

Bryophyte flora of Melendiz Mountain in Turkey

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Abstract: In this study, the bryophyte flora of Melendiz Mountain (Niğde Province) was investigated. In total, 99 taxa were found in this area. Of these, 4 taxa were liverworts and 95 taxa were mosses. According to Henderson's grid-square system, 39 moss taxa for the B8 square and 12 moss taxa for the C13 square are new records. Among them, *Syntrichia caninervis* Mitt. var. *abanchesii* (Luisier) R.H.Zander was recorded for the first time, and *Cinclidotus pachylomoides* Bizot and *Orthotrichum sprucei* Mont. were recorded for the second time in Turkey. In addition, the life forms and life strategies of the bryophytes in the area were determined. The turf life form and colonist life strategy for bryophytes of Melendiz Mountain were dominant.

Key words: Bryophyte, flora, Melendiz Mountain, Turkey, new national record

1. Introduction

We investigated bryophyte flora growing in volcanic substrates and the effect of this substrate on bryophyte diversity. Volcanoes possess unique attributes in addition to the general features commonly found in all varieties of mountains (Gerrard, 1990; Kruckeberg, 2004). The shape, isolated position, and recurrent volcanic activity put volcanoes into a special class of mountains. The volcanic landscape is also quite distinct from other mountainous regions because of the way it is formed and the effect that the instability of the environment has on the colonisation, evolution, and persistence of the biota. The shape, size, and elevation of volcanoes significantly affect plant life. Volcanic substrates can provide unique environments for plants. Volcanoes possess a special kind of surface heterogeneity and have physical and temporal properties that can have a profound effect on flora and vegetation (Kruckeberg, 2004). The goal of this study was to recognise the bryophyte species growing in a volcanic substrate in order to increase our understanding of the factors that influence the distribution and composition of volcanic bryophyte species.

1.1. Study area

Melendiz Mountain is located in the north-western area of Niğde Province and is the most widely distributed of the inner Anatolian volcanic units (Figure 1). It is situated in both the B8 and C13 squares of the Henderson grid system (Henderson, 1961) (Figure 2).

Melendiz Mountain is covered with Andesitic-basaltic lava (Beekman, 1966), and shallow soil and stony-rocky sites are found throughout the area. Although the study

area has cold winters and a semiarid Mediterranean climate according to 41 years of climatic data obtained from Niğde Meteorology Station (Akman, 1999), it is affected by orographic rainfall. The general vegetation in this area consists of dry forest remnants, *Quercus pubescens* Willd., *Q. infectoria* Olivier, *Q. trojana* P.B.Webb., *Pyrus elaeagrifolia* Pall., and anthropogenic steppe (Altın, 2008).

2. Materials and methods

The study was carried out between April 2010 and April 2011. Bryophyte specimens were collected from 25 locations selected in the area (Table). All specimens were stored in the special bryophyte collections of Ezer and Kara in the Niğde University herbarium. The specimens were identified using relevant literature (Zander, 1993; Frey et al., 1995, 2006; Greven, 1995, 2003; Paton, 1999; Cortini Pedrotti, 2001, 2006; Heyn & Herrnstadt, 2004; Smith, 2004; Guerra et al., 2006; Brugués et al., 2007; Casas et al., 2009). In addition, the life form analysis according to the classification scheme by Hill et al. (2007) and the life strategy analysis according to the classification schemes of Frey and Kürschner (1991) were composed. The list of taxa for the liverworts according to Ros et al. (2007) and for the mosses according to Hill et al. (2006) was arranged. The status of the taxa in Turkey was determined by reviewing the related literature (Uyar & Çetin, 2004; Kürschner & Erdağ, 2005). For each taxon, only one collector number (i.e. *M.Can* 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 Niğde's provincial borders, Niğde was not written in the list in order to avoid repetition.

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Figure 1. The boundaries of the study area.

The new records for the C13 grid square are indicated with (*), for the B8 grid square with (▲), for both C13 and B8 with (*), taxa recorded from Turkey for the second time with (*), and the new record for Turkish bryophyte flora with (**)

3. Results and discussion

In this study, 247 bryophyte specimens collected from the research area were checked, and among them 99 taxa belonging to 40 genera and 17 families were determined. Of these bryophytes, 4 families, 4 genera, and 4 taxa belong

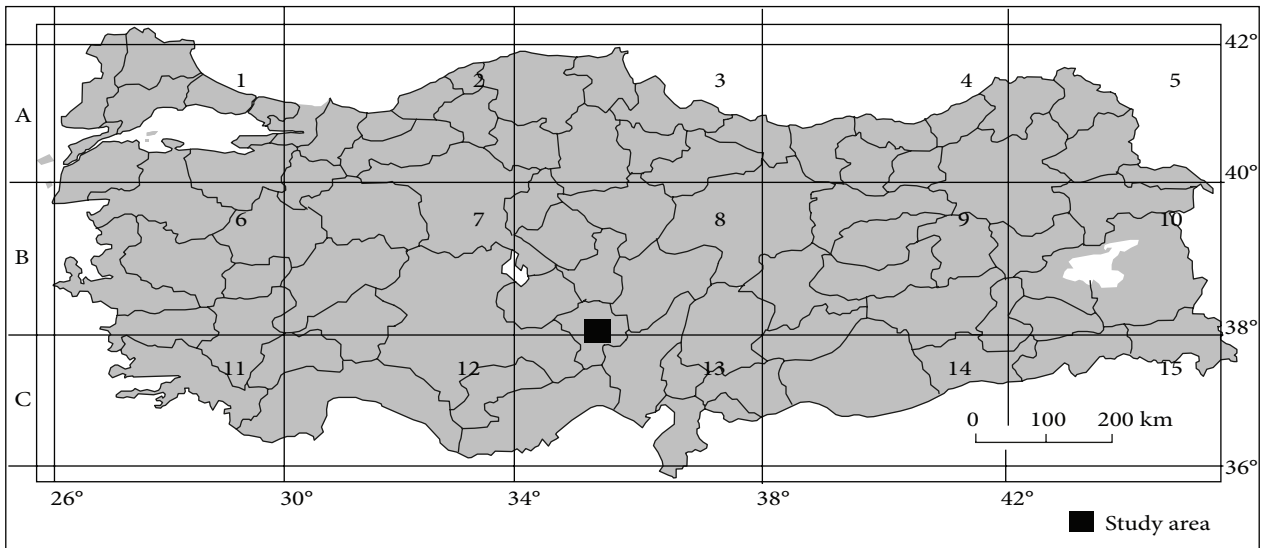


Figure 2. Grid system of Turkey adopted by Henderson (1961).

Table. Details of the study sites.

Location number	Location	Dominant vegetation type	Altitude (a.s.l.)	Coordinates	Date
1	Fesleğen village	<i>Astragalus</i> sp.	1670 m	37°59'21"N, 34°52'51"E	02.10.2010
2	Gebere dam north	<i>Pinus nigra</i> Arn.	1708 m	38°03'05"N, 34°38'16"E	02.10.2010
3	Gebere pond	<i>Robinia pseudoacacia</i> L.	1700 m	38°02'44"N, 34°38'20"E	02.10.2010
4	Edge of Gebere pond	Rocky place	1700 m	38°02'44"N, 34°38'19"E	02.10.2010
5	Güresentepe	<i>Astragalus</i> sp.	2100 m	36°50'45"N, 36°18'54"E	02.10.2010
6	Yeşilburç-Taşlıca way	Anthropogenic	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
7	Yeşilburç	Anthropogenic	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
8	Yeşilburç dam	Rocky place	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
9	Edge of Yeşilburç dam	Rocky place	1379 m	38°00'49"N, 34°39'42"E	02.10.2010
10	Coast of Yeşilburç dam	Rocky place	1394 m	38°00'48"N, 34°39'44"E	02.10.2010
11	Around Yeşilburç	Anthropogenic	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
12	Yeşilburç village	Anthropogenic	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
13	Yeşilburç roadside	Anthropogenic	1350 m	38°01'03"N, 34°39'47"E	02.10.2010
14	Hançerli village	Anthropogenic	1502 m	38°00'10"N, 34°36'58"E	25.02.2011
15	Hançerli picnic area	<i>Robinia pseudoacacia</i> L.	1532 m	38°00'05"N, 34°36'07"E	25.02.2011
16	Around Okçu village	<i>Verbascum</i> sp.	1228 m	37°55'30"N, 34°33'06"E	25.02.2011
17	Okçu village entrance	<i>Robinia pseudoacacia</i> L.	1229 m	37°55'27"N, 37°33'07"E	25.02.2011
18	Above Okçu village	Anthropogenic	1470 m	37°57'25"N, 34°31'30"E	25.02.2011
19	Okçuoğlu creek	Rocky place	1228 m	37°55'27"N, 37°33'07"E	25.02.2011
20	Mill	<i>Populus alba</i> L.	1466 m	38°02'08"N, 34°39'47"E	25.02.2011
21	Ketençimen	Steppe–meadow	2085 m	38°07'33"N, 34°36'11"E	18.03.2011
22	Bridgehead, descending from Ketençimen	<i>Astragalus</i> sp.	1891 m	38°05'48"N, 34°37'21"E	18.03.2011
23	Tepeköy output	Anthropogenic	1614 m	38°03'52"N, 34°39'03"E	18.03.2011
24	Altunhisar-Akbaş village	<i>Astragalus</i> sp.	1160 m	37°56'53"N, 34°26'10"E	16.04.2011
25	Between Altunhisar–Melendiz	<i>Astragalus</i> sp.	1517 m	38°01'55"N, 34°22'29"E	16.04.2011

to liverworts; and 14 families, 36 genera, and 95 taxa belong to mosses. Using the grid-square system adopted by Henderson (1961), 39 moss taxa were reported for the first time in the B8 square, and 12 moss taxa were reported for the first time in the C13 square. *Syntrichia caninervis* Mitt. var. *abranchesii* (Luisier) R.H.Zander is a new record for the bryophyte flora of Turkey and *Cinclidotus pachylomoides* Bizot and *Orthotrichum sprucei* Mont. are second records for Turkey. Among them, *C. pachylomoides* was first recorded in Erzincan Province in 2011 (Erdağ & Kürschner, 2011). *O. sprucei* was first recorded in Çine Valley in Muğla in 2000 (Erdağ & Kürschner, 2000), and so the second record of this species is presented after a long period of time.

The dominant family in the study area was Pottiaceae (33 taxa), which has xerophytic characters and is indicative of the Mediterranean region (Kara, 2006). Up to 33% of the bryophyte species identified in this study were in this family (Figure 3). The other families with the most number of taxa were Grimmiaceae (13 taxa) and Bryaceae (11 taxa), which are generally xerophytic, and Brachytheciaceae (12 taxa), which is usually found near water habitats. The genera with the highest number of species in this study were *Syntrichia* (12), *Bryum* (11), *Grimmia* (10), and *Orthotrichum* (10).

The number of bryophytes specimens found in this study on rocks was 106, on soil 63, on trees 27, on walls 25, on soil overlying rocks 25, and on plant residues 1 (Figure 4). Thus the majority of bryophyte species in this region grew on rocks. This is due to the type of terrain found in the study area: the forest has been mostly destroyed, and so the area is deprived of natural vegetation and the ground is covered in stony and rocky fields.

Acrocarpous mosses constituted 79% of the total moss flora. This was the expected amount of acrocarpous mosses in the area because of the extreme environmental conditions that favour their growth, such as low humidity and desiccation due to a long summer. Pleurocarpous

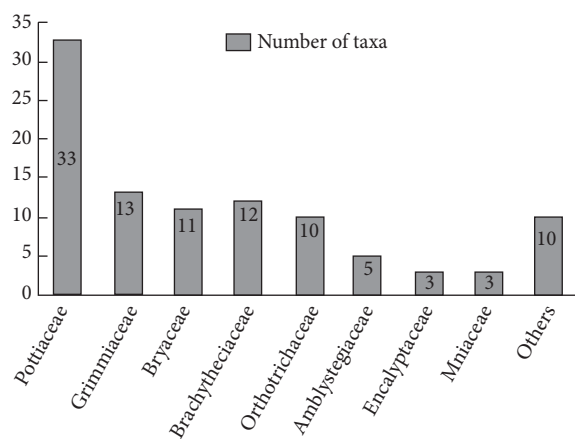


Figure 3. Proportions of families.

mosses, which constituted 21% of the total, were generally found along edges of streams in deep valleys.

Of the 99 taxa occurring in the study area, 9 life forms were identified: turfs (35%), cushions (21%), tufts (13%), mat roughs (13%), wefts (5%), turf-scattered (4%), aquatic-trailing (4%), mat thalloids (3%), and dendroids (2%) (Figure 5). Turfs and cushions are commonly seen in acrocarpous mosses that grow under xerophytic, sunny conditions (Kürschner, 2004; Düzenli et al., 2009; Kara et al., 2011). Because of the large amount of acrocarpous mosses in the study area, the turf and cushion life forms are dominant in this area.

In this study, 10 life strategies were recorded: colonists (54%), perennials (16%), long-lived shuttle (8%), competitive perennials (7%), annual shuttle (5%), short-lived shuttle (3%), stress-tolerant perennials (4%), ephemeral colonists (1%), fugitives (1%), and pioneer colonists (1%) (Figure 6). According to these proportions, the colonist life strategy is dominant with a remarkable incidence in this area. Colonists often appear immediately after pioneers (Kürschner & Parolly, 1999; Ezer et al., 2010) and are important forerunners in crust stabilisation (Kürschner, 2004). Morphologically, they are characterised by the xeropottioid life syndrome (Kürschner, 2004).

The majority of bryophyte species that were found in this area have been cited in many European countries. However, *Tortula brevissima* has been classified as rare (R) and *Cinclidotus pachylomoides* has been classified as critically endangered (CR) in Europe by the European Committee for Conservation of Bryophytes (ECCB, 1995; Ören et al., 2012).

4. Description of *Syntrichia caninervis* var. *abranchesii* (Luisier) R.H.Zander: a new record for Turkey

Plants 0.4–1.0 cm high, olive-green or brownish turfs. Stems erect. Leaves appressed when dry, spreading when moist, ovate, ovate-lingulate, apex rounded, obtuse, sometimes cucullate, apiculate to mucronate, margins recurved from base to near the apex, without a differentiated border (Figure 7). Costa reddish-brown, strongly, average 50 µm wide at the midpoint. Laminal cells irregularly bistratose in the upper leaf, unistratose at mid-leaf, upper and middle laminal cells quadrate, rectangular or rounded, thick-walled, average 4–6 µm wide at the midpoint, with bifurcate-simple, nonpedicellate papillae, rectangular and smooth in marginal basal (Figure 7). The transverse section contains 1 row of guide cells and 1–3 rows of abaxial stereids, the abaxial side with bifurcate or branched papillae (Figure 7). Sporophyte unknown.

Specimen examined: Turkey, C13, Melendiz Mountain, above Okçu village, on soil, northern slope, 1228 m, 25.02.2011, 37°55'27"N, 37°33'07"E, M.Can 51a.

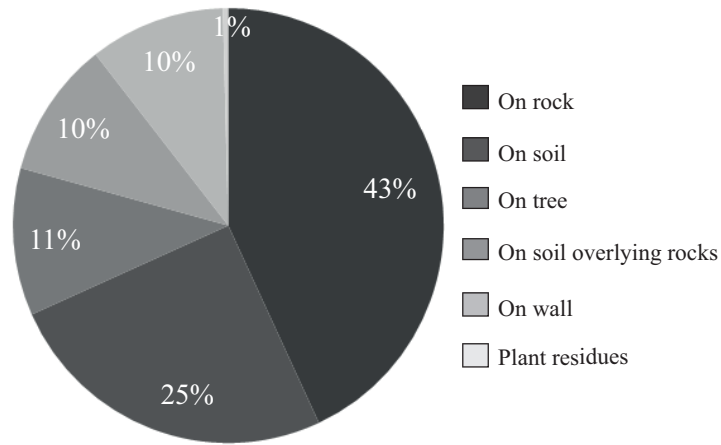


Figure 4. Substrate preferences of bryophytes.

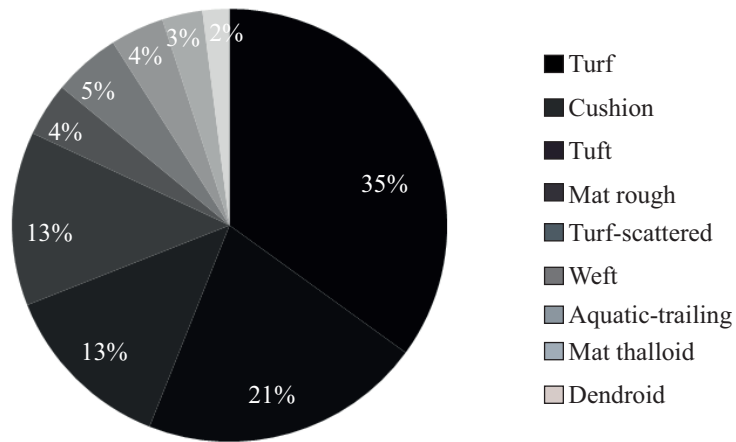


Figure 5. Distribution of life forms of bryophytes.

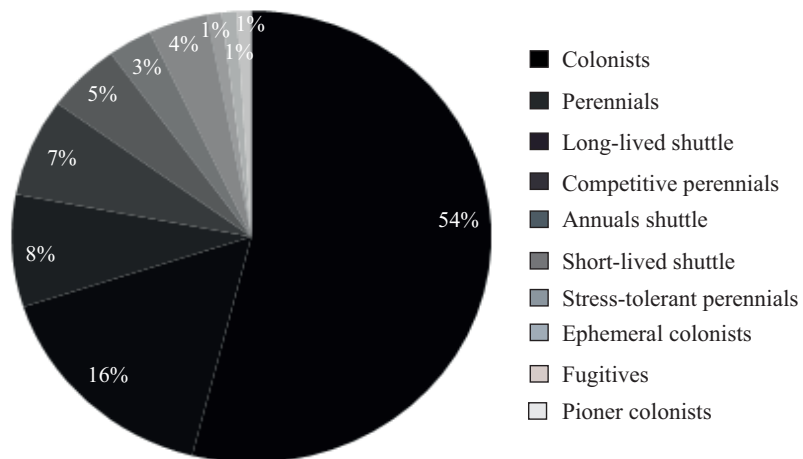


Figure 6. Life strategies spectrum of bryophytes.

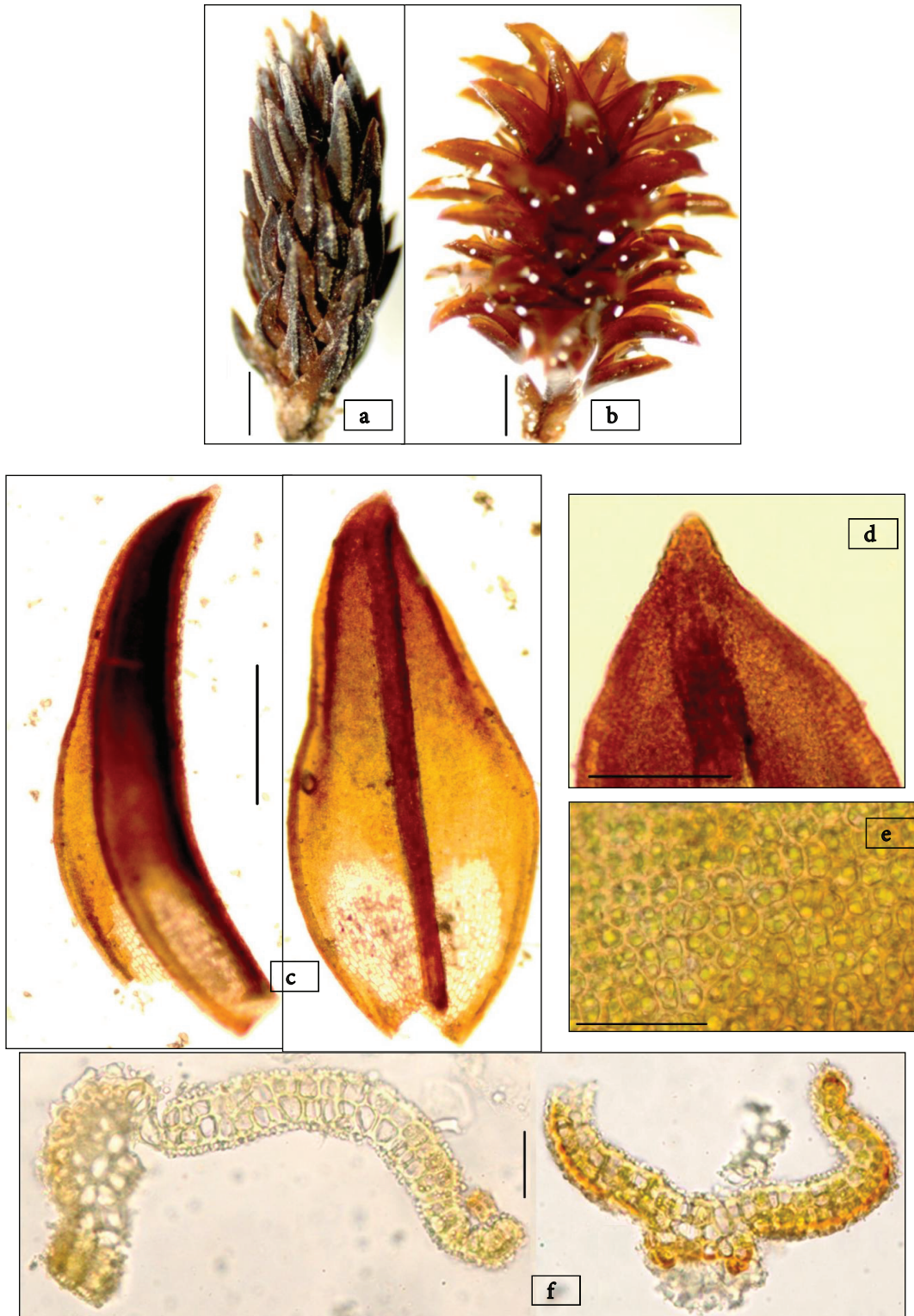


Figure 7. *Syntrichia caninervis*. var. *abranchezii*. a- habit when dry, b- habit when moist, c- leaves, d- leaf apical, e- median cells, f- cross sections. Scale bar: a, b = 500 μ m; c = 200 μ m; d, e, f = 20 μ m.

Substrate: On soil.

Syntrichia caninervis var. *abrangesii* is characterised by papilosity on the abaxial side of the costa and by the absence of a hyaline hair point, which distinguishes it from the rest of the taxa in the *caninervis* group. The similarities between *Syntrichia caninervis* var. *abrangesii* and *Syntrichia intermedia* var. *cavla* (Durieu & Sagot) Delogne include the absence of hyaline hair points, the presence of hydroids in the costa, and similar cell size. However, these 2 species differ in the stratification of the lamina, the constriction of the leaf, the recurved margins,

and the papilosity of the costa (Gallego et al., 2002). *Syntrichia caninervis* var. *abrangesii* is a rare finding and has only been observed in one other study performed in Spain (Gallego et al., 2002).

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Appendix

The Bryofloristic List

Marchantiopsida

Marchantiaceae (Bisch.) Lindl.

Marchantia L.

1. *Marchantia polymorpha* L.

B8, Melendiz Mountain, Loc. 20, on plant residues, *M.Can* 85.

Distribution in Turkey: A1, A2, A4, A5, B6, B9, C11, C12, C13, C15.

Life form: mat thalloid - Life strategy: colonist.

Aytoniaceae Cavers

Reboulia Raddi

2. *Reboulia hemisphaerica* (L.) Raddi

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 82.

Distribution in Turkey: A1, A2, A4, B6, B7, B8, C11, C12.

Life form: mat thalloid - Life strategy: long-lived shuttle.

Jungermanniopsida

Pelliaceae H. Klinggr.

Pellia Raddi

3. ▲*Pellia epiphylla* (L.) Corda

B8, Melendiz Mountain, Loc. 11, 14, on soil, *M.Can* 8a.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, C11.

Life form: mat thalloid - Life strategy: colonist.

Geocalyceae H. Klinggr.

Chiloscyphus Corda

4. ▲*Chiloscyphus polyanthos* (L.) Corda

B8, Melendiz Mountain, Loc. 15, on wall, *M.Can* 45.

Distribution in Turkey: A1, A2, A4, A5, B6, C11.

Life form: aquatic-trailing - Life strategy: competitive perennial.

Bryopsida

Encalyptaceae Schimp.

Encalypta Hedw.

5. *Encalypta intermedia* Jur.

B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 21a.

Distribution in Turkey: B9, B10.

Life form: tuft - Life strategy: long-lived shuttle.

6. **Encalypta spathulata* Müll. Hal.

C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 80.

Distribution in Turkey: A2.

Life form: tuft - Life strategy: long-lived shuttle.

7. *Encalypta vulgaris* Hedw.

B8, Melendiz Mountain, Loc. 8, 10, on rock and soil overlying rocks, *M.Can* 13b.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 53b.

Distribution in Turkey: A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14.

Life form: tuft - Life strategy: long-lived shuttle.

Funariaceae Schwagr.

Funaria Hedw.

8. *Funaria hygrometrica* Hedw.

B8, Melendiz Mountain, Loc. 25, on soil, *M.Can* 97a.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B10, C11, C12, C13, C14, C15.

Life form: tuft - Life strategy: fugitive.

Grimmiaceae Arnott

Grimmia Hedw.

- 9. *Grimmia anodon*** Bruch & Schimp.
B8, Melendiz Mountain, Loc. 3, 12, on rock and wall, *M.Can* 30c.
C13, Melendiz Mountain, Loc. 1, 16, 18, on rock and soil, *M.Can* 14a.
Distribution in Turkey: A2, A3, B6, B7, B9, B10, C11, C12, C14, C15.
Life form: cushion - Life strategy: stress-tolerant perennial.
- 10. **Grimmia capillata*** De Not.
B8, Melendiz Mountain, Loc. 5, on rock, *M.Can* 35c.
C13, Melendiz Mountain, Loc. 20, on rock, *M.Can* 88a.
Distribution in Turkey: B7, B10.
Life form: cushion - Life strategy: colonist.
- 11. *Grimmia dissimulata*** E.Maier
C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 47a.
Distribution in Turkey: A1, A2, A4, A5, B7, C11.
Life form: cushion - Life strategy: competitive perennial.
- 12. **Grimmia funalis*** (Schwagr.) Bruch & Schimp.
B8, Melendiz Mountain, Loc. 13, on rock, *M.Can* 34c.
Distribution in Turkey: A2, A4, A5, B6, C11.
Life form: cushion - Life strategy: colonist.
- 13. *Grimmia laevigata*** (Brid.) Brid.
B8, Melendiz Mountain, Loc. 2, on rock, *M.Can* 16b.
C13, Melendiz Mountain, Loc. 18, on rock and soil, *M.Can* 47c.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14, C15.
Life form: cushion - Life strategy: colonist.
- 14. **Grimmia montana*** Bruch & Schimp.
B8, Melendiz Mountain, Loc. 3, 21, on soil, *M.Can* 96b.
Distribution in Turkey: A1, A2, A4, B6, C11, C15.
Life form: cushion - Life strategy: colonist.
- 15. **Grimmia nutans*** Bruch
B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 21c.
Distribution in Turkey: A4, B6, C11.
Life form: cushion - Life strategy: colonist.
- 16. **Grimmia orbicularis*** Bruch ex Wilson
B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 13h.
Distribution in Turkey: A1, A2, A4, B6, B7, B9, C11, C12, C13, C14.
Life form: cushion - Life strategy: colonist.
- 17. *Grimmia ovalis*** (Hedw.) Lindb.
B8, Melendiz Mountain, Loc. 2, 10, 20, 21, on rock and soil, *M.Can* 95.
C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 47b.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14, C15.
Life form: cushion - Life strategy: colonist.
- 18. *Grimmia pulvinata*** (Hedw.) Sm.
B8, Melendiz Mountain, Loc. 2, 3, 4, 14, 21, on tree (*Robinia pseudoacacia* L.), *M.Can* 12b.
C13, Melendiz Mountain, Loc. 1, 16, 18, on rock, *M.Can* 14b.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14.
Life form: cushion - Life strategy: colonist.
- Schistidium** Bruch & Schimp.
- 19. *Schistidium apocarpum*** (Hedw.) Bruch & Schimp.
B8, Melendiz Mountain, Loc. 10, on rock, *M.Can* 36d.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, C11, C12, C13, C14.
Life form: tuft - Life strategy: pioneer colonist.
- 20. **Schistidium flaccidum*** (De Not.) Ochyra
B8, Melendiz Mountain, Loc. 9, on rock, *M.Can* 29a.
Distribution in Turkey: A2, A4, B6, B10, C11, C15.
Life form: cushion - Life strategy: colonist.
- 21. **Schistidium rivulare*** (Brid.) Podp.
C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 61d.
Distribution in Turkey: A1, A4, C11.
Life form: aquatic-trailing - Life strategy: perennial.
- Ditrichaceae** Limpricht
- Ceratodon** Bridel
- 22. **Ceratodon conicus*** (Hampe) Lindb.
B8, Melendiz Mountain, Loc. 10, on rock, *M.Can* 36d.
C13, Melendiz Mountain, Loc. 5, on rock, *M.Can* 35d.
Distribution in Turkey: B7, B10, C11.
Life form: turf - Life strategy: colonist.
- Pottiaceae** Schimp.
- Tortella** (Lindb.) Limpr.
- 23. **Tortella flavovirens*** (Bruch) Broth.
B8, Melendiz Mountain, Loc. 12, on rock, *M.Can* 30d.
Distribution in Turkey: A1, A2, A3, B6, B7, C11, C12, C13.
Life form: tuft - Life strategy: colonist.
- Weissia** Hedw.
- 24. **Weissia condensa*** (Voit) Lindb.
B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 11b.
Distribution in Turkey: A1, A3, A4, B6, C11, C12, C13.
Life form: turf - Life strategy: colonist.
- 25. **Weissia rutilans*** (Hedw.) Lindb.
B8, Melendiz Mountain, Loc. 7, on rock, *M.Can* 27.
C13, Melendiz Mountain, Loc. 1, on soil, *M.Can* 32c.
Distribution in Turkey: C11.
Life form: turf - Life strategy: short-lived shuttle.
- Barbula** Hedw.
- 26. **Barbula bolleana*** (Müll. Hal.) Broth.
B8, Melendiz Mountain, Loc. 3, on wall, *M.Can* 40a.
Distribution in Turkey: B6, C11, C12.
Life form: turf - Life strategy: colonist.

27. **Barbula unguiculata** Hedw.
C13, Melendiz Mountain, Loc. 17, on rock, *M.Can* 59.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B10, C11, C12.
Life form: turf - Life strategy: colonist.
- Cinclidotus** P.Beauv.
28. ***Cinclidotus pachylomoides** Bizot
B8, Melendiz Mountain, Loc. 4, on wall, *M.Can* 25a.
Distribution in Turkey: B9.
Life form: aquatic-trailing - Life strategy: colonist.
29. **Cinclidotus riparius** (Brid.) Arn.
B8, Melendiz Mountain, Loc. 3, 4, on rock and wall, *M.Can* 2.
Distribution in Turkey: A2, B6, B7, B9, C11, C12, C13, C14, C15.
Life form: aquatic-trailing - Life strategy: colonist.
- Crossidium** Jur.
30. **Crossidium squamiferum** (Viv.) Jur.
B8, Melendiz Mountain, Loc. 8, on soil overlying of rocks, *M.Can* 11a.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, C11, C12, C13.
Life form: turf - Life strategy: colonist.
- Didymodon** Hedw.
31. **Didymodon acutus** (Brid.) K.Saito
B8, Melendiz Mountain, Loc. 8, 10, on rock and soil overlying rocks, *M.Can* 13a.
C13, Melendiz Mountain, Loc. 24, on soil, *M.Can* 98d.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, B10, C11, C12.
Life form: turf - Life strategy: colonist.
32. **Didymodon rigidulus** Hedw.
B8, Melendiz Mountain, Loc. 4, on wall, *M.Can* 22a.
Distribution in Turkey: A1, A2, A4, B6, C11, C13.
Life form: tuft - Life strategy: colonist.
33. **Didymodon vinealis** (Brid.) R.H.Zander
B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 21e.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, B10, C11, C12, C13, C14.
Life form: tuft - Life strategy: colonist.
- Phascum** Hedw.
34. ***Phascum cuspidatum** Schreb. ex Hedw. var. **cuspidatum**
C13, Melendiz Mountain, Loc. 5, on soil, *M.Can* 10a.
Distribution in Turkey: A1, A2, A3, B6, B7, B10, C11, C12, C14.
Life form: turf-scattered - Life strategy: annual shuttle.
35. ***Phascum cuspidatum** Schreb. ex Hedw. var. **piliferum** Hedw.
B8, Melendiz Mountain, Loc. 25, on soil, *M.Can* 97c.
C13, Melendiz Mountain, Loc. 19, on soil, *M.Can* 79.
Distribution in Turkey: A1, B6, B7, B10, C11, C12.
Life form: turf-scattered - Life strategy: annual shuttle.
- Protobryum** J.Guerra & M.J.Cano
36. ***Protobryum bryoides** (Dicks) J.Guerra & M.J.Cano
C13, Melendiz Mountain, Loc. 16, on soil, *M.Can* 65a.
Distribution in Turkey: A1, B6, B7.
Life form: turf-scattered - Life strategy: annual shuttle.
- Pseudocrossidium** R.S.Williams
37. **Pseudocrossidium hornschuchianum** (Schultz) R.H.Zander
C13, Melendiz Mountain, Loc. 17, on soil, *M.Can* 60a.
Distribution in Turkey: A1, A4, A5, B6, B7, B8, B10, C11, C12.
Life form: turf - Life strategy: colonist.
- Pterygoneurum** Jur.
38. **Pterygoneurum ovatum** (Hedw.) Dixon
C13, Melendiz Mountain, Loc. 16, 18, 24, on soil and soil overlying rocks, *M.Can* 46a.
Distribution in Turkey: A1, A3, A4, A5, B6, B7, B8, B9, B10, C11, C12, C14.
Life form: turf-scattered - Life strategy: annual shuttle.
- Syntrichia** Brid.
39. ****Syntrichia caninervis** Mitt. var. **abanchesii** (Luisier) R.H.Zander
C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 51a.
Life form: turf - Life strategy: colonist.
40. **Syntrichia caninervis** Mitt. var. **caninervis**
C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 51b.
Distribution in Turkey: A3, A4, B6, B7, B8, B9, B10, C11, C12, C15.
Life form: turf - Life strategy: colonist.
41. * **Syntrichia caninervis** Mitt. var. **gypsophila** (G.Roth) Ochyra
C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 51c.
Distribution in Turkey: B10, C11.
Life form: turf - Life strategy: colonist.
42. **Syntrichia handelii** (Schiffn.) Bach.
B8, Melendiz Mountain, Loc. 8, 15, on soil overlying rocks, *M.Can* 68a.
Distribution in Turkey: A1, A4, B6, B7, B10, C11, C12, C13, C14.
Life form: turf - Life strategy: colonist.
43. **Syntrichia inermis** (Brid.) Bruch
B8, Melendiz Mountain, Loc. 8, 9, 15, 1350 m, on rock and soil overlying rocks, *M.Can* 13d.
C13, Melendiz Mountain, Loc. 18, 24, on rock and soil, *M.Can* 98b.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, B10, C11, C12, C14, C15.
Life form: turf - Life strategy: colonist.
44. **Syntrichia montana** Nees
B8, Melendiz Mountain, Loc. 2, 11, 12, 15, on rock, soil overlying rocks, and tree (*Robinia pseudoacacia* L.), *M.Can* 17d.

C13, Melendiz Mountain, Loc. 18, on rock and soil, *M.Can* 46b.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, B9, B10, C11, C12, C14, C15.

Life form: tuft - Life strategy: colonist.

45. *Syntrichia papillosissima* (Copp.) Loeske

B8, Melendiz Mountain, Loc. 23, on soil, *M.Can* 92.

C13, Melendiz Mountain, Loc. 24, on soil, *M.Can* 98c.

Distribution in Turkey: A1, A2, A3, B6, B7, B10, C11, C12.

Life form: turf - Life strategy: colonist.

46. *Syntrichia princeps* (De Not.) Mitt.

B8, Melendiz Mountain, Loc. 8, 11, on soil overlying rocks and tree (*Salix alba* L.), *M.Can* 26b.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 53g.

Distribution in Turkey: A1, A2, A4, B6, B7, B10, C11, C12, C14, C15.

Life form: turf - Life strategy: colonist.

47. *Syntrichia ruraliformis* (Besch.) Cardot

B8, Melendiz Mountain, Loc. 8, on soil overlying rocks, *M.Can* 21d.

Distribution in Turkey: A1, A2, A4, B6, B7, B9, B10, C11, C12, C13, C15.

Life form: turf - Life strategy: colonist.

48. *Syntrichia ruralis* (Hedw.) F.Weber & D.Mohr

B8, Melendiz Mountain, Loc. 2, 3, 4, 8, 9, 13, 15, 20, 22, on rock, soil, soil overlying rocks, and tree (*Robinia pseudoacacia* L. and *Salix alba* L.), *M.Can* 7b.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C13, C14, C15.

Life form: turf - Life strategy: colonist.

49. *Syntrichia virescens* (De Not.) Ochyra

B8, Melendiz Mountain, Loc. 15, on rock, *M.Can* 55a.

C13, Melendiz Mountain, Loc. 16, on soil, *M.Can* 65c.

Distribution in Turkey: A1, A2, A4, A5, B6, B10, C11, C12.

Life form: turf - Life strategy: colonist.

Tortula Hedw.

50. *Tortula brevissima* Schiffn.

B8, Melendiz Mountain, Loc. 3, 20, on wall, rock, and tree (*Salix alba* L.), *M.Can* 87c.

C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 46e.

Distribution in Turkey: C11.

Life form: turf - Life strategy: colonist.

51. *Tortula lanceola* R.H.Zander

B8, Melendiz Mountain, Loc. 25, on soil, *M.Can* 97b.

C13, Melendiz Mountain, Loc. 16, 24, on soil, *M.Can* 65d.

Distribution in Turkey: A1, A4, B6, B7, B9, B10, C11, C12, C14.

Life form: turf - Life strategy: annual shuttle.

52. *Tortula muralis* L. ex Hedw. var. *aestiva* Brid. ex Hedw.

C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 46c.

Distribution in Turkey: A2, C14.

Life form: turf - Life strategy: colonist.

53. *Tortula muralis* L. ex Hedw. var. *muralis*

B8, Melendiz Mountain, Loc. 15, on rock, *M.Can* 69a.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C13, C14, C15.

Life form: turf - Life strategy: colonist.

54. *Tortula subulata* Hedw.

B8, Melendiz Mountain, Loc. 20, on wall and tree (*Salix alba* L.), *M.Can* 83a.

C13, Melendiz Mountain, Loc. 1, 18, on rock, *M.Can* 66d.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, B10, C11, C12.

Life form: tuft - Life strategy: colonist.

Orthotrichaceae Arnott

Orthotrichum Hedw.

55. *Orthotrichum alpestre* Hornsch. ex Bruch & Schimp.

B8, Melendiz Mountain, Loc. 8, 14, on rock and soil overlying rocks, *M.Can* 74a.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 61c.

Distribution in Turkey: A1, A2, A4, B7, C12.

Life form: cushion - Life strategy: colonist.

56. *Orthotrichum anomalum* Hedw.

B8, Melendiz Mountain, Loc. 2, 6, 12, 13, 20, on rock and tree (*Juglans regia* L. and *Robinia pseudoacacia* L.), *M.Can* 1a.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 61b.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, C11, C12, C14.

Life form: cushion - Life strategy: colonist.

57. *Orthotrichum cupulatum* Hoffm. ex Brid.

B8, Melendiz Mountain, Loc. 6, 9, on rock and tree (*Juglans regia* L.), *M.Can* 1d.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, B9, B10, C11, C12, C13, C14, C15.

Life form: cushion - Life strategy: colonist.

58. *Orthotrichum diaphanum* Schrad. ex Brid.

B8, Melendiz Mountain, Loc. 6, 20, on tree (*Juglans regia* L. and *Salix alba* L.), *M.Can* 84c.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12, C13.

Life form: cushion - Life strategy: colonist.

59. *Orthotrichum pumilum* Sw.

B8, Melendiz Mountain, Loc. 4, 9, 20, on tree (*Robinia pseudoacacia* L. and *Salix alba* L.), *M.Can* 7a.

Distribution in Turkey: A1, A3, A4, B6, B7, C11, C12, C13.

Life form: cushion - Life strategy: colonist.

60. *Orthotrichum rupestre* Schleich. ex Schwagr.

B8, Melendiz Mountain, Loc. 4, 15, 20, on rock and tree

(*Robinia pseudoacacia* L. and *Salix alba* L.), *M.Can* 12c.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 53e.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, B9, B10, C11, C12, C14.

Life form: cushion - Life strategy: colonist.

61. *Orthotrichum sprucei Mont.

B8, Melendiz Mountain, Loc. 6, on tree (*Juglans regia* L.), *M.Can* 1c.

Distribution in Turkey: C11.

Life form: tuft - Life strategy: short-lived shuttle.

62. ▲Orthotrichum stramineum Hornsch. ex Brid.

B8, Melendiz Mountain, Loc. 14, on tree (*Salix alba* L.), *M.Can* 77.

Distribution in Turkey: A1, A2, A4, B6, B7, C11, C13.

Life form: cushion - Life strategy: colonist.

63. ▲Orthotrichum striatum Hedw.

B8, Melendiz Mountain, Loc. 2, 4, on tree (*Robinia pseudoacacia* L.), *M.Can* 12a.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C13.

Life form: cushion - Life strategy: colonist.

64. ▲Orthotrichum urnigerum Myrin

B8, Melendiz Mountain, Loc. 12, on rock, *M.Can* 30b.

Distribution in Turkey: A2, A3, A4, B6, B7, B10, C11, C12, C13.

Life form: cushion - Life strategy: colonist.

Bartramiaceae Schwagr.

Philonotis Brid.

65. ▲Philonotis seriata Mitt.

B8, Melendiz Mountain, Loc. 14, on soil, *M.Can* 73.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, C12.

Life form: turf - Life strategy: long-lived shuttle.

Bryaceae Schwagr.

Bryum Hedw.

66. Bryum argenteum Hedw.

B8, Melendiz Mountain, Loc. 3, 7, 8, on rock, soil, and soil overlying rocks, *M.Can* 10b.

C13, Melendiz Mountain, Loc. 5, 16, on rock and soil, *M.Can* 65b.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14.

Life form: turf - Life strategy: colonist.

67. Bryum caespiticium Hedw.

B8, Melendiz Mountain, Loc. 10, 14, 20, 21, on rock, soil, and tree (*Salix alba* L.), *M.Can* 94.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, B9, C11, C12, C13, C14.

Life form: turf - Life strategy: colonist.

68. Bryum canariense Brid.

C13, Melendiz Mountain, Loc. 5, on rock, *M.Can* 35e.

Distribution in Turkey: A1, A2, A4, B6, B8, C11, C12.

Life form: turf - Life strategy: colonist.

69. Bryum capillare Hedw.

B8, Melendiz Mountain, Loc. 4, 8, on wall, soil overlying rocks, and tree (*Salix alba* L.), *M.Can* 13g.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 62b.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, C11, C12.

Life form: turf - Life strategy: colonist.

70. ▲Bryum dichotomum Hedw.

B8, Melendiz Mountain, Loc. 21, on soil, *M.Can* 96a.

C13, Melendiz Mountain, Loc. 17, 18, on rock and soil, *M.Can* 53i.

Distribution in Turkey: A1, A4, B6, B10, C11, C12.

Life form: turf - Life strategy: colonist.

71. *Bryum neodamense Itzigs. ex Müll. Hal.

C13, Melendiz Mountain, Loc. 5, on soil, *M.Can* 31a.

Distribution in Turkey: A1, A4.

Life form: turf - Life strategy: perennial.

72. ▲Bryum pallens Sw.

B8, Melendiz Mountain, Loc. 21, on soil, *M.Can* 90a.

Distribution in Turkey: A1, A2, A3, A4, B6, B10, C11, C12, C13.

Life form: turf - Life strategy: short-lived shuttle.

73. Bryum pallescens Schleich. ex Schwagr.

C13, Melendiz Mountain, Loc. 5, on soil, *M.Can* 31b.

Distribution in Turkey: A1, A2, A4, A5, B6, B7, B8, B9, B10, C11, C12, C15.

Life form: tuft - Life strategy: colonist.

74. Bryum pseudotriquetrum (Hedw.) P.Gaertn., E.Mey. & Scherb.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 54a.

Distribution in Turkey: A1, A2, A3, A4, B6, B7, B8, B9, B10, C11, C12.

Life form: turf - Life strategy: competitive perennial.

75. ▲Bryum radiculosum Brid.

B8, Melendiz Mountain, Loc. 10, on soil, *M.Can* 43a.

Distribution in Turkey: A1, A2, A4, B6, B7, C11, C12.

Life form: cushion - Life strategy: ephemeral colonist.

76. Bryum torquescens Bruch & Schimp.

C13, Melendiz Mountain, Loc. 18, on soil, *M.Can* 46d.

Distribution in Turkey: A1, A2, A4, B6, B8, B9, C11, C12.

Life form: turf - Life strategy: long-lived shuttle.

Mniaceae Schwagr.

Rhizomnium T.J.Kop.

77. Rhizomnium punctatum (Hedw.) T.Kop.

B8, Melendiz Mountain, Loc. 11, on soil, *M.Can* 8b.

Distribution in Turkey: A1, A2, A3, A4, B6, B7.

Life form: turf - Life strategy: long-lived shuttle.

Plagiomnium T.J.Kop.

78. ▲Plagiomnium ellipticum (Brid.) T.J.Kop.

B8, Melendiz Mountain, Loc. 14, on wall, *M.Can* 70a.

Distribution in Turkey: A1, A2, A3, A4, B9, C11.

Life form: turf - Life strategy: competitive perennial.

79. **▲Plagiomnium undulatum** (Hedw.) T.J.Kop.
B8, Melendiz Mountain, Loc. 14, on soil, *M.Can* 71.
Distribution in Turkey: A1, A2, A3 A4, B6, B7, C11, C13.
Life form: turf - Life strategy: competitive perennial.
Amblystegiaceae (Broth.) M.Fleisch.
Amblystegium Schimp.
80. **Amblystegium serpens** (Hedw.) Schimp.
B8, Melendiz Mountain, Loc. 10, on soil, *M.Can* 43b.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Cratoneuron (Sull.) Spruce
81. **Cratoneuron filicinum** (Hedw.) Spruce
B8, Melendiz Mountain, Loc. 4, 14, 15, on wall, rock, and soil, *M.Can* 25b.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C13.
Life form: weft - Life strategy: competitive perennial.
Drepanocladus (Müll Hal.) G.Roth
82. **▲Drepanocladus aduncus** (Hedw.) Warnst.
B8, Melendiz Mountain, Loc. 21, on soil, *M.Can* 90b.
Distribution in Turkey: A1, A2, A4, B6, B7, B9, B10.
Life form: weft - Life strategy: perennial.
Hygroamblystegium Loeske
83. **Hygroamblystegium tenax** (Hedw.) Jenn.
B8, Melendiz Mountain, Loc. 3, 4, 11, 14, 15, on wall and soil overlying rocks, *M.Can* 6a.
Distribution in Turkey: A1, A2, A4, B6, B9, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Leptodictyum (Schimp.) Warnst.
84. **Leptodictyum riparium** (Hedw.) Warnst.
B8, Melendiz Mountain, Loc. 4, on wall, *M.Can* 22b.
Distribution in Turkey: A1, A2, A4, A5, B6, B7, B9, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Brachytheciaceae Schimp.
Eurhynchium Schimp.
85. **Eurhynchium striatum** (Hedw.) Schimp.
C13, Melendiz Mountain, Loc. 1, on soil, *M.Can* 32b.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12.
Life form: weft - Life strategy: perennial.
Platyhypnidium M.Fleisch.
86. **Platyhypnidium riparioides** (Hedw.) Dixon
B8, Melendiz Mountain, Loc. 3, 4, 14, on rock and wall, *M.Can* 9.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Cirriphyllum Grout
87. **▲Cirriphyllum crassinervium** (Taylor) Loeske & M.Fleisch
B8, Melendiz Mountain, Loc. 20, on tree (*Salix alba* L.), *M.Can* 87e.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Sciuro-hypnum Hampe
88. **▲Sciuro-hypnum starkei** (Brid.) Ignatov & Huttunen
B8, Melendiz Mountain, Loc. 8, on tree (*Salix alba* L.), *M.Can* 26c.
Distribution in Turkey: A1, A2, A4, B6, C11, C13.
Life form: mat rough - Life strategy: stress-tolerant perennial.
Brachythecium Schimp
89. **Brachythecium glareosum** (Spruce) Schimp.
B8, Melendiz Mountain, Loc. 22, on soil, *M.Can* 93b. C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 81b.
Distribution in Turkey: A2, A3, A4, B6, C11.
Life form: mat rough - Life strategy: competitive perennial.
90. **▲Brachythecium mildeanum** (Schimp.) Schimp. ex Milde
B8, Melendiz Mountain, Loc. 14, on soil, *M.Can* 78b.
Distribution in Turkey: A1, A2, A3, A4, A5, C11.
Life form: mat rough - Life strategy: perennial.
Scorpiurium Schimp.
91. **▲Scleropodium touretii** (Brid.) L.F.Koch
B8, Melendiz Mountain, Loc. 15, on rock, *M.Can* 63d.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12, C13.
Life form: mat rough - Life strategy: perennial.
Brachytheciastrum Ignatov & Huttunen
92. **▲Brachytheciastrum velutinum** (Hedw.) Ignatov & Huttunen
B8, Melendiz Mountain, Loc. 20, on rock, *M.Can* 88c. C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 54b.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B10, C11, C12, C14.
Life form: mat rough - Life strategy: perennial.
Homalothecium Schimp.
93. **Homalothecium lutescens** (Hedw.) H.Rob.
B8, Melendiz Mountain, Loc. 23, on soil overlying rocks, *M.Can* 89.
C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 53f.
Distribution in Turkey: A1, A2, A3, A4, B6, B7, C11, C12.
Life form: weft - Life strategy: perennial.
94. **Homalothecium sericeum** (Hedw.) Schimp.
B8, Melendiz Mountain, Loc. 9, on rock, *M.Can* 37a. C13, Melendiz Mountain, Loc. 1, on soil, *M.Can* 32e.
Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7, B9, B10, C11, C12, C14.
Life form: mat rough - Life strategy: perennial.

Fabroniaceae Schimp.

Fabronia Raddi

95. ▲Fabronia pusilla Raddi

B8, Melendiz Mountain, Loc. 20, on rock, *M.Can* 88d.

C13, Melendiz Mountain, Loc. 18, on rock, *M.Can* 66c.

Distribution in Turkey: B6, C11, C12.

Life form: weft - Life strategy: perennial.

Leskeaceae Schimp.

Habrodon Schimp.

96. ▲Habrodon perpusillus (De Not.) Lindb.

B8, Melendiz Mountain, Loc. 8, on soil overlying rocks,
M.Can 44c.

Distribution in Turkey: A1, A2, A3, A4, B6, B10, C11,
C12, C13.

Life form: mat rough - Life strategy: perennial.

Leucodontaceae Schimp.

Leucodon Schwagr.

97. Leucodon sciuroides (Hedw.) Schwagr.

B8, Melendiz Mountain, Loc. 8, on soil overlying rocks,
M.Can 44a.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7,
C11, C12, C13.

Life form: mat rough - Life strategy: long-lived shuttle.

Isothecium Brid.

98. ▲Isothecium alopecuroides (Dubois) Isov.

B8, Melendiz Mountain, Loc. 10, on soil, *M.Can* 43d.

Distribution in Turkey: A1, A2, A3, A4, A5, B6, B7,
C11, C13.

Life form: dendroid - Life strategy: stress-tolerant
perennial.

99. ▲Isothecium myosuroides Brid.

B8, Melendiz Mountain, Loc. 3, on wall, *M.Can* 38b.

Distribution in Turkey: A1, A2, A3, A4, C13.

Life form: dendroid - Life strategy: stress-tolerant
perennial.