

## Bryophyte flora of Erciyes Mountain in Turkey, with 6 bryophyte records from the country

Recep KARA<sup>1\*</sup>, Tülay EZER<sup>1</sup>, Merve CAN GÖZCÜ<sup>2</sup>, Şadiye Gül BOZDOĞAN<sup>1</sup>

<sup>1</sup>Department of Biology, Faculty of Science and Arts, Niğde University, Niğde, Turkey

<sup>2</sup>Department of Biology, Polatlı Faculty of Science and Arts, Gazi University, Ankara, Turkey

Received: 15.11.2013

Accepted: 17.03.2014

Published Online: 20.05.2014

Printed: 19.06.2014

**Abstract:** In this study, the bryophyte flora of Erciyes Mountain was investigated. In total, 244 taxa were found in this area. Of these, 9 families, 9 genera, and 11 taxa belong to liverworts and 25 families, 72 genera, and 233 taxa belong to mosses. According to Henderson's grid-square system, 138 bryophyte taxa for the B8 square are new records. Among them, *Leiocolea heterocolpos* (Thed. ex Hartm.) H.Buch., *Scapania obscura* (Arn. & Jens.) Schiffn., *Schistidium pulchrum* H.H.Blom., *Tortula lingulata* Lindb., *Bryum knowltonii* Barnes, and *Brachythecium capillaceum* (F.Weber & D.Mohr) Giacom are new records for the bryophyte flora of Turkey. *Polytrichastrum sexangulare* (Brid.) G.L.Sm.; *Dicranum fulvum* Hook.; *Gymnostomum lanceolatum* M.J.Cano, Ros & J.Guerra; *Tortula systylia* (Schimp.) Lindb.; *Pohlia obtusifolia* (Vill. ex Brid.) L.F.Koch.; and *Drepanocladus polygamus* (Schimp.) Hedenäs are second records for Turkey.

**Key words:** Bryophyte, Erciyes Mountain, flora, new record, Turkey

### 1. Introduction

Turkey, which is in the transition zone of 3 different biogeographically regions, the European-Siberian, Mediterranean, and Irano-Turanian, is one of the richest countries between Europe and the Middle East in terms of biodiversity (Kaya and Raynal, 2011). This biodiversity is reflected in the bryophyte flora as well as vascular plants and Turkey has unique vegetation. Although the vascular plants have been thoroughly investigated in Turkey, the floristic studies on bryophytes are still insufficient.

According to recent literature, although significant bryofloristic studies were made in the Central Anatolian Region near the present research area (Yayıntaş and Erdağ, 1995; Ezer, 2006; Kara et al., 2006; Tonguç Yayıntaş and Yayıntaş, 2010; Can et al., 2013; Ezer and Kara, 2013), there has not been a detailed study on the bryophyte flora of Erciyes Mountain. Therefore, this study aimed to investigate the bryophyte flora of Erciyes Mountain, which is one of the highest mountains in Turkey.

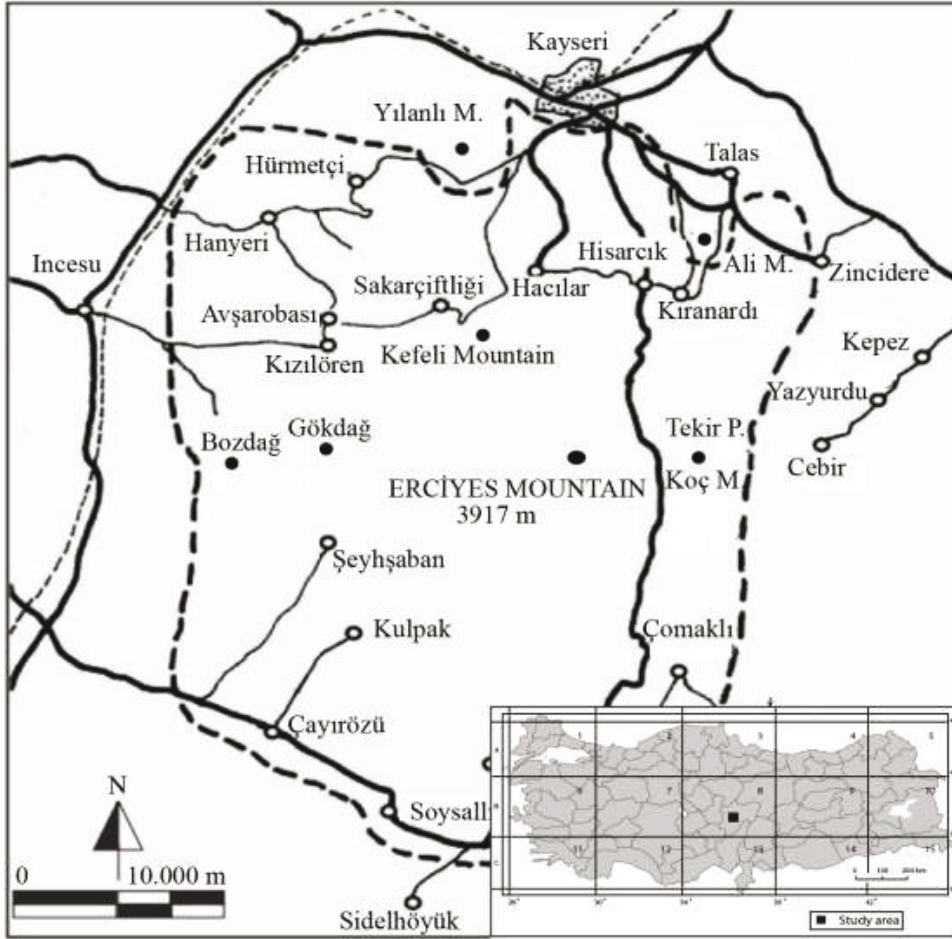
#### 1.1. Study area

Erciyes Mountain is located within the boundaries of Kayseri Province in the Central Anatolian Region. It is situated in the Irano-Turanian Phytogeographic Region and the B8 grid square as adopted by Henderson (1961) (Figure 1). The peak of Erciyes Mountain reaches 3917 m a.s.l., and so it is the highest mountain of the Central Anatolian Region and the fifth highest of Turkey. The

mountain, of volcanic origin, is a stratovolcano. This stratovolcano consists of many separate vents, some of which have erupted cinder cones and domes on the volcano's flanks (Vural and Aytaç, 2005). Volcanic activities in the mountain began in the Neogene era and ended about 2000 years ago. The mountain has been inactive since then (Ünaldı, 2007). The area is covered by 6 different soil types: colluvial soils, brown soils, organic soils, alluvial soils, hydromorphic alluvial soils, and noncalcareous brown soil, which is the most widespread in the area (Halıcı et al., 2005; Vural and Aytaç, 2005). According to the nearest meteorological station, located in Kayseri, the study area has a Mediterranean climate characterized by dry summers, warm temperatures, and precipitation during the winter months (Halıcı et al., 2005; Vural and Aytaç, 2005). However, the physical geographical factors formed by the altitude of the mountain affect the type of climate and cause hardening of the climate type (Ünaldı, 2007).

The natural integrity of the vegetation of Erciyes Mountain has been destroyed by anthropogenic factors, grazing, and agricultural activities (Vural and Aytaç, 2005). The general vegetation in this area consists of that of the steppe region, characterized by *Astragalus angustifolius* Lam. subsp. *pungens* (Willd.) Hayek, *A. acicularis* Bunge, *Onobrychis argaea* Boiss. & Balansa, *Artemisia caucasica* Willd., *Poa alpina* L., and *Stipa pulcherrima* K.Koch subsp. *crassiculmis* (P.Smirn.) Tzvelev at about 1000–1100 m;

\* Correspondence: recep кара77@gmail.com



**Figure 1.** The boundaries of the study area (adopted from Vural and Aytaç, 2005).

arid forest characterized by *Populus tremula* L., *Juniperus oxycedrus* L., *J. communis* L. var. *saxatilis* (Pall.) A.E.Murray, *Quercus infectoria* Oliver subsp. *boissieri* (Reut.) O.Schwarz, *Q. cerris* L., *Q. pubescens* Willd., *Q. robur* L., and a damaged anthropogenic steppe region at 1100–2500 m, and alpine meadows spreading at above 3000 m. In addition, rock vegetation such as *Asplenium adianthum-nigrum* L., *Cystopteris fragilis* (L.) Bernh., and *Sedum alpestre* Vill. is mainly common in rocky regions at higher altitudes in the area (Vural and Aytaç, 2005; Ünalı, 2007).

## 2. Materials and methods

The study was carried out between the years 2011 and 2013. Bryophyte specimens were collected from 62 locations selected in the area (Table 1). All specimens were stored in the Niğde University herbarium. The specimens were identified using relevant literature (Zander, 1993; Frey et al., 1995; Greven, 1995; Paton, 1999; Cortini Pedrotti, 2001; Greven, 2003; Heyn and Herrstadt, 2004; Smith, 2004; Cortini Pedrotti, 2006; Frey et al., 2006; Guerra et al., 2006; Brugues et al., 2007; Casas et al., 2009).

The status of the taxa in Turkey was determined by reviewing the latest literature (Uyar and Çetin, 2004; Kürschner and Erdağ, 2005; Ros et al., 2008; Özenoğlu Kiremit and Keçeli, 2009; Ros et al., 2013). For each taxon, only one collector number (e.g., ERC 75) was given in order to avoid repetition and the locality number was shortened as loc. in the bryofloristic list. Because the whole study area was located within Kayseri's provincial borders, 'Kayseri' was not written in the list in order to avoid repetition.

The new records for the B8 grid square are indicated with a single asterisk, the taxa recorded from Turkey for the second time with double asterisks, and the new records for Turkish bryophyte flora with triple asterisks in the bryofloristic list presented in the Appendix. The bryofloristic list was arranged according to Ros et al. (2007) and Hill et al. (2006).

## 3. Results and discussion

In this study, 3758 bryophyte specimens collected from the research area were checked, and among them 244 taxa belonging to 81 genera and 34 families were determined. Of these bryophytes, 9 families, 9 genera, and 11 taxa

**Table 1.** Details of the study sites.

Location number	Date	Altitude (m a.s.l.)	Coordinates	Location	Habitat
1	19.05.2011	1727	38°36'721"N 35°31'121"E	Over Hisarcık	Riverfront
2	23.06.2011	1565	38°37'201"N 35°30'952"E	Hisarcık output	Riverfront
3	23.06.2011	2075	38°37'200"N 35°30'951"E	Below Erciyes command	Picnic area
4	23.06.2011	2043	38°34'352"N 35°30'935"E	Water channel	Picnic area
5	23.06.2011	2211	38°30'940"N 35°31'632"E	Near Tekir pond	Lake shore
6	23.06.2011	2185	38°30'292"N 35°31'366"E	Develi way, left-hand side	Roadside
7	16.09.2011	2052	38°35'594"N 35°27'953"E	Serçeyayla locality	Steppe
8	16.09.2011	1894	38°35'639"N 35°27'953"E	Turkish World Forest	<i>Populus tremula</i> forest
9	16.09.2011	1072	38°14'590"N 35°17'006"E	Sultansazlığı	Lake shore
10	07.10.2011	1105	38°27'420"N 35°12'470"E	Bahçeler locality	Riverfront
11	07.10.2011	1083	38°23'300"N 35°21'580"E	Soysallı village - Büyüleyen lake	Lake shore
12	08.10.2011	2371–3000	38°32'160"N 35°30'500"E	Around Erciyes Mountain	Picnic area
13	09.10.2011	2225–2243	38°33'320"N 35°33'150"E	Cemeteries' location	Steppe
14	25.11.2011	1080	38°23'280"N 35°21'580"E	Soysallı village, north side	Rocky
15	25.11.2011	1685	38°27'040"N 35°30'440"E	Between Develi Erciyes and Antika hill	Steppe
16	25.11.2011	1750	38°27'340"N 35°31'260"E	Between Develi Erciyes and Çomaklı village	Rocky
17	26.11.2011	1583	38°37'140"N 35°31'050"E	Cennet valley	Riverfront
18	26.11.2011	1592	38°37'120"N 35°31'060"E	Deveyutan - vicinity of the old mill	Riverfront
19	26.11.2011	1597	38°37'100"N 35°31'070"E	Yallı location	Riverfront
20	26.11.2011	1603	38°37'090"N 35°31'090"E	Erikli location	Riverfront
21	26.11.2011	2031	38°30'110"N 35°31'100"E	Beyond Mirada hotel	Picnic area
22	26.11.2011	2060	38°29'020"N 35°31'050"E	Taşlı hill	Rocky
23	28.04.2012	1071	38°27'060"N 35°11'230"E	Shore of Kurbağa lake	Lake shore
24	28.04.2012	1078	38°26'540"N 35°12'400"E	Şeyh Şaban reefs, Çayırözü location	Rocky
25	29.04.2012	1730	38°28'490"N 35°22'080"E	Kulpak plateau, Çatak location	<i>Juniperus</i> sp. forest
26	29.04.2012	1862	38°29'070"N 35°22'320"E	Erikli Plateau	Rocky
27	26.05.2012	1910	38°28'290"N 35°30'350"E	Between Develi and Kayseri	Roadside
28	26.05.2012	1970	38°29'120"N 35°31'990"E	Eastern side of Erciyes Mountain	Roadside
29	26.05.2012	1545	38°37'320"N 35°31'030"E	Derebahçe location	Riverfront
30	27.05.2012	1677	38°36'580"N 35°30'500"E	Afforestation area of Erciyes Mountain	Riverfront
31	27.05.2012	1925	38°35'520"N 35°30'420"E	Vicinity of telecom radio transmitter	Rocky
32	27.05.2012	1995	38°35'240"N 35°30'240"E	Hacılar turnoff	Roadside
33	14.06.2012	3060	32°32'055"N 35°28'234"E	Çoban residence locality	Steppe
34	15.06.2012	1555	38°26'315"N 35°29'551"E	Aksu promenade area	Picnic area
35	15.06.2012	1785–1898	38°27'712"N 35°27'317"E	Road going to the ruins of Gereme	Roadside
36	15.06.2012	1785	38°27'634"N 35°25'894"E	Gereme ruins	Ruins
37	15.06.2012	2052	38°34'417"N 35°30'928"E	Tekir plateau	Picnic area
38	03.07.2012	1936	38°28'516"N 35°32'254"E	Above Çomaklı village	<i>Populus tremula</i> forest
39	04.07.2012	1324	38°36'528"N 35°17'483"E	Kızılören way, caves	Rocky
40	15.09.2012	2620	38°34'243"N 35°28'540"E	Lifos Mountain, Gondol location	Rocky
41	15.09.2012	2705	38°33'956"N 35°27'539"E	Lifos Mountain	Rocky

Table 1. (continued).

42	15.09.2012	2500	38°34'331"N 35°27'433"E	Opposite Perilikarp	Rocky
43	16.09.2012	1676	38°34'401"N 35°18'803"E	Kökez location	<i>Quercus</i> sp. forest
44	29.09.2012	2070	38°35'383"N 35°27'547"E	Around Perilikarp	Rocky
45	30.09.2012	2174	38°33'006"N 35°31'622"E	Hotels' vicinity	Picnic area
46	30.09.2012	1763	38°36'390"N 35°29'878"E	Northwest of Lifos Mountain	<i>Quercus</i> sp. forest
47	30.09.2012	1770	38°36'479"N 35°29'908"E	Hacılar way	Roadside
48	03.11.2012	1130	38°23'190"N 35°22'180"E	North of Kurbağa lake	Rocky
49	03.11.2012	1285	38°24'000"N 35°23'340"E	Kızıklı village plantations	Roadside
50	03.11.2012	1623	38°26'370"N 35°23'480"E	Around Kızıklı village	Roadside
51	03.11.2012	2080	38°28'400"N 35°27'820"E	Gereme monastery, northern way	<i>Populus tremula</i> forest
52	03.11.2012	2116	38°28'500"N 35°27'430"E	Poplar forest	<i>Populus tremula</i> forest
53	04.11.2012	1840	38°34'150"N 35°20'380"E	Between Sarıgöl and Kızılören	Roadside
54	04.11.2012	2230	38°33'430"N 35°22'370"E	Sarıgöl way	Roadside
55	10.11.2012	1378	38°35'450"N 35°04'182"E	Subaşı, above Sürtme	Rocky
56	10.11.2012	1273	38°33'779"N 35°15'437"E	Sürtme way	Roadside
57	10.11.2012	1090	38°32'948"N 35°13'428"E	Subaşı village	Rocky
58	11.11.2012	1069	38°27'315"N 35°10'348"E	Çöl lake	Roadside
59	11.11.2012	2185	38°32'578"N 35°31'962"E	Opposite of Erciyes Mosque	Riverfront
60	11.11.2012	2195	38°32'633"N 35°31'904"E	Tekir way	Roadside
61	11.11.2012	2008	38°29'061"N 35°30'732"E	Develi plantation area	Picnic area
62	08.06.2013	2078	38°28'140"N 35°26'530"E	Erciyes Mountain, southwestern poplar forest	<i>Populus tremula</i> forest

belong to liverworts and 25 families, 72 genera, and 233 taxa belong to mosses. According to the grid-square system of Henderson (1961), 7 liverwort taxa and 131 moss taxa are new records for the B8 grid square. *Leiocolea heterocolpos* (Thed. ex Hartm.) H.Buch., *Scapania obscura* (Arn. & Jens.) Schiffn., *Schistidium pulchrum* H.H.Blom., *Tortula lingulata* Lindb., *Bryum knowltonii* Barnes, and *Brachythecium capillaceum* (F.Weber & D.Mohr) Giacom are new records for the bryophyte flora of Turkey, and *Polytrichastrum sexangulare* (Brid.) G.L.Sm.; *Dicranum fulvum* Hook.; *Gymnostomum lanceolatum* M.J.Cano, Ros & J.Guerra; *Tortula systylia* (Schimp.) Lindb.; *Pohlia obtusifolia* (Vill. ex Brid.) L.F.Koch.; and *Drepanocladus polygamus* (Schimp.) Hedenäs are second records for Turkey. Among the latter, *Polytrichastrum sexangulare* was first recorded by Henderson (1964) and *Dicranum fulvum* by Henderson and Muirhead (1955) from the A4 grid square. *Gymnostomum lanceolatum* was first recorded from the C13 grid square by Kucera (1998), *Tortula systylia* from the B6 grid square by Yayıntaş and Iwatsuki (1988), and *Drepanocladus polygamus* from the A3 grid square by Çetin and Uyar (1997). Thus, the second records of these species are presented after a long period of time. In addition, *Pohlia obtusifolia*, which was first recorded by Kırmacı et al. (2012), is given as a second record.

The dominant family in the study area was Pottiaceae (62 taxa). Up to 25% of the bryophyte species identified in this study were in this family. The other families with the most number of taxa were Grimmiaceae (29 taxa), Brachytheciaceae (28 taxa), and Bryaceae (24 taxa) (Figure 2). The genera with the highest number of species in this study were *Bryum* Hedw. (23 taxa), *Grimmia* Hedw. (17 taxa), and *Orthotrichum* Hedw. (16 taxa).

The number of bryophyte specimens found in this study on rocks was 56%, on soil 29%, on soil overlying rocks 9%, on trees 5%, and in water 1%. Thus, the majority of bryophyte species in this region grew on rocks. This is due to the topographical features of the study area. The higher parts of the area are covered with rocks. Forests were also destroyed by anthropogenic factors. Acrocarpous mosses constitute 75% of the total moss flora. This is not surprising because of the study area's location in the Mediterranean region.

### 3.1. New national records

***Leiocolea heterocolpos*** (Hartm.) H.Buch.

Syn: *Lophozia heterocolpos* (Thed. ex Hartm.) M.Howe; *Jungermannia heterocolpos* Thed. ex Hartm.

Specimen examined: Turkey, B8 Kayseri: Erciyes Mountain, opposite of Perilikart, 38°34'526"N, 35°27'721"E, 2400 m a.s.l., 15.09.2012, on rock, ERC 840a.

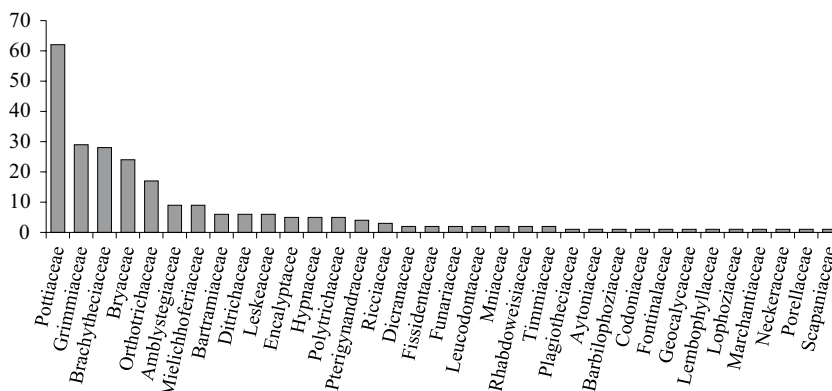


Figure 2. Proportions of families.

Plants small, shoots up to 2 mm long, procumbent, loose mats often among mosses, yellowish-brownish green (Figures 3a and 3b). Leaves average  $0.3 \times 0.3$  mm, concave, bilobed (Figure 3c). Lobes rounded or acute, sinuses between the lobes one-fourth of leaf length, acute (Figure 3d). Leaf cells rounded to trigone, average  $10\text{--}20$   $\mu\text{m}$  (Figures 3e and 3f). Oil bodies  $2\text{--}8$  per cell. Gemmae present, generally abundant on shoot tips,  $1\text{--}2$ -celled, ovoid, smooth, brownish (Figure 3g). Sporophytes absent.

The species was found among *Reboulia hemisphaerica* (L.) Raddi, *Pohlia cruda* (Hedw.) Lindb., *Marchantia polymorpha* L., *Plagiomnium ellipticum* (Brid.) T.J.Kop., *Distichium capillaceum* (Hedw.) Bruch & Schimp., and *Dicranoweisia cirrata* (Hedw.) Lindb.

Turkish *Leiocolea heterocolpos* specimens have a few minor differences from those of other countries. Main differences between Turkish and British Isles specimens are presented in Table 2.

*Leiocolea heterocolpos* is distinguished from *L. alpestris* by its brown gemmae on shoot tips (Paton, 1999).

World distribution: Europe, Canary Islands, Spain, Madeira, Central Scotland, North England, Faroe Islands, Iceland, Greenland, North America, Asia (Paton, 1999; Ros et al., 2007).

***Scapania obscura*** (Arn. & Jens.) Schiffn.

Syn: *Martinellia obscura* Arnell & C.E.O.Jensen.

Specimen examined: Turkey, B8 Kayseri: around Erciyes Mountain,  $38^{\circ}32'160''\text{N}$ ,  $35^{\circ}30'500''\text{E}$ , 2371 m a.s.l., on soil, 08.10.2011, ERC 211e.

Plants small, up to 2 mm long, yellowish-brownish green (Figures 4a and 4b). Leaves average  $0.5 \times 0.6$  mm, bilobed, margins entire, not bordered (Figure 4c). Dorsal lobe transversely inserted, oblong, rounded, not decurrent. Ventral lobe ovate, acute-oblong, long decurrent. Ventral lobe is larger than dorsal lobe (Figure 4d). Leaf cells rounded to rectangular, hexagonal, about  $10 \times 15$   $\mu\text{m}$  (Figure 4e). Oil bodies  $2\text{--}5$  per cell. Gemmae  $2\text{--}celled$ , ovoid, brownish (Figure 4f). Sporophytes absent.

The species was found among *Pohlia cruda* (Hedw.) Lindb., *Distichium inclinatum* (Hedw.) Bruch & Schimp., *Tortula hoppeana* (Schultz) Ochyra, and *Bryum knowltonii* Barnes.

Turkish *Scapania obscura* specimens have a few minor differences from those of other countries. Main differences between Turkish and southwestern British Columbian specimens are presented in Table 3.

*Scapania obscura* is distinguished from *S. subalpina* (Nees ex Lindenb.) Dumort by its bilobed leaves for which ventral lobe is larger than dorsal lobe,  $2\text{--}celled$  gemmae, and oil bodies  $2\text{--}5$  per cell.

World distribution: North Europe, Alps, Nordic countries, Russia, North America, Greenland, Baffin Island, Pacific Northwest, Italy (Schuster, 1974; Damsholt, 2002; Ros et al., 2007; Wagner, 2008).

***Schistidium pulchrum*** H.H.Blom.

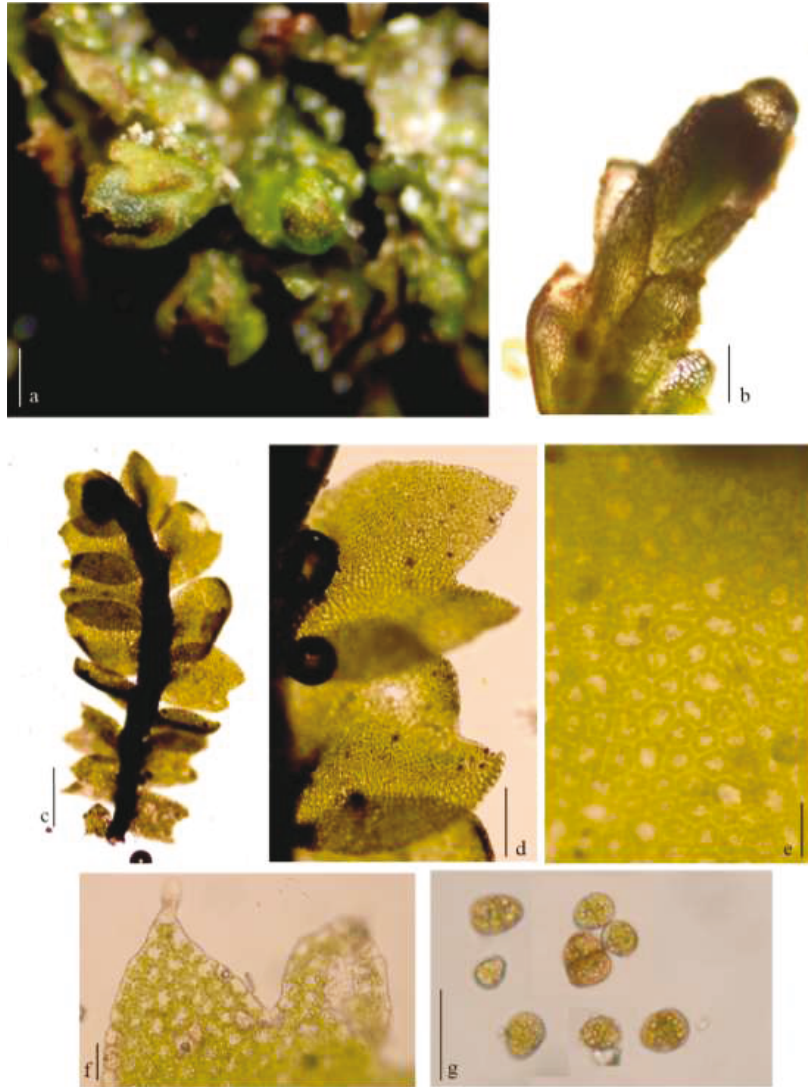
Specimen examined: Turkey, B8 Kayseri: Erciyes Mountain, Erikli Plateau,  $38^{\circ}29'070''\text{N}$ ,  $35^{\circ}22'320''\text{E}$ , 1862 m a.s.l., 29.04.2012, on rock, ERC 446f.

Plants up to  $1\text{--}1.5$  cm, yellowish or brownish green tufts (Figure 5a). Leaves erect or slightly curved when dry (Figure 5b), erecto-spreading when moist, lanceolate, acute, rarely obtuse, keeled, about  $0.7\text{--}1$  mm long (Figure 5c), unistratose, rarely bistratose (Figure 5d). Margins usually recurved, entire, uni- or bistratose. Costa excurrent, ends denticulate bright white awn. Awn averages  $0.1$  mm (Figure 5e). Basal cells rectangular, midleaf cells of various shape, sometimes trigonous, sinuous, about  $9\text{--}15$   $\mu\text{m}$  long (Figure 5f). Capsules brown-orange, cylindrical, average  $0.8 \times 0.5$  mm (Figure 5g), exothelial cells irregularly shaped, rectangular to isodiametric (Figure 5h). Setae short. Peristome teeth red, papillate, weakly perforated (Figure 5i).

The species was found among *Syntrichia papillosissima* (Copp.) Loeske, *Grimmia montana* Bruch & Schimp., *G. pulvinata* (Hedw.) Sm., and *Tortula inermis* (Brid.) Mont.

Turkish *Schistidium pulchrum* specimens have a few minor differences from those of other countries. Main

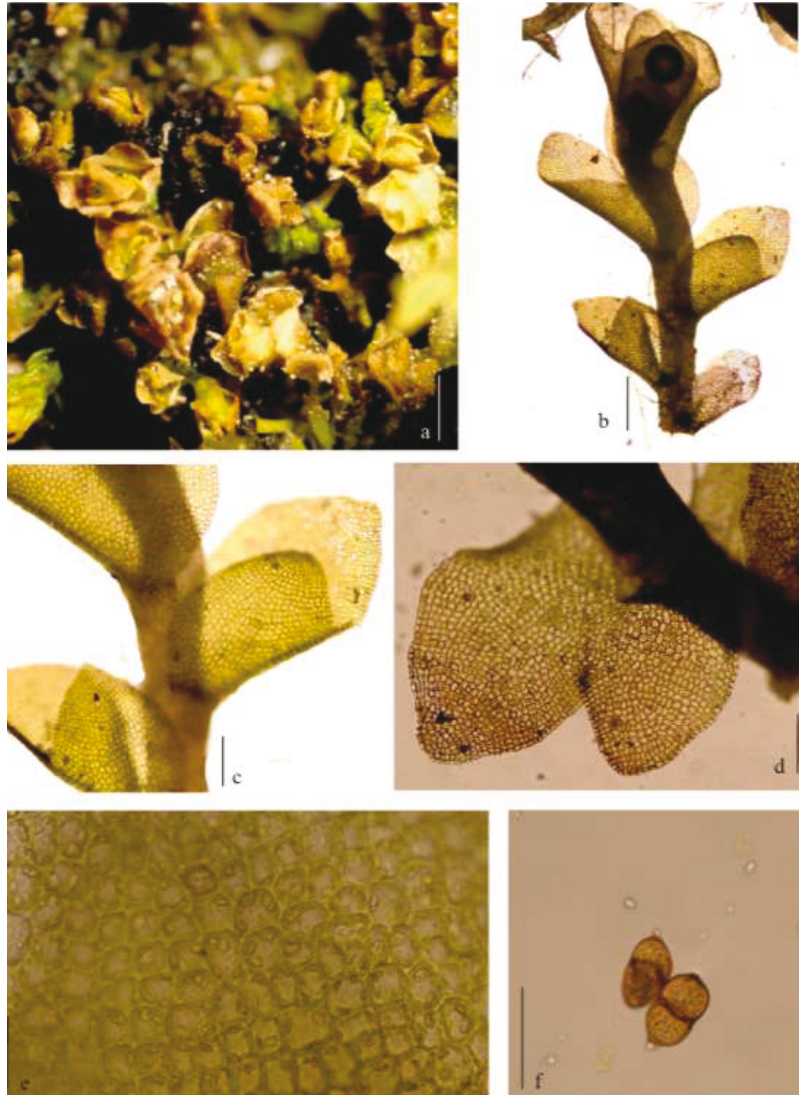




**Figure 3.** *Leiocolea heterocolpos*: a, b- habit; c, d- leaves; e- median cells; f- leaf apices; g- gemmae. Scale bars: a, c = 200  $\mu$ m; b, d = 100  $\mu$ m; e, f, g = 20  $\mu$ m.

**Table 2.** Main differences between Turkish and British Isles *Leiocolea heterocolpos* specimens.

	Turkish plants	British Isles plant (Paton, 1999)
Shoot length	up to 2 mm	0.5–2.0 (2.5) mm
Leaf size	0.3 $\times$ 0.3 mm	1.0 (1.2) $\times$ 1.0 (2.3) mm
Leaf shape	concave, bilobed	convex or occasionally concave, bilobed
Leaf cells	10–20 $\mu$ m	20–26 (30) $\mu$ m
Oil bodies	2–8 per cell	2–5 (8) per cell
Substrate	andesitic rocks	humus rich soils or rocks
Altitude	2400 m a.s.l.	900 m a.s.l.



**Figure 4.** *Scapania obscura*: a, b- habit; c, d- leaves; e- median cells; f- gemmae. Scale bars: a = 500 µm; b = 200 µm; c, d = 100 µm; e, f = 20 µm.

**Table 3.** Main differences between Turkish and southwestern British Columbian *Scapania obscura* specimens.

	Turkish plants	Southwestern British Columbian plants (Wagner, 2008)
Plant size	up to 2 mm long	2.0–2.5 mm
Color	yellowish-brownish green	light golden-green to deep, rich reddish-brown
Leaf cells	10 × 15 µm	20 × 30–35 µm

differences between Turkish and Nordic and North American specimens are presented in Table 4.

*Schistidium pulchrum* is distinguished from *S. apocarpum* (Hedw.) Bruch & Schimp. by its bright awns, recurved leaves, and trigonous laminal cells (Anderson et al., 2007).

World distribution: Greenland, Alaska, Eurasia, Spain, Italy (Anderson et al., 2007; Ros et al., 2013).

***Tortula lingulata*** Lindb.

Syn: *Barbula montenegrina* Breidl. & Szyszyl.; *Tortula montenegrina* (Breidl. & Szyszyl.) Broth.

Specimen examined: Turkey, B8 Kayseri: Erciyes



**Figure 5.** *Schistidium pulchrum*: a, b- habit when dry; c- leaves; d- cross-sections; e- leaf apices; f- median cells; g- capsule; h- exothecial cells; i- peristome teeth. Scale bars: a, b, g = 500 µm; c = 100 µm; d, e, f, h, i = 20 µm.

**Table 4.** Main differences between Turkish, Nordic, and North American *Schistidium pulchrum* specimens.

	Turkish plants	Nordic plants (Nyholm, 1998)	North American plants (Anderson et al., 2007).
Leaf long	0.7–1 mm	1.5–2.2 mm	1.5–2.3 mm
Hair point	average 0.1 mm	0–0.7 mm	unreported
Capsule	average 0.8 × 0.5 mm	0.7–1.25 × 0.5–0.75 mm	0.8–1.3 mm
Spore	average 10 µm	10–13 µm	11–15 µm
Substrate	andesitic rocks	siliceous or calcareous rocks	rocks





**Figure 6.** *Tortula lingulata*: a, b- habit when dry; c- leaves; d- leaf apices; e- median cells; f- cross-section; g- capsule. Scale bars: a = 2 mm; b, g = 200 µm; c = 100 µm; d, e, f = 20 µm.

Mountain, poplar forest, 38°28'480"N, 35°31'733"E, 1757 m a.s.l., 03.07.2012, way of Gereme Monastery, 38°28'400"N, 35°27'820"E, 2080 m a.s.l., poplar forest, 38°28'500"N, 35°27'430"E, 2116 m a.s.l., on rock, 03.11.2012 ERC 1010b.

Plants average 2.2 mm high, green tufts (Figure 6a). Stems erect. Leaves twisted when dry (Figure 6b), erect when moist, lingulate, 600–750 × 200–250 µm, recurved (Figure 6c). Apex rounded, obtuse, mucronate (Figure 6d). Margins recurved, bordered by several rows of smooth cells. Costa reddish-green, percurrent, 20 µm wide at the

**Table 5.** Main differences between Turkish and Estonian *Tortula lingulata* specimens.

	Turkish plants	Estonian plants (Ingerpuu et al., 2008)
Plant length	average 2.2 mm	average 1.75 mm
Leaf	600–750 × 200–250 µm	650–1317 × 243–523 µm
Costa width	average 20 µm	average 45 µm
Capsule	average 1 × 0.4 mm	average 1.47 × 0.6 mm

midpoint. Laminal cells unistratose, upper and middle cells quadrate to rounded, average 5 µm, papillate (Figures 6e and 6f). Basal cells rectangular, colorless. Capsules erect, cylindrical, average 1 × 0.4 mm, yellowish brown (Figure 6g). Seta curved.

The species was found among *Homalothecium lutescens* (Hedw.) H. Rob., *Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr., *Grimmia pulvinata* (Hedw.) Sm., *Tortula brevissima* Schiffn., *Bryum caespiticum* Hedw., and *Brachytheciastrum trachypodium* (Brid.) Ignatov & Huttunen.

Turkish *Tortula lingulata* specimens have a few minor differences from those of other countries. Main differences between Turkish and Estonian specimens are presented in Table 5.

*Tortula lingulata* is distinguished from *T. obtusifolia* (Schwagr.) Mathieu and *T. muralis* subsp. *aestiva* (Brid. ex Hedw.) Meyl. by its leaf apex never forming a hyaline hair-point, leaves bordered by several rows of smooth cells, and obtuse and mucro leaf apex (Kosnar and Kolar, 2009).

World distribution: Baltic area, Czech Republic, Germany, Estonia (Ingerpuu et al., 2008; Kosnar and Kolar, 2009).

***Bryum knowltonii* Barnes**

Syn.: *Bryum maritimum* Bomanss.; *Bryum gilvum* I. Hagen; *Bryum lacustre* (F. Weber & D. Mohr) Blandow.; *Bryum opsicarpum* J. J. Amann.

Specimen examined: Turkey, B8 Kayseri: Erciyes Mountain, around Erciyes Mountain, 38°32'160"N, 35°30'500"E, 2371 m a.s.l., 08.10.2011 and Turkish World Forest, 1900 m a.s.l., 38°35'61"N, 35°30'117"E, 02.07.2012, on soil and rock, ERC 211d.

Plants rarely up to 1 cm, yellowish green tufts (Figure 7a). Leaves flexuose when dry (Figure 7b), erect-patent when moist, concave, about 1–1.5 mm long, unistratose, ovate, acuminate, reddish at the base (Figures 7c and 7d). Margins indistinctly bordered, entire. Costa reddish, strong, ending below apex. Basal cells rectangular (Figure 7e), midleaf cells rectangular to hexagonal, 10–30 µm long (Figure 7f). Upper cells narrowly rectangular to rhomboidal. Capsules pendulous, broadly pyriform, with a short, distinct neck, average 2 mm long, shiny brownish-yellow (Figure 7g). Peristome teeth brownish-yellow (Figure 7h). Setae 15–25 mm long.

The species was found among *Schistidium platyphyllum* (Mitt.) H. Perss., *Bryoerythrophyllum recurvirostrum* (Hedw.) P. C. Chen., *Encalypta spathulata* Müll. Hal., *Grimmia longirostris* Hook., *Tortula obtusifolia*

(Schwagr.) Mathieu, and *Ceratodon conicus* (Hampe) Lindb.

Turkish *Bryum knowltonii* specimens have a few minor differences from those of other countries. Main differences between Turkish, British, and eastern North American specimens are presented in Table 6.

*Bryum knowltonii* is distinguished from *B. warneum* (Röhl.) Brid. by its ovate-acuminate leaves with reddish leaf bases, percurrent costa, pendulous capsules, and brownish-yellow peristome teeth.

World distribution: North, West, and Central Europe; France, Slovenia, Iceland, Faroe Islands, Siberia, Himalayas, Canada, Alaska, Colorado, Greenland (Crum and Anderson, 1981a; Smith, 2004; Hill et al., 2006; Ros et al., 2013).

***Brachythecium capillaceum* (F. Weber & D. Mohr) Giacom.**

Syn.: *Brachythecium salebrosum* var. *cylindricum* Schimpr.; *Brachythecium rotaeantum* De Not.

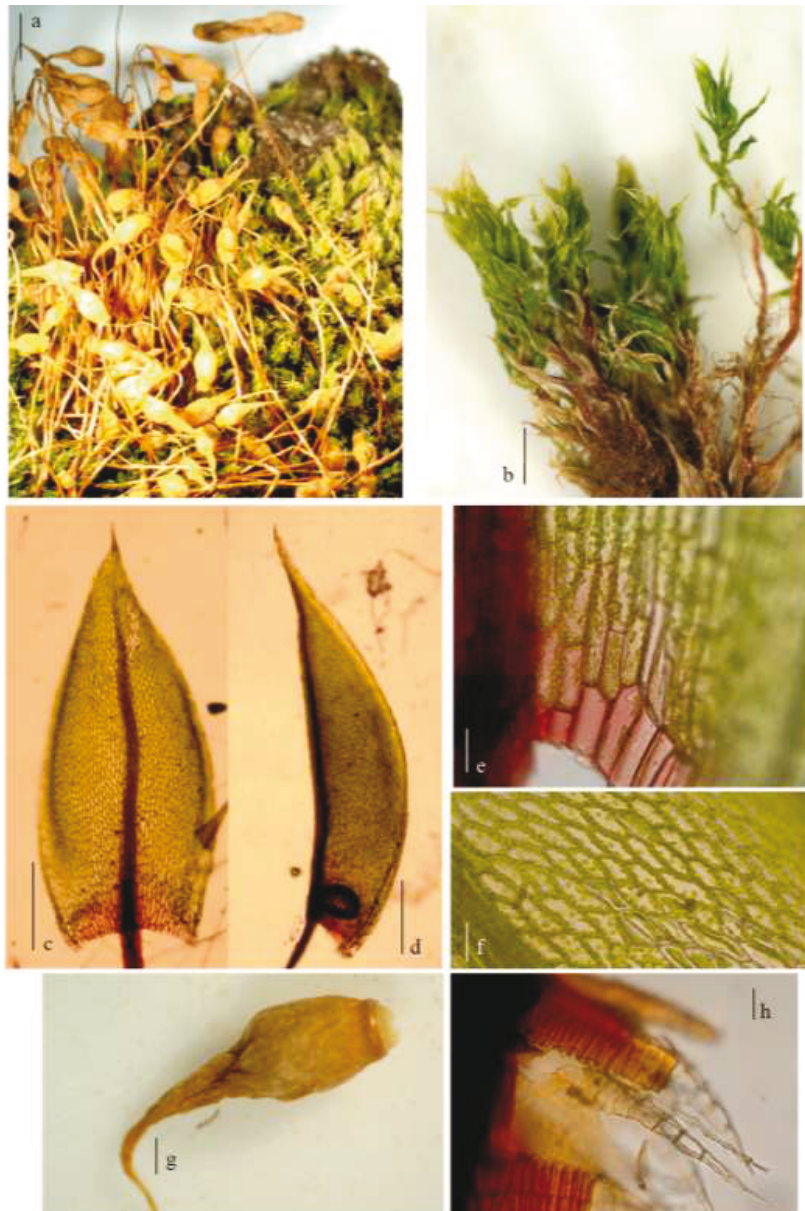
Specimen examined: Turkey, B8 Kayseri: Erciyes Mountain, around Tekir Plateau-Sarıdaş 38°32'230"N, 35°32'090"E, 2240 m a.s.l., 27.05.2012, Subaşı Sürümte, 1378 m a.s.l., 37°35'450"N, 35°04'182"E on soil, ERC 1047b.

Plants medium-sized, yellowish green. Leaves appressed when dry (Figure 8a), erect when moist (Figure 8b), concave, ovate-lanceolate, average 0.6–0.8 mm (Figure 8c). Apex long acuminate. Margins plane, entire below, slightly denticulate above, base not decurrent. Costa extending two-third of the way up the leaf. Median cells linear-rhomboidal, 2–4 × 15–30 µm, 6–8 times as long as wide (Figure 8d). Alar cells quadrate (Figure 8e). Sporophytes absent.

The species was found among *Heterocladium dimorphum* (Brid.) Schimp., *Ceratodon conicus* (Hampe) Lindb., *Philonotis calcarea* (Bruch & Schimp.) Schimp., *Syntrichia ruralis* (Hedw.) F. Weber & D. Mohr, *Tortula subulata* Hedw., and *Plasturhynchium meridionale* (Schimp.) M. Fleisch.

Turkish *Brachythecium capillaceum* specimens have a few minor differences from those of other countries. Main differences between Turkish and eastern North American specimens are presented in Table 7.

*Brachythecium capillaceum* is closely related to *B. salebrosum* Hoffm. ex F. Weber & D. Mohr) Schimp. and *B. albicans* (Hedw.) Schimp., but differs by its quadrate alar cells; concave, not decurrent leaves; and slightly denticulate long acuminate acumen.



**Figure 7.** *Bryum knowltonii*: a, b- habit when dry; c, d- leaves; e- basal cells; f- median cells; g- capsule; h- peristome teeth. Scale bars: a = 2 mm, b = 1 mm; c, d = 200 µm; e, f, h = 20 µm; g = 500 µm.

**Table 6.** Main differences between Turkish, British, and eastern North American *Bryum knowltonii* specimens.

	Turkish plants	British plants (Smith, 2004)	Eastern North American plants (Crum and Anderson, 1981a)
Median cells	10–30 µm	14–24 µm	unreported
Leaf length	1–1.5 mm	unreported	2–2.5 mm
Leaf shape	ovate, acuminate	ovate-lanceolate, acute	oblong ovate, acute, or short acuminate
Capsule length	2 mm	unreported	1.5–2.5 mm
Seta length	15–25 mm	unreported	12–25 mm
Substrate	soil and rock	soil and dune-slacks	sandy soil



**Figure 8.** *Brachythecium capillaceum*: a- habit when dry; b- habit when moist; c- leaves; d- median cells; e- alar cells. Scale bars: a = 500 mm; b = 1 mm; c = 100 µm; d, e = 20 µm.

**Table 7.** Main differences between Turkish and eastern North American *Brachythecium capillaceum* specimens.

	Turkish plants	Eastern North American plants (Crum and Anderson, 1981b)
Color	yellowish green	dark, dirty green to yellowish
Leaves	appressed when dry, erect when moist	erect when dry, erect-spreading when moist
Leaf shape	ovate-lanceolate	oblong-lanceolate
Median cell size	6–8 times as long as wide	10 times as long as wide
Alar cells	quadrate	subquadrate



World distribution: Georgia, Florida, Texas, North Carolina, Tennessee, Bosnia-Herzegovina, Germany, Poland, Austria, Italy, France, Slovenia (Crum and Anderson, 1981b; Ros et al., 2013).

## References

- Anderson EL, Edited by Flora of North America Editorial Committee (2007). Flora of North America North of Mexico. Volume 27. Bryophytes: Mosses, Part 1. Oxford, UK: Oxford University Press.
- Brugues M, Cros RM, Guerra J (2007). Flora Briofítica Ibérica, Vol. 1. Murcia, Spain: Sociedad Espanola de Briologia (in Spanish).
- Can SM, Kara R, Ezer T (2013). Bryophyte flora of Melendiz Mountain in Turkey. *Turk J Bot* 37: 575–588.
- Casas C, Brugues M, Cros RM, Sergio C, Infante M (2009). Handbook of Liverworts and Hornworts of the Iberian Peninsula and the Balearic Islands. Barcelona, Spain: Institut d'Estudis Catalans.
- Çetin B, Uyar G (1997). *Campylium polygamum* (B.S. & G.) J.Lange & C.Jens., a new record for the moss flora of Turkey. *Lindbergia* 22: 43.
- Cortini Pedrotti C (2001). Flora Dei Muschi d'Italia, Sphagnopsida, Andreaopsida, Bryopsida (I parte). Rome, Italy: Antonia Delfino Editore (in Italian).
- Cortini Pedrotti C (2006). Flora dei Muschi d'Italia, Bryopsida (II parte). Rome, Italy: Antonia Delfino Editore (in Italian).
- Crum HA, Anderson LE (1981a). Mosses of Eastern North America, Volume 1. New York, NY, USA: Colombia University Press.
- Crum HA, Anderson LE (1981b). Mosses of Eastern North America, Volume 2. New York, NY, USA: Colombia University Press.
- Damsholt K (2002). Illustrated Flora of Nordic Liverworts and Hornworts. Lund, Sweden: Nordic Bryological Society.
- Ezer T (2006). The Moss (Musci) Flora of Ecişehir, Cimbar and Emlik valleys (Niğde-Turkey). *Ot Sist Bot Derg* 13: 161–170.
- Ezer T, Kara R (2013). Succession of epiphytic bryophytes in *Cedrus libani* forest on the Meydan Plateau (Aladağ). *Turk J Bot* 37: 389–397.
- Frey W, Frahm JP, Fischer E, Lobin W (1995). Kleine Kryptogamenflora, Die Moos- und Farnpflanzen Europas. Stuttgart, Germany: Gustav Fischer Verlag (in German).
- Frey W, Frahm JP, Fischer E, Lobin W (2006). The Liverworts, Mosses and Ferns of Europe (English edition revised and edited by TL Blockeel). Colchester, UK: Harley Books.
- Greven HC (1995). *Grimmia* Hedw. (Grimmiaceae, Musci) in Europe. Leiden, the Netherlands: Backhuys Publishers.
- Greven HC (2003). *Grimmiaceae* of the World. Leiden, the Netherlands: Backhuys Publishers.
- Guerra J, Cano MJ, Ros RM (2006). Flora Briofítica Ibérica, Volumen III. Murcia, Spain: Sociedad Espanola de Briologia (in Spanish).
- Halıcı MG, John V, Aksoy A (2005). Lichens of Erciyes Mountain (Kayseri, Turkey). *Fl Medit* 15: 567–580.
- Henderson DM (1961). Contributions to the bryophyte flora of Turkey: V. Summary of present knowledge. *Notes Roy Bot Gard Edinburgh* 23: 279–301.
- Henderson DM (1964). Contributions to the bryophyte flora of Turkey: VI. *Notes Roy Bot Gard Edinburgh* 25: 279–291.
- Henderson DM, Muirhead CW (1955). Contribution to the bryophyte flora of Turkey. *Notes Roy Bot Gard Edinburgh* 22: 29–43.
- Heyn CC, Herrnstadt I (2004). The Bryophyte Flora of Israel and Adjacent Regions. Jerusalem, Israel: Israel Academy of Sciences and Humanities.
- Hill MO, Bell N, Bruggeman-Nannenga MA, Brugues M, Cano M, Enroth JJ, Flatberg KI, Frahm JP, Gallego MT, Garilleti R et al. (2006). Bryological monograph. An annotated checklist of the mosses of Europe and Macaronesia. *J Bryol* 28: 198–267.
- Ingerpoo N, Maasikpalu K, Vellak K (2008). Morphology and habitat properties of *Tortula lingulata* in Estonia. *Folia Cryptog Estonica* 44: 49–54.
- Kara R, Tonguç Yayıntaş Ö, Düzenli A (2006). Gebere, Gümüşler, Murtaza (Niğde) Barajları karayosunu florası ve hayat formları. *Ot Sist Bot Derg* 13: 171–188 (in Turkish).
- Kaya Z, Raynal DJ (2001). Biodiversity and conservation of Turkish forests. *Biol Conserv* 97: 131–141.
- Kırmacı M, Kürschner H, Erdağ A (2012). New and noteworthy records to the bryophyte flora of Turkey and Southwest Asia. *Cryptogam Bryol* 33: 267–270.
- Kosnar J, Kolar F (2009). A taxonomic study of selected European taxa of the *Tortula muralis* (Pottiaceae, Musci) complex: variation in morphology and ploidy level. *Preslia* 81: 399–421.
- Kucera J (1998). *Gymnostomum lanceolatum* Cano, Ros & Guerra (Pottiaceae, Musci) also in Turkey and Croatia. *J Bryol* 20: 515–516.
- Kürschner H, Erdağ A (2005). Bryophytes of Turkey: an annotated reference list of the species with synonyms from the recent literature and an annotated list of Turkish bryological literature. *Turk J Bot* 29: 95–154.
- Nyholm E (1998). Illustrated Flora of Nordic Mosses, Fasc. 4. Lund, Sweden and Copenhagen, Denmark: Nordic Bryological Society.
- Özenoğlu Kiremit H, Keçeli T (2009). An annotated check-list of the Hepaticae and Anthocerotae of Turkey. *Cryptogam Bryol* 30: 343–356.
- Paton JA (1999). The Liverwort Flora of the British Isles. Colchester, UK: Harley Books.



- Ros RM, Mazimpaka V, Abou-Salama U, Aleffi M, Blockeel TL, Brugués M, Cano MJ, Cros RM, Dia MG, Dirkse GM et al. (2007). Hepatics and anthocerotates of the Mediterranean, an annotated checklist. *Cryptogam Bryol* 28: 351–437.
- Ros RM, Mazimpaka V, Abou-Salama U, Aleffi M, Blockeel TL, Brugués M, Cros RM, Dia MG, Dirkse GM, Draper I et al. (2013). Mosses of the Mediterranean, an annotated checklist. *Cryptogam Bryol* 34: 99–283.
- Ros RM, Munoz J, Werner O, Rams S (2008). New typifications and synonyms in *Tortula* sect. *Pottia* (Pottiaceae, Musci). *Taxon* 57: 279–288.
- Schuster RM (1974). The Hepaticae and Anthocerotae of North America. Volume 3. New York, NY, USA: Columbia University Press.
- Smith AJE (2004). The Moss Flora of Britain. 2nd ed. Cambridge, UK: Cambridge University Press.
- Tonguç Yayıntaş Ö, Yayıntaş AN (2010). Bryofloristic records of mosses in Kayseri-Yahyalı Hacer forest. *Phytol Balcan* 16: 329–336.
- Ünalı ÜE (2007). A negative example area in human-natural environment relationship: Erciyes Mountain (Turkey). *Humanity & Social Sci J* 2: 139–147.
- Uyar G, Çetin B (2004). A new check-list of the mosses of Turkey. *J Bryol* 26: 203–220.
- Vural C, Aytaç Z (2005). The flora of Erciyes Dağı (Kayseri, Turkey). *Turk J Bot* 29: 185–236.
- Wagner DH (2008). Species Fact Sheet. Washington, DC, USA: US Forest Service. Available at <http://www.fs.fed.us/r6/sfpnw/issssp/documents/planning-docs/sfs-br-scapania-obscura-2009-06.doc>.
- Yayıntaş A, Erdağ A (1995). Some mosses from Ihlara Valley. *Journal of the Faculty of Science, Ege University, Series B* 18: 1–7.
- Yayıntaş A, Iwatsuki Z (1988). Some moss records from western Turkey. *Hikobia* 10: 209–213.
- Zander RH (1993). Genera of the Pottiaceae: mosses of harsh environments. *Bull Buffalo Sci Nat Sci* 32: 1–378.

## Appendix

### The Bryofloristic List

#### MARCHANTIOPHYTA

##### Barbilophozioaceae

\**Barbilophozia hatcheri* (Evans.) Steph., loc. 42, 44, 54, on rock and soil overlying rocks, ERC 856b.

##### Geocalycaceae

*Chiloscyphus polyanthos* (L.) Corda, loc. 11, 60, on soil and in the water, ERC 162.

##### Codoniaceae

\**Fossombronina pusilla* (L.) Ness., loc. 6, on soil, ERC 84b.

##### Lophozioaceae

\*\*\**Leiocolea heterocolpos* (Thed. ex Hartm.) H.Buch., loc. 42, on rock and soil overlying rocks, ERC 840a.

##### Marchantiaceae

*Marchantia polymorpha* L., loc. 3, 11, 13, 17, 42, 60, on soil, rock, soil overlying rocks, and in the water, ERC 49b.

##### Porellaceae

*Porella platyphylla* (L.) Pfeiff., loc. 8, 21, 22, 44, 54, on rock and soil overlying rocks, ERC 905.

##### Aytoniaceae

*Reboulia hemisphaerica* (L.) Raddi., loc. 42, 53, on rock, soil, and soil overlying rocks, ERC 1030a.

##### Ricciaceae

\**Riccia glauca* L., loc. 25, on soil, ERC 439a.

\**R. papillosa* Moris, loc. 28, 31, 32, 53, 54, 60, on soil, ERC 1012f.

\**R. sorocarpa* Bisch., loc. 6, on soil, ERC 87a.

##### Scapaniaceae

\*\*\**Scapania obscura* (Arn. & Jens.) Schiffn., loc. 12, on soil, ERC 211e.

#### BRYOPHYTA

##### Polytrichaceae

\**Polytrichastrum alpinum* (Hedw.) G.L.Sm., loc. 40, 42, 44, on soil and soil overlying rocks, ERC 801b.

\*\**P. sexangulare* (Brid.) G.L.Sm., loc. 60, on soil, ERC 233c.

*Polytrichum juniperinum* Hedw., loc. 5, 8, 12, 17, 21, 32, 33, 37, 41, 52–54, on soil, rock, soil overlying rocks and tree (*Populus tremula* L.), ERC 1078a.

\**P. piliferum* Hedw., loc. 12, 13, 33, 40, 41, on soil and soil overlying rocks, ERC 236a.

\**P. strictum* Menzies ex Brid., loc. 13, 32, 60, on soil, ERC 1072c.

##### Timmiaceae

\**Timmia bavarica* Hessel., loc. 8, 41, 42, 44, on rock and soil overlying rocks, ERC 911b.

\**T. norvegica* J.E.Zetterst., loc. 44, on soil overlying rocks, ERC 904.

##### Encalyptaceae

\**Encalypta alpina* Sm., loc. 8, 52, on soil and rock, ERC 734d.

\**E. rhamnoides* Schwägr., loc. 1, 5, 8, 17, 33, 36, 38, 50, 51, 53, on soil, rock, and soil overlying rocks, ERC 1016b.

\**E. spatulata* Müll.Hal., loc. 1, 13, 19–21, 29, 35, 41, 50, 60, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 1086a.

*E. vulgaris* Hedw., loc. 15, 25, 30, 38, 39, 47, 49, 52, 55, 56, on soil, rock, and soil overlying rocks, ERC 441a.

\**E. ciliata* Hedw., loc. 29, on rock, ERC 127a.

##### Funariaceae

\**Entosthodon muhlenbergii* (Turner) Fife, loc. 11, on rock, ERC 279c.

*Funaria hygrometrica* Hedw., loc. 8, 11, 14, 16, 17, 25, 26, 29, 34, 36, on soil, rock, soil overlying rocks, and tree (*Salix alba* L.), ERC 574.

#### Grimmiaceae

*Grimmia alpestris* (F.Weber & D.Mohr) Schleich., loc. 5, 8, 12, 21, 31–33, 37, 41–44, 52–54, on soil, rock, and soil overlying rocks, ERC 20b.

*G. anodon* Bruch & Schimp., loc. 7, 20, 35, 40, 46, 70, 85, 95, 102, 111, on soil, rock, and soil overlying rocks, ERC 890d.

\**G. caespiticia* (Brid.) Jur., loc. 41, 44, on rock, ERC 957e.

*G. crinita* Brid., loc. 24, 27, 52, on rock and soil overlying rocks, ERC 714e.

\**G. donniana* Sm., loc. 2, 8, 17, 33, 29, 35, 57, on rock, ERC 1069e.

\**G. elatior* Bruch ex Bals.Criv. & De Not., loc. 42, 44, on rock and soil, ERC 900c.

*G. laevigata* (Brid.) Brid., loc. 10, 19, 24, 25, 39, 35, 46, 48, 56, 60, on rock and soil overlying rocks, ERC 1069c.

\**G. lisae* De Not., loc. 4, on rock, ERC 75b.

\**G. longirostris* Hook., loc. 1, 2, 12, 14, 15, 17, 25, 30, 50, 52, on rock and soil overlying rocks, ERC 997c.

*G. montana* Bruch & Schimp., loc. 8, 16, 21, 25–27, 31, 39, 49, 52, 61, on rock and soil overlying rocks, ERC 961.

*G. nutans* Bruch., loc. 27, 46, 60, on rock, ERC 520.

*G. orbicularis* Bruch. ex. Wilson, loc. 25, on rock, ERC 401d.

*G. ovalis* (Hedw.) Lindb., loc. 8, 10, 15, 16, 21, 25, 26, 35, 36, 38, 39, 41, 42, 44, 46–50, 52, 53, 55–57, 60, on soil, rock, and soil overlying rocks, ERC 977a.

*G. plagiopodia* Hedw., loc. 1, 11, 12, 25, 56, on soil and rock, ERC 1059b.

*G. pulvinata* (Hedw.) Sm., loc. 2, 11, 14–19, 24–27, 30, 43, 46, 50–52, 55–57, on soil, rock, and soil overlying rocks, ERC 779a.

\**G. reflexidens* Müll.Hal., loc. 8, 21, 25, 51, on rock, ERC 620b.

*G. trichophylla* Grev., loc. 8, 25, 30, 35, on soil and rock, ERC 653d.

\**Schistidium agassizii* Sull. & Lesq., loc. 8, 16, on rock, ERC 677b.

*S. apocarpum* (Hedw.) Bruch & Schimp., loc. 1, 2, 8, 35, 42, 44, 46, on rock and soil overlying rocks, ERC 3a.

*S. atrofusum* (Schimp.) Limpr., loc. 8, 37, 42, 60, on rock, ERC 231g.

\**S. brunnescens* Limpr., loc. 33, 41, 56, on soil and rock, ERC 1059e.

*S. confertum* (Funck) Bruch & Schimp., loc. 4, 5, 8, 17, 25, 31, 35, 38, 43, 52, 53, on soil, rock, and soil overlying rocks, ERC 1018d.

\**S. dupretii* (Thér.) W.A.Weber, loc. 42, on rock, ERC 861a.

\**S. elegantulum* H.H.Blom., loc. 1, 8, 16, on rock, ERC 5d.

*S. flaccidum* (De Not.) Ochyra, loc. 8, 11, 25, 27, 38, 42, 44, 46, 50, 52, on rock and soil overlying rocks, ERC 990a.

\**S. helveticum* (Schkuhr) Deguchi, loc. 8, 31, 44, rock and soil overlying rocks, ERC 506b.

\**S. platyphyllum* (Mitt.) H.Perss., loc. 8, 12, 16, 31, 33, on soil and rock, ERC 192a.

\*\*\**S. pulchrum* H.H.Blom., loc. 26, on rock, ERC 446f.

\**S. rivulare* (Brid.) Podp., loc. 5, 6, 12, 13, 17, 33, 52, 60, on soil and rock, ERC 726b.

#### Fissidentaceae

\**Fissidens crassipes* Wilson ex Bruch & Schimp., loc. 52, on rock, ERC 749a.

\**F. viridulus* (Sw. ex anon.) Wahlenb. var. *incurvus* (Starke ex Röhl.) Waldh., loc. 6, on soil, ERC 88a.

#### Ditrichaceae

*Ceratodon conicus* (Hampe) Lindb., loc. 1, 3, 5, 17–20, 28–30, 35–39, 42, 48, 61, on soil, rock, and soil overlying rocks, ERC 1086d.

*C. purpureus* (Hedw.) Brid., loc. 4, 8, 12, 15–17, 25, 33, 40, 44, 52, on soil, rock, soil overlying rocks, and tree (*Salix alba* L.), ERC 494a.

*Distichium capillaceum* (Hedw.) Bruch & Schimp., loc. 8, 12, 31, 33, 40–42, on soil, rock, and soil overlying rocks, ERC 800c.

\**D. inclinatum* (Hedw.) Bruch & Schimp., loc. 12, 31, 33, 42, on soil and rock, ERC 211b.

*Ditrichum flexicaule* (Shawägr.) Hampe, loc. 1, 8, 44, 46, on soil, rock, and soil overlying rocks, ERC 940e.

\**D. heteromallum* (Hedw.) E.Britton, loc. 12, 29, 60, on soil and rock, ERC 92b.

#### Rhabdoweisiaceae

\**Dicranoweisia cirrata* (Hedw.) Lindb., loc. 8, 42, on rock and soil overlying rocks, ERC 855b.

\**D. crispula* (Hedw.) Milde., loc. 8, 28, 42, 44, on soil, rock and soil overlying rocks, ERC 923b.

#### Dicranaceae

\**Dicranum scoparium* Hedw., loc. 44, on soil and soil overlying rocks, ERC 916c.

\*\*\**D. fulvum* Hook., loc. 44, on soil overlying rocks, ERC 923c.

#### Pottiaceae

*Gymnostomum aeruginosum* Sm., loc. 1, 3, 14, 25, 29, 38, 52, 44, 47, on soil, rock, and soil overlying rocks, ERC 966c.

*G. calcareum* Nees & Hornsch., loc. 12, on rock, ERC 198d.

\*\**G. lanceolatum* M.J.Cano, Ros & J.Guerra, loc. 17, 19, 33, on rock, ERC 558d.

\**G. virudulum* Brid., loc. 2, 4, on rock, ERC 79c.

*Tortella flavovirens* (Bruch) Broth., loc. 29, on rock, ERC 125i.

*T. tortuosa* (Hedw.) Limpr., loc. 25, 31, 41, 42, 44, on soil, rock, and soil overlying rocks, ERC 430e.

\**Weissia breutelii* Müll.Hal., loc. 49, on soil overlying rocks, ERC 979b.

*W. brachycarpa* (Nees & Hornsch.) Jur., loc. 1, 31, 36, 53, on soil, rock, and soil overlying rocks, ERC 4g.

\**W. controversa* Hedw., loc. 8, 13, 17, 21, 29, 43, 49, 60, on soil and rock, ERC 112e.

*W. rutilans* (Hedw.) Lindb., loc. 2, 13, 27, 29, 33, 44, on soil and rock, ERC 912a.

\**Barbula unguiculata* Hedw., loc. 2, 8, 17, on soil, rock, and soil overlying rocks, ERC 700e.

*Bryoerythrophyllum recurvirostrum* (Hedw.) P.C.Chen, loc. 1–3, 12, 17, 21, 31–33, 38, 44, 53, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 1030c.

\**B. rubrum* (Jur. ex Geh.) P.C.Chen, loc. 40–42, 46, on soil and rock, ERC 937b.

\**Crossidium squamiferum* (Viv.) Jur. var. *pottioideum* (De Not.) Mönk., loc. 2, 4, on soil and rock, ERC 24d.

*Didymodon acutus* (Brid.) K.Saito, loc. 10, 11, 14, 25, 49, 52, on soil, rock, and soil overlying rocks, ERC 981a.

\**D. australasiae* (Hook. & Grev.) R.H.Zander, loc. 1, 29, 52, on rock and soil overlying rocks, ERC 714g.

\**D. cordatus* Jur., loc. 25, 52, on rock, ERC 405c.

*D. fallax* (Hedw.) R.H.Zander, loc. 1, 2, on rock, ERC 6d.

\**D. insulanus* (De Not.) M.O.Hill, loc. 29, 25, 48, 50, on rock and soil overlying rocks, ERC 993b.

\**D. nicholsonii* Culm., loc. 1, on rock, ERC 9b.

*D. rigidulus* Hedw., loc. 29, 12, 14, 33, 39, 44, 46, 49, on soil, rock, and soil overlying rocks, ERC 979e.

\**D. spadiceus* (Mitt.) Limpr., loc. 53, on soil overlying rocks, ERC 1019c.

\**D. umbrosus* (Müll.Hal.) R.H.Zander, loc. 44, on rock, ERC 917b.

*D. vinealis* (Brid.) R.H.Zander, loc. 1, 10–12, 14, 15, 35, 48–50, on soil, rock, and soil overlying rocks, ERC 645g.

\**Microbryum floerkeanum* (F.Weber & D.Mohr) Schimp., loc. 31, on soil, ERC 501c.

\**M. starckeanum* (Hedw.) R.H.Zander, loc. 2, 12, 25, on soil and rock, ERC 24c.

\**Phascum cuspidatum* Hedw. var. *cuspidatum* Nees & Hornsch., loc. 1, 8, 10, 15, 16, 25, 26, on soil, rock, and soil overlying rocks, ERC 444b.

*P. cuspidatum* Hedw. var. *piliferum* (Hedw.) Hook. & Taylor, loc. 5, 8, 16, 25, 29, 52, on soil and rock, ERC 16a.

\**Protobryum bryoides* (Dicks.) J.Guerra & M.J.Cano, loc. 23, 60, on soil, ERC 1076b.

*Pseudocrossidium hornschiianum* (Schultz) R.H.Zander, loc. 17, 48, on soil and rock, ERC 972a.

\**P. obtusulum* (Lindb.) H.A.Crum & L.E.Anderson, loc. 10, on soil and rock, ERC 157f.

\**P. revolutum* (Brid.) R.H.Zander, loc. 33, on rock, ERC 531c.

*Pterygoneurum ovatum* (Hedw.) Dixon, loc. 2, 12, 14, 15, 24, 25, 30, 49, 55–57, on soil, rock, and soil overlying rocks, ERC 1044b.

*Stegonia latifolia* (Schwägr.) Venturi ex Broth., loc. 12, 33, 40, on soil, ERC 792a.

\**Syntrichia calcicola* J.J.Amann, loc. 12, on soil, ERC 185a.

*S. caninervis* var. *caninervis* Mitt., loc. 11, 48, on soil and rock, ERC 972b.

\**S. caninervis* var. *gypsophila* (J.J.Amann ex G.Roth) Ochyra, loc. 10, 14, 16, 23, 25, 48, on soil, rock, and soil overlying rocks, ERC 147b.

\**S. caninervis* var. *pseudodesertorum* (Vondr.) M.T.Gallego, loc. 10, 11, on soil and rock, ERC 154a.

*S. handelii* (Schiffn.) S.Agnew & Vondr., loc. 8, 11, 14, 19, 25, on soil and rock, ERC 432c.

\**S. laevipila* Brid., loc. 11, 24, 25, 38, on rock and tree (*Juglans regia* L.), ERC 461d.

*S. montana* Nees, loc. 8, 15, on rock, ERC 661c.

*S. norvegica* F.Weber, loc. 5, 6, 12, 13, 21, 42, 44, 51, 54, 59, on soil, rock, and soil overlying rocks, ERC 220a.

*S. papillosissima* (Copp.) Loeske, loc. 8, 10, 15–22, 25–27, 29–33, 35–44, 51–55, 79, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 700f.

*S. princeps* (De Not.) Mitt., loc. 12, 18–21, 25, 30, 31, 47, 50, 52, 57, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 1066b.

*S. ruralis* var. *ruralis* (Hedw.) F.Weber & D.Mohr., loc. 11, 13–21, 25–28, 33, 38–44, 46–50, on soil, rock, soil overlying rocks, and trees (*Salix alba* L., *Populus tremula* L., *Quercus cerris* L.), ERC 1085c.

*S. ruralis* var. *ruraliformis* (Besch.) Delogne, loc. 1, 2, 8, 14–21, 41–44, 48–52, 53, 55–57, on soil, rock and soil overlying rocks, ERC 2a.

*S. subpapillosissima* (Bizot & R.B.Pierrot ex W.A.Kramer) M.T.Gallego & J.Guerra, loc. 8, 10, 19, 29, 35, on soil, rock, and trees (*Salix alba* L., *Populus tremula* L.), ERC 98a.

*S. virescens* (De Not.) Ochyra, loc. 10, 22, 25, 33, 35, 38, 43, 47, 55, 56, on soil, rock, soil overlying rocks, and tree (*Salix alba* L.), ERC 1057b.

\**Tortula atrovirens* (Sm.) Lindb., loc. 1, 3, 8, 12, 13, 21, 25, 29, 30, 52, on soil and rock, ERC 61b.

*T. brevissima* Schiffn., loc. 11, 14–18, 27, 36, 43, 50, 51, 55, on soil, rock, and soil overlying rocks, ERC 129a.

*T. hoppeana* (Schultz) Ochyra, loc. 12, 13, 33, 40, 41, 52, 60, on soil, rock, and soil overlying rocks, ERC 833a.

*T. inermis* (Brid.) Mont., loc. 15, 21, 25, 26, 30, 38, 48, 49, 55–57, on soil, rock, and soil overlying rocks, ERC 157e.

*T. lanceola* R.H.Zander, loc. 12, 14, 42, 51, 53, 54, on soil, rock, and soil overlying rocks, ERC 1041b.

\**T. leucostoma* (R.Br.) Hook. & Grev., loc. 11, on rock, ERC 456d.

\*\**T. lingulata* Lindb., loc. 51, 52, on rock, ERC 1010b.

*T. mucronifolia* Schwägr., loc. 12, on soil and rock, ERC 188a.

*T. muralis* Hedw., loc. 1–3, 11, 14, 25–27, 28, 38, on soil, rock, and soil overlying rocks, ERC 443c.

\**T. obtusifolia* (Schwägr.) Mathieu, loc. 12, 17, 27, 33, on rock, ERC 544b.

*T. subulata* Hedw., loc. 1–4, 13, 15–21, 24–27, 35–39, 41–43, 46, 52–57, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 31b.

\*\**T. systylia* (Schimp.) Lindb., loc. 33, on soil, ERC 567c.

\**T. vahliana* (Schultz) Mont., loc. 25, on soil, ERC 437c.

\**T. wilsonii* (Hook.) R.H.Zander, loc. 12, 40, 44, 60, on soil, rock, and soil overlying rocks, ERC 190c [the Mediterranean moss checklist (Ros et al., 2013) does not contain this species for Turkey, but the species was reported from İzmir (Ros et al., 2008)].

#### Orthotrichaceae

\**Nyholmiella obtusifolia* (Brid.) Holmen & Warncke, loc. 29, 25, on soil, rock, and trees (*Salix alba* L., *Juglans regia* L.), ERC 492a.

*Orthotrichum anomalum* Hedw., loc. 14, 17–20, 28, 36, 39, 42–44, 46–49, 52, 56, on soil, rock, and trees (*Salix alba* L., *Quercus cerris* L.), ERC 109f.

*O. cupulatum* Hoffm. ex Brid., loc. 15, 16, 19, 25, 29, 41, 52, on rock and soil overlying rocks, ERC 809a.

*O. urnigerum* Myrin., loc. 18, 19, 24, 25, 29, on rock and tree (*Salix alba* L.), ERC 418a.

*O. alpestre* Bruch & Schimp., loc. 5, 29, 18, 24, 43, on rock and tree (*Quercus cerris* L.), ERC 883e.

*O. diaphanum* Schrad. ex Brid., loc. 29, 24, 55, on rock and tree (*Juglans regia* L.), ERC 126c.

\**O. pallens* Bruch ex Brid., loc. 8, 18, 19, 29, 46, 47, on rock and tree (*Salix alba* L., *Populus tremula* L.), ERC 141a.

*O. pumilum* Sw. ex anon., loc. 10, 18, 29, 43, on rock and tree (*Salix alba* L.), ERC 877b.

\**O. rivulare* Turner, loc. 29, on tree (*Juglans regia* L.), ERC 105a.

\**O. tenellum* Bruch ex Brid., loc. 29, 17, 18, 19, 20, 43, 46, 52, on rock and trees (*Salix alba* L., *Quercus cerris* L., *Juglans regia* L.), ERC 1009c.

\**O. laevigatum* J.E.Zetterst., loc. 8, 16, 21, 42, 52, on rock, ERC 1009d.

*O. rupestre* Schleich. ex Schwägr., loc. 1, 2, 15–20, 27–29, 38, 41–44, 46–50, 53, 62, on soil, rock, soil overlying rocks, and trees (*Salix alba* L., *Populus tremula* L., *Quercus cerris* L.), ERC 909a.

\**O. scanicum* Grönvall, loc. 62, soil overlying rocks, ERC 1091d.

\**O. affine* Schrad. ex Brid., loc. 29, 17, 18, 19, 20, 46, 47, on rock and trees (*Salix alba* L., *Juglans regia* L., *Quercus cerris* L.), ERC 365c.

\**O. lyellii* Hook. & Taylor, loc. 29, on trees (*Salix alba* L., *Juglans regia* L.), ERC 122e.

\**O. speciosum* Nees, loc. 17, 18, 20, 25, on rock, ERC 370e.

*O. striatum* Hedw., loc. 17, 25, 29, on rock and tree (*Salix alba* L.), ERC 118d.

#### Bartramiaceae

\**Bartramia ithyphylla* Brid., loc. 12, 33, 44, on soil and soil overlying rocks, ERC 903a.

\**Philonotis arnellii* Husn., loc. 12, 13, 17, on soil, ERC 242b.

\**P. caespitosa* Jur., loc. 3, 4, 8, 29, 33, 37, 52, 60, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 530a.

\**P. calcarea* (Bruch & Schimp.) Schimp, loc. 8, 60, 45, on soil, ERC 517c.

*P. fontana* (Hedw.) Brid., loc. 3, 12, 13, on soil, ERC 59c.

\**P. tomentella* Molendo, loc. 4, on soil, ERC 70c.

#### Bryaceae

\**Bryum archangelicum* Bruch & Schimp., loc. 17, 25, 27, 30, 31, 33, 41, 42, 52, 53, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 1017c.

*B. argenteum* Hedw., loc. 12, 15–21, 23–30, 38–42, 44, 50, 52, 55, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 519d.

*B. caespiticum* Hedw., loc. 1–6, 8, 11–13, 21, 25, 27, 31–33, 35–53, on soil, rock, soil overlying rocks, and trees (*Populus tremula* L., *Salix alba* L.), ERC 399a.

*B. canariense* Brid., loc. 1, 8, 13, 17, 18, 25, 42, 49, 53, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 770b.

*B. capillare* Hedw., loc. 1, 8, 13, 17, 18, 25, 42, 49, 53, 62, on soil, rock, and soil overlying rocks, ERC 674a.

*B. dichotomum* Hedw., loc. 10, 12–14, 16, 25–28, 57, 59–61, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 719a.

\**B. donianum* Grev., loc. 3, 8, 12, 33, 35, 49, on soil and rock, ERC 61a.

\**B. elegans* Nees, loc. 4, 8, 17, 29, 39, 42, 60, 62, on soil and rock, ERC 1090g.

\**B. funckii* Schwägr., loc. 29, 25, on soil and soil overlying rocks, ERC 123d.

\**B. intermedium* (Brid.) Blandow, loc. 2, 12, 14, 33, 49, 52, 60, on soil and rock, ERC 36d.

\*\**B. knowltonii* Barnes, loc. 8, 12, on soil and rock, ERC 211d.

*B. kunzei* Hornsch., loc. 2, 3, 17, 23, 25, 36, 39, 41–43, 48, on soil, rock, soil overlying rocks, and tree (*Salix alba* L.), ERC 399c.

\**B. mildeanum* Jur., loc. 17, 18, on soil and rock, ERC 333c.

\**B. moravicum* Podp., loc. 15, 21, on soil and rock, ERC 377d.

\**B. neodamense* Itzigs., loc. 60, on soil, ERC 516.

*B. pallens* Sw. ex anon., loc. 3, 17, 20, 29, 42, 52, 53, 61, on soil, rock, and soil overlying rocks, ERC 55b.

*B. pallescens* Schleich. ex Schwägr., loc. 4, 6, 8, 12, 25, 29, 37, on soil and rock, ERC 208d.

\**B. pseudotriquetrum* (Hedw.) P.Gaertn. et al. var. *bimum* (Schreb.) Lilj., loc. 12, 17, 25, 60, on soil and rock, ERC 420c.

*B. pseudotriquetrum* (Hedw.) P.Gaertn. et al. var. *pseudotriquetrum*, loc. 3, 8, 12, 13, on soil and rock, ERC 235d.

\**B. ruderales* Crundw. & Nyholm, loc. 12, 17, 25, on soil and rock, ERC 434d.

*B. schleicheri* DC., loc. 4, 13, 37, 60, on soil and rock, ERC 70b.

*B. torquescens* Bruch & Schimp., loc. 2, 8, 10, 12, 19, 20, 21, 42, 53, on soil, rock, and soil overlying rocks, ERC 1030e.

*B. turbinatum* (Hedw.) Turner., loc. 4, on soil, ERC 62b.

*Imbricium alpinum* (Huds. ex With.) N.Pedersen, Bruch & Schimp., loc. 5, 29, 33, 52, on soil and soil overlying rocks, ERC 91b.

#### Mielichhoferiaceae

*Pohlia cruda* (Hedw.) Lindb., loc. 13, 21, 25, 28, 32, 40, 42, 46, 50, 54, on soil, rock, and soil overlying rocks, ERC 994a.

\**P. elongata* Hedw., loc. 12, 17, on soil and rock, ERC 203c.

\*\**P. obtusifolia* (Vill. ex Brid.) L.F.Koch., loc. 33, 52, on soil and rock, ERC 716b.

\**P. annotina* (Hedw.) Lindb., loc. 52, on rock, ERC 738f.

*P. drummondii* (Müll.Hal.) A.L.Andrews., loc. 12, 33, 41, 52, on soil, rock, and soil overlying rocks, ERC 213c.

\**P. ludwigii* (Spreng. ex Schwägr.) Broth., loc. 4, 52, 60, on soil and rock, ERC 67b.

\**P. prolixa* (Kindb.) Lindb. ex Broth., loc. 31, on rock, ERC 504d.

\**P. longicollis* (Hedw.) Lindb., loc. 62, on soil overlying rocks, ERC 1091a.

\**P. wahlenbergii* (F.Weber & D.Mohr) A.L.Andrews, loc. 4, 5, 12, 33, 41, 52, on soil, ERC 72c.

#### Mniaceae

*Rhizomnium punctatum* (Hedw.) T.J.Kop., loc. 13, on soil, ERC 242a.

*Plagiomnium ellipticum* (Brid.) T.J.Kop., loc. 17, 42, on soil, rock, and soil overlying rocks, ERC 842c.

#### Fontinalaceae

\**Fontinalis antipyretica* Hedw., loc. 4, 13, 17, on soil, ERC 64a.

#### Amblystegiaceae

*Amblystegium serpens* (Hedw.) Schimp., loc. 6, 8, 13, 11, 15, 17, 18, 20, 36, 42, on soil, rock, and trees (*Salix alba* L., *Juglans regia* L., *Populus tremula* L.), ERC 700c.

*Cratoneuron filicinum* (Hedw.) Spruce., loc. 3, 11, 60, 13, 16, on soil and rock, ERC 49c.

\**Drepanocladus polygamus* (Schimp.) Hedenäs, loc. 8, on soil, ERC 633d.

*Hygroamblystegium fluviatile* (Hedw.) Loeske, loc. 11, 28, on rock, ERC 452b.

\**H. humile* (P.Beauv.) Vanderp., loc. 11, 14, 29, on soil, rock, and tree (*Salix alba* L.) ERC 604a.

*H. tenax* (Hedw.) Jenn., loc. 3, 11, 29, 33, on soil and rock, ERC 120a.

\**H. varium* (Hedw.) Mönk., loc. 5, 11, 12, 60, 63, 36, 53, 54, on soil and rock, ERC 1039c.

\**Hygrohypnum duriusculum* (De Not.) D.W.Jamieson, loc. 3, 29, on rock, ERC 104b.

*Leptodictyum riparium* (Hedw.) Warnst., loc. 13, on rock, ERC 238b.

#### Leskeaceae

\**Lescuraea mutabilis* (Brid.) Lindb. ex I.Hagen, loc. 42, on rock, ERC 849b.

\**L. saxicola* (Schimp.) Molendo, loc. 8, 42, on rock, ERC 857a.

\**Pseudoleskea radicata* (Mitt.) Macoun & Kindb., loc. 42, 44, on rock, ERC 912e.

\**Pseudoleskeella catenulata* (Brid. ex Schrad.) Kindb., loc. 8, 42, 46, on rock and tree (*Quercus cerris* L.), ERC 847b.

\**P. nervosa* (Brid.) Nyholm, loc. 46, on rock and tree (*Quercus cerris* L.), ERC 790a.

\**P. tectorum* (Funck ex Brid.) Kindb. ex Broth., loc. 46, on rock, ERC 942c.

#### Brachytheciaceae

\**Scorpiurium circinatum* (Bruch) M.Fleisch. & Loeske, loc. 1, 3, 8, 12, 13, 17, 31, 32, 60, on soil, rock, and soil overlying rocks, ERC 515c.

\**S. deflexifolium* (Solms) M.Fleisch. & Loeske, loc. 25, 31, 35, on soil and soil overlying rocks, ERC 441d.

\**S. sendtneri* (Schimp.) M.Fleisch., loc. 5, 8, 12, 13, 21, 31, 33, 53, 54, 61, on soil, rock, and soil overlying rocks, ERC 1084e.

\**Plasturhynchium meridionale* (Schimp.) M.Fleisch., loc. 8, 12, 42, 55, 60, on soil and rock, ERC 1073a.

\**Eurhynchium striatum* (Hedw.) Schimp., loc. 54, 60, on soil and rock, ERC 1074b.

*Platyhypnidium riparioides* (Hedw.) Dixon, loc. 16, 18, on rock, ERC 707a.

\**Rhynchostegium confertum* (Dicks.) Schimp., loc. 8, 35, 40, 53, on soil and rock, ERC 1018a.

\**Rhynchostegiella litorea* (De Not.) Limpr., loc. 26, 42, on rock and soil overlying rocks, ERC 841d.



\**Oxyrrhynchium hians* (Hedw.) Loeske, loc. 12, 31, 33, 35, 37, 42, on soil and soil overlying rocks, ERC 844h.

\**O. schleicheri* (R.Hedw.) Röhl., loc. 8, on soil, ERC 696d.

\**O. speciosum* (Brid.) Warnst., loc. 52, on rock, ERC 718a.

*Kindbergia praelonga* (Hedw.) Ochyra, loc. 6, 21, 25, 28, 43, 50, 61, on soil, rock, and soil overlying rocks, ERC 1082a.

\**Sciuro-hypnum plumosum* (Hedw.) Ignatov & Huttunen, loc. 8, 12, 17, 20, 33, 59, 60, on soil, rock, and tree (*Populus tremula* L.), ERC 1078b.

\**Brachythecium albicans* (Hedw.) Schimp., loc. 3, 13, 17, 18, 22, 29, 52, 47, on soil and rock, ERC 946e.

\*\*\**B. capillaceum* (F.Weber & D.Mohr) Giacom., loc. 60, 55, on soil, ERC 1047b.

*B. glareosum* (Bruch ex Spruce) Schimp., loc. 8, 12, 16, 17, 23, 25, 30, 31, 33, 60, on soil, rock, and soil overlying rocks, ERC 775d.

*B. mildeanum* (Schimp.) Schimp., loc. 3, on rock, ERC 19d.

*B. rutabulum* (Hedw.) Schimp., loc. 2, 5, 11, 15, 17, 20, 37, 60, on soil, rock, soil overlying rocks, and tree (*Salix alba* L.), ERC 970a.

\**B. salebrosum* (Hoffm. ex F.Weber & D.Mohr) Schimp., loc. 3, 13, 17, 29, on soil and rock, ERC 257b.

\**Scleropodium cespitans* (Wilson ex Müll.Hal.) L.F.Koch., loc. 60, on soil, ERC 521a.

*Eurhynchiastrum pulchellum* (Hedw.) Ignatov & Huttunen, loc. 21, 28, 31, 41–46, 50, 53, 54, 62, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L.), ERC 1088e.

*Brachytheciastrum collinum* (Schleich. ex Müll.Hal.) Ignatov & Huttunen, loc. 12, 40, 42, on soil and soil overlying rocks, ERC 839b.

*B. trachypodium* (Brid.) Ignatov & Huttunen, loc. 52, on rock, ERC 1010c.

*B. velutinum* (Hedw.) Ignatov & Huttunen, loc. 4, 8, 18, 29, 38, 46, on soil, rock, and soil overlying rocks, ERC 704b.

*Homalothecium aureum* (Spruce) H.Rob., loc. 8, 52, 56, on soil and rock, ERC 1062a.

*H. lutescens* (Hedw.) H.Rob., loc. 2, 13, 15, 18, 41–43, 46, 53, 55, 62, on soil, rock, and soil overlying rocks, ERC

1091e.

*H. philippeanum* (Spruce) Schimp., loc. 4, 5, 15–18, 20, 27–29, 31, 38–44, 47, 49, on soil, rock, soil overlying rocks, and tree (*Populus tremula* L., *Salix alba* L.), ERC 777c.

*H. sericeum* (Hedw.) Schimp., loc. 1, 8, 18, 19, 20, 21, 25, on soil, rock, and soil overlying rocks, ERC 705f.

#### Hypnaceae

\**Calliergonella cuspidata* (Hedw.) Loeske, loc. 13, 45, on soil, ERC 925b.

\**Hypnum cupressiforme* Hedw. var. *cupressiforme*, loc. 8, 16, 40, 41, 42, 44, 46, on soil, rock, and soil overlying rocks, ERC 920a.

\**H. cupressiforme* Hedw. var. *resupinatum* (Taylor) Schimp., loc. 29, on tree (*Salix alba* L.), ERC 103a.

\**H. revolutum* (Mitt.) Lindb., loc. 1, 4, 8, 18, 33, 41, 42, 44, 46, 54, on soil, rock, and soil overlying rocks, ERC 1031a.

*H. vaucheri* Lesq., loc. 8, on rock, ERC 700g.

#### Pterigynandraceae

*Habrodon perpusillus* (De Not.) Lindb., loc. 8, 46, 47, on rock, ERC 932d.

\**Heterocladium dimorphum* (Brid.) Schimp., loc. 8, 12, 37, 44, 60, on soil, rock, and soil overlying rocks, ERC 183b.

#### Plagiotheciaceae

\**Myurella julacea* (Schwägr.) Schimp., loc. 21, 44, on soil and rock, ERC 959a.

*M. tenerrima* (Brid.) Lindb., loc. 21, 33, 41, 42, 44, on soil, rock, and soil overlying rocks, ERC 964e.

\**Plagiothecium denticulatum* var. *obtusifolium* (Turner) Moore, loc. 42, on soil overlying rocks, ERC 844c.

#### Leucodontaceae

\**Antitrichia curtispindula* (Hedw.) Brid., loc. 33, on soil, ERC 556g.

*Leucodon sciuroides* (Hedw.) Schwägr., loc. 29, 18, 19, 20, 44, 47, on rock, ERC 949a.

#### Neckeraceae

\**Neckera menziesii* Drumm., loc. 44, on rock, ERC 919a.

#### Lembophyllaceae

\**Isothecium holtii* Kindb., loc. 35, 53, on rock and soil overlying rocks, ERC 1022a.