6. Soredia C and KC (+) red, rhizines white, rarely simple, fibrillose, turning dark and becoming rare in the centre *P. extenuata*
7. Lobules, phyllidia, schizidia and isidia present 8
7. Lobules and isidia absent 11
8. Upper surface smooth or weakly tomentose near apothecia 9
8. Upper surface tomentose 10
9. Thallus usually phyllidiate, upper surface smooth, shiny, especially weakly tomentose near the apothecia, lower surface with veins, rhizines whitish, simple, at intervals, 5-7 mm in length; apothecia on the elongated stalks, disc 4-9 mm in diam., generally very pale brown, saddle shaped *P. degenii*
9. Frequently lobulate or schizidate similar to isidia, thallus about 15 cm in diam., upper surface gray brown and shiny, generally fissured, lower surface without veins, whitish in the margins, dark brown or black towards to centre, without veins, whitish or with white flecks, rhizines black, concentric in the bottom, fasciculate, apothecia smooth, disc oval-globose, brown to dark brown *P. elisabethae*
10. Phyllidia squamulose or coralloid, laminal and marginal..... *P. praetextata*
10. Isidia laminal, squamulose or peltate *P. lepidophora*
11. Lower surface distinctly veined 12
11. Lower surface without veins or with a few diffuse veins, pale brownish near margins, black in central parts, white flecks absent, rhizines sparse, bush-shaped, fasciculate; upper surface brownish gray, bluish or greenish when dry, blue-green when wet. *P. malacea*
12. Yellowish orange tone absent in the lower surface, rhizines thick 13

12. Lower surface diffuse, weakly ochraceous or brown veined; rhizines whitish, simple to fasciculate, 5 mm in length and separate; apothecia saddle-shaped, Brown, upper surface smooth, matt to shiny, gray to brown when dry, somewhat maculate *P. hymenina*
13. Edges down turned 14
13. Edges up turned rarely entire 15
14. Thallus thick and upper surface densely tomentose, rhizines simple in the margins, squarrose in the centre *P. canina*
14. Thallus thin and upper surface thinly tomentose, rhizines cylindrical, with short squarrose ramifications *P. membranacea*
15. Upper surface at least tomentose in the edges of lobes 16
15. Upper surface not tomentose 19
16. Veins dark brown to black from the parts near the margin 17
16. Veins whitish in the margins, turning to brown in the center 18
17. Upper surface gray, thick, tomentose almost like pressed, intervals between veins in the lower surface cream and angular *P. rufescens*
17. Upper surface brownish, thick and erect tomentose in the margins, scabrose and with shiny parts towards centre, intervals between veins white and round in the lower surface *P. kristinssonii*
18. Veins in the margins slightly raised, becoming flat immediately towards centre, veins and rhizines cream, ochreaous only in the centre, usually with squamulose phyllidia *P. monticola*
18. Veins distinctly raised everywhere; phyllidia absent 19
19. Veins raised, thin, makes an anastomosed network, cream, pale brown in the margins, turning to brown in the center *P. virescens*
19. Veins distinctly raised everywhere, not thin; veins and rhizines cream near the edges, pale brown in the centre *P. ponojensis*
20. Lobes pruinose especially in the edges, veins reticulate, smooth, diffuse, blackens immediately in the centre, white flecks present between the veins in the centre *P. neckeri*
20. Lobes not pruinose, shiny 21
21. White flecks absent between veins 22
21. White flecks present between veins; rhizines dark, fasciculate, forms concentric rings. Apothecia horizontale, globose or oval, disc dark brown *P. horizontalis*
22. Lower surface with smooth brownish to black veins; rhizines brown to black, slightly branched, 7(11) mm in length *P. neopolydactyla*
22. Lower surface white, brownish, blackens towards centre; veins brown to black, prominent but smooth, white areas which are round or elongated are present, rhizines together when young, fasciculate, whitish to dark brown *P. polydactylon*

3.2. *Peltigera extenuata* (Nyl. ex Vain.) Lojka Lichenoth. Univ. Fasc. V, No.222 (1886)

Thallus small to medium, up to 3 cm in diam. Upper surface pale greyish to pale brown when dry, bluish green when wet, thick whitish-grey tomentose, sorediate, soredia in granular, orbicular, laminare soralia. Soralia C and KC (+) red, gyrophoric acid present. Lower surface whitish, with white or whitish veins which are anastomosed, turning brown through the center. Rhizines white, rarely simple, fibrillose, turns dark and become sparse in the centre. Photobiont *Nostoc*. Apothecia not observed in the Turkish specimen (Figure 2).

This species is common in the oceanic and suboceanic parts of Turkey especially in the northern part of Anatolia under forest on siliceous mother rock. It is easily distinguished from closely related *P. didactyla*, by having gyrophoric acid in the thallus.

Specimens examined: Aydın, Nazilli, NE of Samailli, *Quercus* sp. communities, 850m, 38°01'12" N 28°18'24" E, 15.06.2009; Bartın, Kurucaşile, west of Curunlu Village, siliceous rocks, 210 m, 41°49'35" N 32°38'45" E, 30.07.2010; Erzurum, Narman, Narman Recreation Area, south of Göllü, *Pinus sylvestris* forest, 2000 m, 40°13'19" N 41°52'29" E, 29.08.2009; Eskişehir, Alpu, Sündiken Mountain, 1369 m, 39°59'12" N 31°03'58" E, *P. sylvestris* forest, 13.08.2010; Giresun, Dereli, Yavuzkemal, Kulakkaya Plateau, *Picea orientalis* forest, 1790 m, 40°41'33" N 38°20'07" E, 05.09.2009. Ordu, Çaybaşı, south of Köklük, *Fagus orientalis* forest, 1060 m, 40°58'24" N 37°01'25" E, 07.09.2009; Rize, Çamlıhemşin, Ayder Plateau, 1406 m, 40°57'27" N 41°07'06" E, 01.09.2009.



Figure 2. *Peltigera extenuata* a. habitus, b. Soralia (ANES:15585)

3.3. Distribution of the species

Distributions of the *Peltigera* species based on the locality numbers in Table 1 are given in Table 2.

Table 2. Distribution of the *Peltigera* species

<i>P. canina</i>	4, 5, 6, 9, 10, 11, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 29, 30, 31, 32, 33, 34, 35, 43, 44, 46, 51, 52, 59, 61, 63, 64, 65, 66, 68, 69, 71, 74, 78, 80, 81, 82, 87, 89, 90, 91, 92, 94, 95, 96, 97, 98, 100, 101, 102, 105, 107, 109, 110, 111, 113, 114, 115, 117, 119, 120, 121, 122, 123, 124, 127, 129, 130, 131, 136, 140, 141, 142, 143, 144, 145, 146, 148, 153, 154, 155, 156, 157, 158, 159, 164, 165, 166, 168, 169, 171, 173, 176, 179, 180, 181, 185, 187, 190, 191, 193, 194
<i>P. collina</i>	4, 23, 51, 54, 65, 69, 72, 96, 97, 115, 119, 121, 128, 129, 131, 159, 168, 184
<i>P. degenii</i>	78, 126, 141
<i>P. didactyla</i>	18, 19, 36, 51, 79, 89, 93, 97, 99, 101, 156, 158, 161, 162, 165, 169, 171, 187, 196
<i>P. elisabethae</i>	6, 19, 42, 51, 52, 82, 99, 101, 103, 113, 121, 130, 131, 165, 166, 168, 173, 174, 181, 182, 183, 184, 187, 188, 197
<i>P. extenuata</i>	23, 36, 89, 93, 100, 162, 169, 188
<i>P. horizontalis</i>	19, 25, 51, 53, 89, 90, 101, 106, 107, 115, 118, 125, 164, 180, 198
<i>P. hymenina</i>	60, 125
<i>P. kristinsonii</i>	19, 25, 51, 53, 89, 90, 101, 104, 106, 107, 163
<i>P. lepidophora</i>	18
<i>P. leucophylebia</i>	19, 118, 119, 120, 165, 198
<i>P. malacea</i>	165, 189
<i>P. membranacea</i>	4, 9, 10, 11, 16, 19, 20, 36, 47, 50, 53, 54, 55, 59, 60, 63, 64, 65, 66, 68, 73, 76, 77, 78, 81, 82, 90, 96, 97, 100, 107, 110, 114, 115, 118, 119, 120, 121, 123, 125, 126, 127, 128, 129, 131, 137, 140, 144, 155, 156, 187, 188, 192, 197
<i>P. monticola</i>	1, 7, 8, 10, 11, 12, 14, 15, 16, 17, 20, 22, 25, 26, 27, 46, 50, 51, 53, 56, 57, 61, 70, 75, 79, 81, 82, 83, 84, 86, 89, 96, 98, 110, 112, 113, 114, 121, 124, 132, 133, 134, 139, 140, 141, 145, 148, 149, 153, 157, 160, 167, 173, 176, 177, 178, 192
<i>P. neckeri</i>	5, 6, 8, 10, 11, 13, 16, 17, 18, 20, 23, 25, 27, 28, 29, 30, 34, 35, 36, 37, 40, 45, 46, 49, 50, 51, 53, 54, 59, 61, 64, 65, 66, 74, 75, 76, 77, 78, 80, 81, 82, 89, 90, 94, 95, 97, 98, 101, 102, 105, 110, 111, 113, 117, 118, 119, 120, 121, 124, 125, 127, 129, 131, 137, 138, 140, 141, 147, 148, 152, 153, 156, 158, 162, 166, 171, 173, 177, 181, 185, 187, 191
<i>P. neopolydactyla</i>	101, 183, 184
<i>P. polydactylon</i>	19, 20, 27, 29, 30, 34, 45, 51, 52, 78, 81, 82, 97, 101, 103, 116, 117, 118, 120, 125, 129, 130, 131, 156, 161, 165, 166, 168, 170, 172, 181, 183, 187
<i>P. ponojensis</i>	4, 12, 19, 50, 51, 52, 64, 71, 84, 88, 89, 91, 94, 98, 116, 120, 127, 135, 148, 168, 192, 193, 194
<i>P. praetextata</i>	4, 5, 10, 16, 19, 20, 22, 23, 25, 27, 28, 29, 34, 37, 38, 39, 40, 41, 46, 47, 49, 50, 51, 52, 54, 55, 60, 62, 65, 66, 72, 78, 81, 82, 90, 93, 97, 99, 100, 101, 105, 108, 109, 110, 111, 112, 113, 115, 116, 117, 118, 119, 120, 121, 122, 124, 127, 129, 130, 131, 137, 141, 159, 161, 164, 168, 169, 170, 171, 173, 174, 175, 176, 179, 180, 181, 182, 183, 184, 186, 187, 192, 197, 198
<i>P. rufescens</i>	2, 3, 4, 6, 7, 9, 18, 19, 20, 21, 22, 25, 42, 46, 47, 48, 49, 58, 59, 61, 64, 67, 68, 71, 79, 80, 82, 83, 85, 89, 90, 92, 94, 95, 96, 97, 98, 100, 101, 102, 103, 106, 107, 121, 123, 124, 125, 129, 132, 133, 140, 144, 146, 150, 151, 153, 154, 158, 161, 162, 165, 166, 168, 169, 173, 176, 182, 186, 187, 190, 191, 195, 196
<i>P. venosa</i>	19, 78, 93, 102, 120, 165, 198
<i>P. virescens</i>	92, 127, 194

4. Conclusions

The *Peltigera* species grow mostly on soil, bark, epiphytic or epilithic mosses, rock crevices under forests and on dried meadow plants in exposed habitats and in more or less humid and natural habitats where anthropogenic effect is low. Besides, *Peltigera* species are one of the most common lichen species that occupy habitats such as the sides of forest tracks with mosses or directly on soil with *Cladonia* and other terricolous lichen species.

Peltigera species mostly grow on soil and mosses in the crevices of rocks as small thalli in the areas where anthropogenic effects particularly overgrazing are predominated. Overgrazing is commonly seen throughout Turkey. During our field excursions we observed that in the areas close to nitrogen rich agricultural areas, *Peltigera* species were either absent or had wide distributions with smaller thalli. In such areas, species with high ecological tolerance such as *P. canina* and *P. rufescens* were common. The only exception for this observation was in the Central and Eastern Black Sea Regions. In most localities in these regions, well developed *Peltigera* thalli were found mixed with mosses even on natural stone walls in the edges of arable fields and gardens.

The most important reason for rich *Peltigera* distribution in the Black Sea Region of Turkey is climatic conditions. In this region, habitats with favorable humid properties for *Peltigera* species are abundant. The species such as *P. degenii*, *P. leucophlebia*, *P. neopolydactyla* and *P. malacea* which are rarely encountered in other regions have distribution along with some other species of the genus. Comparing the diversity of the *Peltigera* species in different regions of Turkey, Black Sea Region and the areas where oceanic climate is predominant have the richest diversity.

Species like *P. canina*, *P. monticola*, *P. ponojensis* and *P. rufescens* which prefer dry areas and calcareous substrata (Vitikainen, 1994; Goffinet and Hastings, 1994) are widely distributed in Mediterranean, Central and Eastern Anatolia Regions. Because of local variations in habitat diversities in these regions, species growing in humid conditions (Vitikainen, 1994; Goffinet and Hastings, 1994) like *P. collina*, *P. didactyla*, *P. elisabethae*, *P. horizontalis*, *P. praetextata* and *P. venosa* were also collected. The mixed forests in the Amanos Mountains, *Pinus nigra* forests in Kaz Mountain in Çanakkale, *Pinus nigra* and *Quercus* mixed forests in Çevrepinar Mountain in Kahramanmaraş, Türkmen and Sündiken Mountains in Eskişehir and *Pinus sylvestris* forests in Akdağmadeni in Yozgat can be given as examples of rich habitat diversity areas in these regions.

In Thrace Region, species reported to grow in humid areas such as *P. canina*, *P. collina*, *P. elisabethae*, *P. horizontalis*, *P. neckeri*, *P. praetextata* and *P. polydactylon* (Vitikainen, 1994; Smith et al., 2009) are found in *Fagus* forests in the Yıldız Mountains. Because the proper habitats are very restricted in Thrace Region, the species diversity was not rich except in the Yıldız Mountains. In Belgrade Forest, which is one of the best protected areas in the vicinity of İstanbul metropole, *P. praetextata* was very common under *Fagus* communities. This species is one of the shade loving *Peltigera* species (Smith et al., 2009). In Koru Mountain and its vicinity; *P. neckeri*, which can grow in drier conditions and a common species in Mediterranean Region was found. *Peltigera* species which partly prefer humid habitats such as *P. praetextata* and *P. membranacea* were found in the vicinity of Şarköy (Tekirdağ) under *Quercus-Carpinus* communities.

In Mediterranean Region, the diversity of *Peltigera* species increases especially at higher altitudes. This effect was obviously seen in the transition areas from *P. brutia* forest to *P. nigra* forest in the south or from steppe to forest vegetations in the north. Important reasons for this consequence are change in climate and increase in the diversity of the natural habitats. Çamlıyayla (İçel), Zorkun Plateau (Osmaniye), Elmalı Cedar Research Forest and vicinity of Akseki (Antalya) can be given as examples for this kind of areas. In the areas with more natural habitats such as Nif Mountain (İzmir), Babadağ, (Denizli), Spil Mountain (Manisa); the diversity of *Peltigera* species is richer when compared with close surroundings.

In Central Anatolia Region, Türkmen, Murat and Eğrigöz Mountains, Sultandağları, the Sündiken Mountains (Eskişehir), Erciyes Mountain (Kayseri), Akdağlar (Sivas-Yozgat) and Çamlıbel Pass provide suitable habitats for *Peltigera* species. Towards Northern Central Anatolia such as Ankara Çamkoru Research Forest, Çamlık (Yozgat), Çat Forests (Sivas) species growing in dry habitats such as *P. rufescens*, *P. monticola* and *P. canina* were found. In Oltu, Narman, Olur (districts of Erzurum), species with wide ecological tolerance such as *P. rufescens* and *P. canina* and also species which prefer typically humid habitats such as *P. didactyla*, *P. neckeri*, *P. horizontalis* and *P. extenuata* were found under *P. sylvestris* forests.

Among the reported *Peltigera* species from Turkey up to date, only *P. aphthosa*, *P. leucophlebia* and *P. venosa* contain green algae. *P. aphthosa* was previously reported from Artvin, Ardahan (Woronow, 1915), Erzincan (Yazıcı and Aslan, 2003), Erzurum (Aslan, 2000), Trabzon (Yazıcı, 1999), Bayburt (Yazıcı and Aslan, 2003) in Turkey. After our field work and examination of herbarium materials in H and personal collections in Turkey, we concluded that probably the specimens identified as *P. aphthosa* in Turkey are *P. leucophlebia*. These two species are clearly distinguished by small outgrowths in the margins of cephalodia of *P. leucophlebia*, such outgrowths are not characteristic in *P. aphthosa*. Furthermore Vitikainen (1994) reported that *P. aphthosa* is absent in the Mediterranean-montane belt, but it is rarely present in very humid habitats of oceanic areas. Because we could not check all the records previously reported from Turkey, we preserved the name *P. aphthosa* in the key and the checklist.

The other green algae containing *Peltigera* species, *P. venosa* is easily distinguished from other species of the genus by its small and fan-shaped thalli. During this study, this species was collected under *P. sylvestris* forest from

Türkmen Mountain (Eskişehir), Akdağmadeni (Yozgat) and under *Abies nordmanniana* forest in Ilgaz Mountain (Kastamonu). This species was also collected on soil with *P. leucophlebia* under *Picea orientalis* forest in Şavşat (Artvin) and *A. nordmanniana* and *P. sylvestris* forest in the Küre Mountains (Kastamonu). We found the populations of this species especially on bare and humid soils where the vegetation is weak as indicated by Vitikainen (1994).

The cyanolichen, *Peltigera virescens* is one of the taxonomically problematic species. Holotype address of this species is Erciyes Mountain (Kayseri) (Steiner, 1905; Vitikainen, 1994). In our study, we examined one specimen of this species which was collected from a close locality to holotype address (Halıcı et al., 2005). Besides, we examined two more specimens of this species collected from Turkey in H. This species was only collected from Mediterranean Region up to date. The veins of this species which is very close to *P. ponojensis* and *P. monticola* are paler than the veins of *P. monticola* and the rhizines are frequently lined in the margins and weakly branched, and they are seen as simple rhizines towards the centre of lower surface and the color of the rhizines are paler in the margins and darken towards to centre.

P. monticola, *P. ponojensis*, *P. rufescens* and *P. virescens* have tomentose and pruinose upper surface and prefer dry areas and calcareous substrata. They are common in all Turkey but especially have a wide distribution in Central Anatolia and Mediterranean Regions. *P. monticola*, a species described by Vitikainen (1994) is reported to have a distribution in Southern Europe. This species was previously only reported from Antalya in Turkey by Tufan et al. (2005) and the lichenicolous fungi reported on this species from Turkey were given in Halıcı et al. (2012). It appears that this species has a very wide distribution in Turkey as it was found in many localities in our study. *P. monticola* is distinguished from closely related species by having fragmented and pruinose phyllidiate margins, simple and ochraceous rhizines in the margins and different veins. *P. ponojensis* is distinguished from closely related species by its white veins and rhizines, more raised veins and more or less branched rhizines. The most evident characteristics of *P. rufescens* are darkened brown veins towards to centre and dark confluent rhizines and the most evident characteristics of *P. virescens* is rhizines turning from clusters to simple and brownish from margins towards to centre. However, Vitikainen (1994) reported that distinguishing of these species is problematic. In our opinion, these species should be studied in detail population level and molecular data should be used to support the morphological characters.

P. kristinssonii, a species previously reported from two localities in Turkey by Vitikainen (1994), has been collected from many localities by us in this study. This species was reported as terricolous, muscicolous, mesotrophic and weakly calcicole by Vitikainen (1994), and it was found in similar habitats in Turkey. This species has very similar characteristics to *P. rufescens* but distinguished by rhizines which are seen as solitary tufts and evident circular whitish areas between the veins in lower surface and erect tomentum towards to margins.

P. canina, *P. membranacea* and *P. praetextata* have pruinose or tomentose upper surface and they are very closely related to each other. Among these species, *P. praetextata* is easily distinguished from others by phyllidiate lamina or margins and its rhizine structures. *P. canina* and *P. membranacea* are morphologically more similar. *P. membranacea* is distinguished from *P. canina* by its whitish lower surface, generally whitish veins which turns to pale brownish towards to centre, simple rhizines in the margin turning to bottle brush shape towards to centre. These species were frequently reported from many localities in Turkey in previous papers and also found in many localities by us (Özdemir Türk and Güner, 1996; Yazıcı, 1999; Aslan, 2000; Yazıcı and Aslan, 2003; John and Breuss, 2004; Güvenç et al., 2006; Tufan et al., 2006).

P. didactyla, *P. extenuata* and *P. lepidophora* are similar in terms of thallus morphology and ecological requirements. From these species, *P. lepidophora* can easily be distinguished from other two species by its peltate laminal isidia. From the other two sorediate species, *P. extenuata* is distinguished from *P. didactyla* by C (+) and KC (+) red medulla, white lower surface and wooly shaped rhizines. Another species which is close to this group because of having soredia is *P. collina*. This species differs from the other three species by its linear soralium structure along the margins and lamina, and non-tomentose thallus. *P. collina* is collected in more or less humid habitats on mosses, bark or siliceous rocks as also indicated by Vitikainen (1994). Especially, it is very common on mosses on the trunks of old trees in *Quercus vulcanica* forest in Sultandağı (Afyon). This species has rarely been reported with apothecia (Smith et al., 2009) and we found fertile specimens of this species in this locality and also in *Quercus* forest in Pınarbaşı (Kastamonu).

P. elisabethae, *P. degenii*, *P. horizontalis*, *P. hymenina*, *P. malacea*, *P. neckeri*, *P. neopolydactyla* and *P. polydactylon* are related closely because of their morphological similarities (Vitikainen, 1994). All these species have shiny and non-tomentose upper surface and mostly grow in more or less humid localities.

P. elisabethae and *P. horizontalis* are frequently misidentified. These species are distinguished from other related species with their flat and circular apothecia. *P. elisabethae* is distinguished from *P. horizontalis* with the fissures in the upper surface, phyllidia, schizidia in the margins and lamina and lower surface without veins. *P. horizontalis* is characteristic with the differences in the upper surface, white spots in the lower surface and brownish black rhizines with the shape of concentric orbicular lines. *P. horizontalis* was reported as an indicator of old forests by Smith et al. (2009) and this species was frequently collected near the bases of old and broad-leaved trees in this study.

P. degenii is distinguished from other closely related species by its white and swollen veins in the lower surface. *P. neckeri* is distinguished by its blackish, nail shaped, tubular apothecia in fertile specimens and whitish pruinose thallus margins in the sterile specimens. *P. neckeri* is very common in Turkey, generally on soil or mosses on

siliceous substrata as indicated by Nimis and Martellos (2004). This species was especially collected in mesic habitats and also semi-xeric habitats in the Mediterranean Region on mosses, soil or siliceous rocks. These findings show that the ecological tolerance of this species is rather high.

P. polydactylon is distinguished from other species by its brown lower surface and frequent and compound rhizines. *P. neopolydactyla* was previously reported by Yazıcı et al. (2011, 2013) from the localities higher than 2000 m in Iğdır and Ardahan provinces. According to Vitikainen (1994), this species is predominantly found in the forest floor. We collected the samples of this species on mosses under forest between 1200-1400 m in Giresun and Trabzon provinces in Black Sea Region. The record given from the eastern unforested slopes of Ağrı Mountain at 2198 m is interesting (Yazıcı et al., 2013).

P. malacea is distinguished from other species by its lower surface without veins which is pale brown close to margins and blackish towards to centre. In humid conditions the blue-green colour of upper surface is one of the most evident characters of this species.

Peltigera species generally prefer natural habitats and they do not grow in nitrogen rich habitats. Because they have a distribution in the places far away from anthropogenic effects. However such areas have been decreasing over years and distribution of *Peltigera* species is under threat. Thus *Peltigera* species which grow mainly on soil are being lost rapidly because their natural distribution areas are rapidly converted for agricultural, industrial practices, development of new urban areas and highway constructions etc.

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