

Research article**The Bryophyte flora of Lapseki (Çanakkale) Mountains**Uğur ÇATAK^{1,*}, Hatice ÖZENOĞLU², Gözde ASLAN¹, Ersin KARABACAK¹, Mesut KIRMACI¹¹Aydın Adnan Menderes University, Aydın, Türkiye²Çanakkale Onsekiz Mart University, Çanakkale, Türkiye*Corresponding author email: ugurcatakbio4@gmail.com

Abstract: The aim of this study was to document the bryophyte diversity of the Lapseki Mountains (Çanakkale, Türkiye), which is influenced by both Mediterranean and Black Sea climatic conditions. Fieldwork was carried out systematically between 2022 and 2023 in various habitats, such as forest stands, rocky areas, and stream banks. A total of 78 sampling sites were investigated, and approximately 3,000 specimens were collected and later identified using standard taxonomic procedures. As a result, 200 taxa representing 52 families and 103 genera were identified. These comprise 162 mosses, 37 liverworts, and 1 hornwort. The three most species-rich families identified in this study are Pottiaceae, Brachytheciaceae, and Orthotrichaceae, while the three most diverse genera are *Riccia*, *Didymodon*, and *Orthotrichum*. The most frequent species included *Orthotrichum diaphanum*, *Homalothecium sericeum*, *Tortula muralis*, *Grimmia pulvinata*, and *Funaria hygrometrica*. The study reveals that the Lapseki Mountains host a diverse bryophyte flora, reflecting the transitional character between Mediterranean and Black Sea regions. These results provide the first bryophyte records from this area and contribute significantly to the knowledge of Turkish bryophyte flora.

Keywords: Bryophytes, Çanakkale, hornworts, liverworts, mosses**Citing:** Çatak, U., Özenoğlu, H., Aslan, G., Karabacak, E., & Kirmacı, M. (2025). The Bryophyte flora of Lapseki (Çanakkale) Mountains. *Acta Biologica Turcica*, 38(4), kswg20250404-16p.**Introduction**

Bryophytes are vital components of ecosystems, contributing to biodiversity, ecosystem functioning, and ecological balance. However, certain regions of Türkiye remain insufficiently studied, which limits the understanding of their full bryophyte diversity.

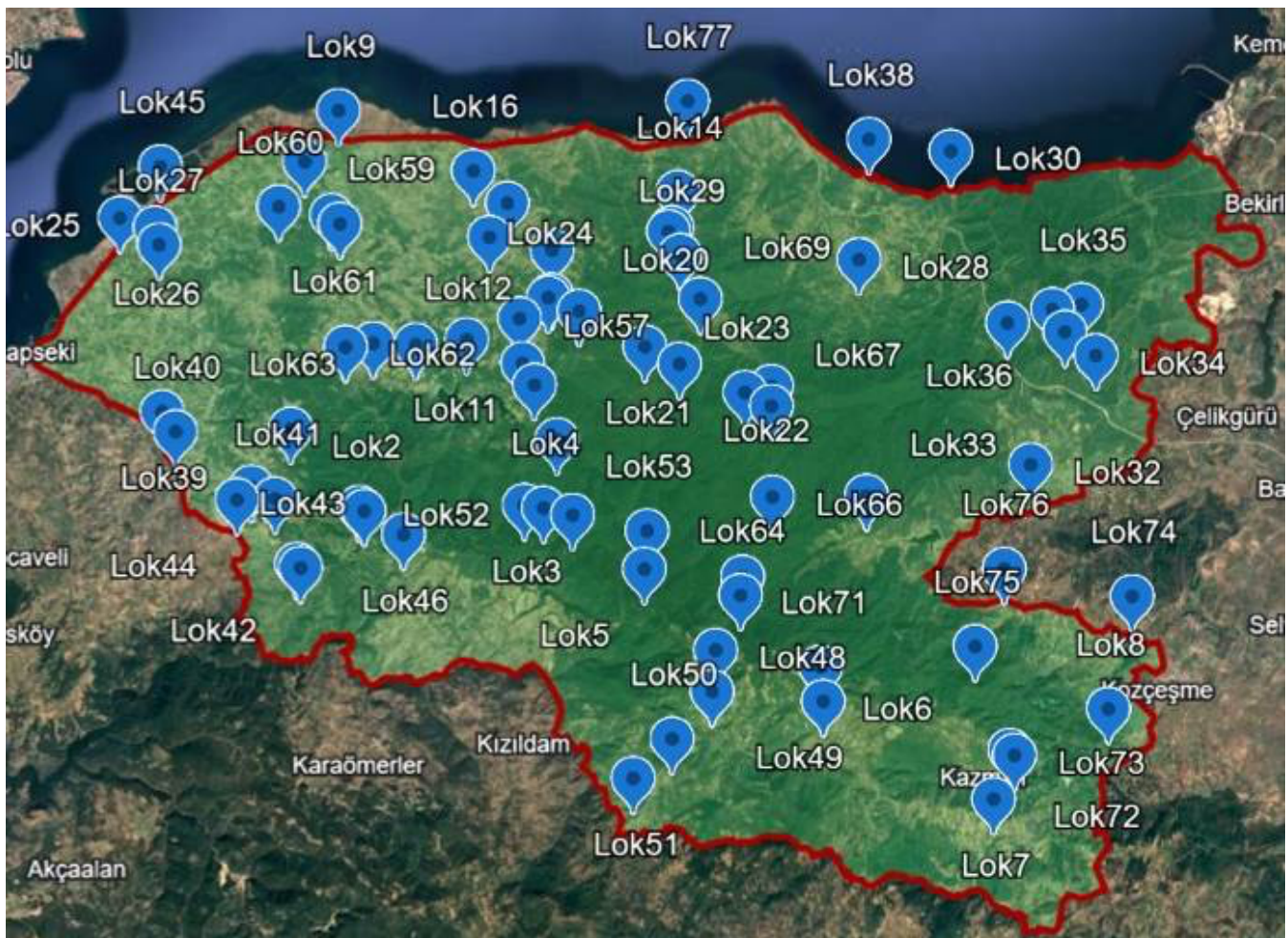
In this context, bryophytes, which were often overlooked in the past but have recently been recognized as essential components of biodiversity, play a significant role in the comprehensive assessment of ecosystems. Studies aimed at documenting and evaluating bryophyte diversity have been gaining momentum in recent years, both worldwide and, increasingly, in our country. When the studies conducted in our country to date are reviewed, it is observed that bryophytes are represented by a total of 1,280 taxa, comprising 5 hornworts

(*Anthocerotophyta*), 224 liverworts (*Marchantiophyta*), and 1,051 mosses (*Bryophyta*) (Abay et al., 2022; Özenoğlu & Kirmacı, 2022, Kürschner & Erdağ, 2023; Erdağ & Kürschner, 2024; Wilbraham et al., 2025).

In the Çanakkale region, which also encompasses our study area, numerous investigations have been carried out (Gökler et al., 1984; Yayıntaş et al., 1990, 1994; Gökler, 1992; Tonguç & Yayıntaş, 1996; Erdağ & Yayıntaş, 1999; Gökler & Özenoğlu, 1999; Yayıntaş, 2014; Keçeli, 2015; Şimşek, 2024). However, despite this considerable research activity, no bryophyte records have so far been reported from the Lapseki Mountains, which were designated as the present study area.

This study was undertaken with the aim of documenting and assessing the bryophyte diversity of the Lapseki Mountains.

The research material consisted of bryophyte samples collected during field studies conducted in different seasons between 2022 and 2023. As shown in Figure 1, the study area was comprehensively surveyed, yielding 78 sampling sites and about 3,000 specimens in total.



Study Area

Çanakkale Strait to the west, the Sea of Marmara to the north, the Biga District to the east, the Çan District to the southeast, and the Çanakkale Central District to the south (Figure 1). The maximum elevation within the

research area is merely 720 m above sea level. In addition to forested slopes and rocky habitats, the area also contains wetlands in the surrounding valleys and high plateaus; however, these wetlands are relatively small in size. The region is an ecotone where the influences of the Mediterranean and Black Sea climates intersect. The humid northern mountains of Dumanlı Mountain are dominated by extensive forests composed of mesic species such as beech (*Fagus orientalis* Lipsky), hornbeam (*Carpinus betulus* L.), and chestnut (*Castanea sativa* Mill.). In the warmer, drier southern valleys, densely populated with oaks

such as *Quercus cerris* L. and *Q. frainetto* Ten., along with stands of turkish pine (*Pinus brutia* Ten.) and the maquis elements that form them, are observed. At higher elevations, black pine (*Pinus nigra* J.F.Arnold subsp. *pallasiana* (Lamb.) Holmboe) stands are notable, while the valleys are rich in seasonally wet streamside vegetation. Numerous extensive agricultural lands surround the settlements. This heterogeneous structure makes the Biga Mountains one of the most important natural habitat mosaics in the Marmara region, both in terms of biogeography and endemic plant diversity.

Table 1. Locality details (L.N.: locality number)

L.N.	Locality	Latitude	Longitude	Altitude (m)	Date
1	On the Biga–Lapseki road, near Şahinli	40°18'14" N	26°45'9" E	177	28.05.2022
2	Şahinli	40°17'57" N	26°47'16" E	311	28.05.2022
3	Near Çamyurt	40°18'3" N	26°50'14" E	457	28.05.2022
4	Çamyurt	40°18'1" N	26°50'35" E	447	28.05.2022
5	Ali Osman Fountain, near Beyçayır Village	40°17'9" N	26°52'26" E	624	28.05.2022
6	Beyçayır Village	40°15'18" N	26°55'42" E	456	28.05.2022
7	Karaağaç	40°13'56" N	26°58'50" E	325	28.05.2022
8	Karaağaç	40°15'13" N	27°1'3" E	143	28.05.2022
9	Hacıömerler	40°23'35" N	26°46'44" E	19	28.05.2022
10	Hacıömerler	40°21'59" N	26°46'46" E	41	29.05.2022
11	Mecidiye	40°20'19" N	26°47'24" E	74	29.05.2022
12	Taştepe	40°20'22" N	26°49'7" E	114	29.05.2022
13	Near Hacıömerler	40°20'17" N	26°48'11" E	77	29.05.2022
14	1 km to Çavuşköy	40°22'26" N	26°53'1" E	97	29.05.2022
15	Çavuşköy canyon	40°21'53" N	26°52'51" E	93	29.05.2022
16	Alpagut	40°22'44" N	26°49'14" E	43	30.05.2022
17	Alpagut roadside	40°22'17" N	26°49'52" E	76	30.05.2022
18	Dereköy	40°21'37" N	26°50'42" E	98	30.05.2022
19	Adatepe	40°20'59" N	26°50'42" E	235	30.05.2022
20	Çırpılık area	40°20'45" N	26°51'13" E	394	30.05.2022
21	Bedesten Fire Watchtower	40°20'15" N	26°52'26" E	315	30.05.2022
22	Çavuşköy	40°20'1" N	26°53'5" E	431	30.05.2022
23	Çavuşköy	40°19'37" N	26°54'16" E	233	30.05.2022
24	Taştepe village roadside	40°20'57" N	26°50'39" E	128	30.05.2022
25	Çardak	40°22'4" N	26°42'42" E	10	08.04.2023
26	Lapseki roadside	40°21'56" N	26°43'22" E	40	08.04.2023
27	East of Çardak	40°21'41" N	26°43'26" E	100	08.04.2023
28	Güreci village	40°21'29" N	26°56'22" E	80	08.04.2023
29	Çavuşköy	40°21'31" N	26°53'1" E	100	09.04.2023
30	Kirazlı dere	40°23'1" N	26°58'4" E	10	09.04.2023
31	Gürece forest, roadside	40°20'34" N	26°59'9" E	90	09.04.2023
32	Nusretiye Road, across from Beypınar village	40°18'36" N	26°59'32" E	80	09.04.2023
33	Nusretiye road	40°18'10" N	26°56'30" E	130	09.04.2023
34	Red Pine grove	40°20'8" N	27°0'44" E	130	09.04.2023

L.N.	Locality	Latitude	Longitude	Altitude (m)	Date
35	Red Pine forest mixed with Stone Pine, flat area	40°20'51" N	27°0'28" E	150	09.04.2023
36	Red Pine–Stone Pine mixed forest	40°20'47" N	26°59'56" E	140	09.04.2023
37	Kurtlar Fountain	40°20'28" N	27°0'10" E	130	09.04.2023
38	Beyond Kirazlı dere, between Hisarkent and Kirazlı	40°23'11" N	26°56'34" E	10	09.04.2023
39	Entrance of Yeniceköy	40°19'20" N	26°43'29" E	70	15.04.2023
40	Oak forest	40°19'3" N	26°43'44" E	75	15.04.2023
41	Degraded maquis scrubland, Şahinler	40°18'7" N	26°45'37" E	260	15.04.2023
42	Pinus brutia forest	40°17'12" N	26°46'1" E	230	15.04.2023
43	Roadside, Temporary water accumulation	40°17'12" N	26°46'1" E	200	15.04.2023
44	Meadow area	40°18'6" N	26°44'54" E	235	15.04.2023
45	Edge of Tümad mining site	40°22'47" N	26°43'26" E	10	16.04.2023
46	Small stream, degraded maquis	40°17'37" N	26°47'59" E	10	16.04.2023
47	Oak-chestnut forest	40°44'12" N	26°59'23" E	280	16.04.2023
48	Below fire watch tower, 1 km from Dumanlı	40°44'37" N	26°47'59" E	420	16.04.2023
49	Dumanlı	40°15'26" N	26°53'40" E	380	16.04.2023
50	Between Dumanlı and Kırçalı	40°22'47" N	26°43'26" E	10	16.04.2023
51	Near Beyçayır	40°15'23" N	26°54'10" E	400	16.04.2023
52	Kocabaşlar	40°18'0" N	26°47'11" E	320	16.04.2023
53	Near Çamyurt	40°17'41" N	26°52'29" E	665	17.04.2023
54	Taştepe	40°18'57" N	26°50'49" E	396	17.04.2023
55	Near Taştepe Dam Lake	40°19'43" N	26°50'23" E	156	17.04.2023
56	Taştepe roadside	40°20'1" N	26°50'10" E	150	17.04.2023
57	Near Taştepe fields	40°20'39" N	26°50'6" E	165	17.04.2023
58	Between Dereköy and Alpagut	40°21'48" N	26°49'32" E	53	17.04.2023
59	Near Hacıömerler	40°22'51" N	26°46'8" E	92	17.04.2023
60	Near Mecidiye	40°22'13" N	26°45'40" E	235	17.04.2023
61	Mecidiye	40°22'6" N	26°46'37" E	60	17.04.2023
62	Between Mecidiye and Taştepe	40°20'15" N	26°46'53" E	70	17.04.2023
63	Kocabaşlar	40°19'6" N	26°45'53" E	140	17.04.2023
64	Dumanlı roadside	40°16'47" N	26°54'11" E	310	17.04.2023
65	Near Dumanlı	40°17'2" N	26°54'13" E	345	17.04.2023
66	Nusratiye	40°18'9" N	26°54'46" E	273	18.04.2023
67	Near Çavuşköy	40°19'25" N	26°54'45" E	383	18.04.2023
68	Çavuşköy roadside	40°19'42" N	26°54'45" E	156	18.04.2023
69	Çavuşköy	40°20'56" N	26°53'26" E	150	18.04.2023
70	Quercus cerris and Beech-oak forest	40°17'54" N	26°51'7" E	573	15.10.2023
71	Dumanlı roadside, stream bed, rocky area	40°15'47" N	26°55'39" E	489	15.10.2023
72	Karaağaç	40°14'36" N	26°59'8" E	247	15.10.2023
73	Kazmalı	40°14'32" N	26°59'13" E	229	15.10.2023
74	Gürgendere pond side	40°16'45" N	27°1'24" E	109	15.10.2023
75	Oak forest	40°16'4" N	26°58'29" E	236	15.10.2023
76	Çataltepe, Bird nest, Stream interior	40°17'8" N	26°59'2" E	130	15.10.2023
77	Güreci, Opet gas station, Seaside	40°23'44" N	26°53'13" E	43	15.10.2023
78	Çavuşköy canyon, Inside and edge of stream, Riverine community, Fagus orientalis	40°21'52" N	26°52'51" E	62	15.10.2023

Results

Approximately 3,000 bryophyte samples were collected from the Lapseki Mountains, identified based on relevant floristic and revisionary studies, and preserved as herbarium material. As a result, a total of 200 taxa representing 52 families and 103 genera were determined. Bryophyta is represented by 162 taxa (30 families and 80 genera), Marchantiophyta by 37 taxa (21 families and 22 genera), and Anthocerotophyta by a single taxon (1 family and 1 genus) (Fig. 2).

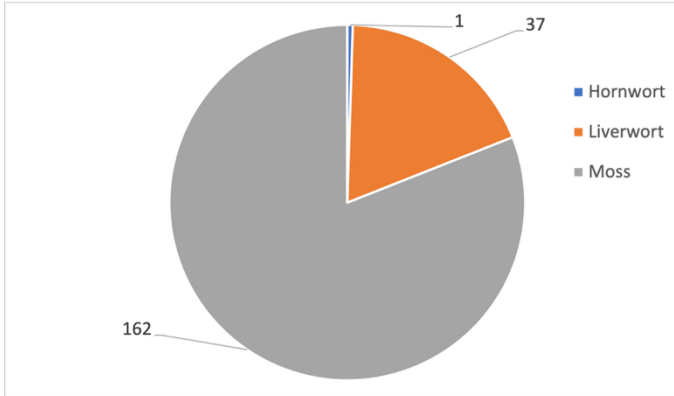


Figure 2. Distribution of bryophyte groups in the study area

Floristic List

ANTHOCEROTOPHYTA

NOTOHYLADACEAE

1. *Phaeoceros laevis* (L.) Prosk. Loc: 24, 34, 52; Substrate: Soil

MARCHANTIOPYTA

CEPHALOZIELLACEAE

1. *Cephaloziella hampeana* (Nees) Schiffn. ex Loeske Loc: 24, 34; Substrate: Soil.

SCAPANACEAE

2. *Scapania undulata* (L.) Dumort. Loc: 65; Substrate: Soil.

CALYPOGEIACEAE

3. *Calypogeia azurea* Stotler & Crotz Loc: 24; Substrate: Root.

JUNGERMANNIACEAE

4. *Mesoptychia turbinata* (Raddi) L. Söderstr. & Vána Loc: 24; Substrate: Soil.

SOUTHBYACEAE

5. *Southbya tophacea* (Spruce) Spruce Loc: 34; Substrate: Soil.

LOPHOCOLEACEAE

6. *Lophocolea bidentata* (L.) Dumort. Loc: 4, 14, 28, 29, 54, 65; Substrate: Soil, soil bank, rock.

7. *L. heterophylla* (Schrad.) Dumort. Loc: 4, 28; Substrate: Soil, rock.

PLAGIOCHILACEAE

8. *Plagiochila porelloides* (Torr. ex Nees) Lindenb. Loc: 29; Substrate: Soil.

FRULLANIACEAE

9. *Frullania dilatata* (L.) Dumort. Loc: 1, 2, 3, 4, 5, 7, 8, 10, 14, 15, 17, 21, 22, 23, 28, 33, 41, 42, 47, 52, 53, 54, 56, 57, 58, 60, 62, 63, 64, 65, 66, 67, 70, 75, 76, 77, 78; Substrate: *Quercus infectoria* Oliv., *Quercus* sp., *Phillyrea latifolia* L., *Quercus frainetto*, *Quercus petraea* (Matt.) Liebl., *Fagus orientalis*, *Quercus cerris*, *Arbutus unedo* L., *Erica arborea* L., *Pinus brutia*, *Carpinus betulus*, *Castanea sativa*, *Styrax officinalis* L., *Juniperus* sp., log, soil, rock.

LEJEUNEACEAE

10. *Lejeunea lamecerina* (Steph.) Schiffn. Loc: 14, 29, 49, 76; Substrate: Rock, soil.

PORELLACEAE

11. *Porella cordaeana* (Huebener) Moore Loc: 3, 4, 7, 9, 14, 78; Substrate: *Quercus* sp., soil.

RADULACEAE

12. *Radula complanata* (L.) Dumort. Loc: 13, 14, 28, 29, 54, 60, 64, 76; Substrate: Soil, rock, *Platanus orientalis* L., *Quercus* sp., *Corylus* sp., *Fagus orientalis*.

METZGERIACEAE

13. *Metzgeria furcata* (L.) Corda Loc: 7, 29, 53; Substrate: *Quercus* sp., soil, *Fagus orientalis*.

FOSSOMBRONIACEAE

14. *Fossombronia angulosa* (Dicks.) Raddi Loc: 24, 34; Substrate: Soil.

15. *F. pusilla* (L.) Nees Loc: 30, 33; Substrate: Soil.

PELLIACEAE

16. *Apopellia endivifolia* (Dicks.) Nebel & Quandt Loc: 14, 49; Substrate: Soil, wet soil.

LUNULARIACEAE

17. *Lunularia cruciata* (L.) Dumort. ex Lindb. Loc: 13, 14, 15, 18, 28, 29, 46, 49, 50, 51, 55; Substrate: Soil, wet soil, cloth.

AYTONIACEAE

18. *Mannia androgyna* (L.) A. Evans Loc: 50, 51; Substrate: Soil.

19. *Reboulia hemisphaerica* (L.) Raddi Loc: 12, 41, 46; Substrate: Soil.

CORSINIACEAE

20. *Corsinia coriandrina* (Spreng.) Lindb. Loc: 30, 51; Substrate: Soil.

MARCHANTIACEAE

21. *Marchantia polymorpha* L. Loc: 41; Substrate: Soil.

RICCIACEAE

22. *Riccia beyrichiana* Hampe ex Lehm. Loc: 35; Substrate: Soil.
23. *R. bicarinata* Lindb. Loc: 30, 32, 35, 44, 46, 50, 51; Substrate: Soil.
24. *R. bifurca* Hoffm. Loc: 30, 37, 46, 51; Substrate: Soil.
25. *R. cavernosa* Hoffm. Loc: 74; Substrate: Soil.
26. *R. ciliata* Hoffm. Loc: 35; Substrate: Soil.
27. *R. ciliifera* Link ex Lindenb. Loc: 51, 53; Substrate: Soil.
28. *R. crozalsii* Levier Loc: 32, 53; Substrate: Soil.
29. *R. gougetiana* Durieu & Mont. Loc: 35, 40, 46, 50, 51, 52, 53; Substrate: Soil, soil covering the rock.
30. *R. macrocarpa* Levier Loc: 35; Substrate: Soil.
31. *R. michelii* Raddi Loc: 32, 35; Substrate: Soil.
32. *R. nigrella* DC. Loc: 46, 50, 51; Substrate: Soil.
33. *R. sorocarpa* Bisch. Loc: 28, 35, 41, 50, 51, 52, 53; Substrate: Soil.
34. *R. subbifurca* Warnst. ex Croz. Loc: 51; Substrate: Soil.

TARGIONIACEAE

35. *Targionia hypophylla* L. Loc: 30; Substrate: Soil.

SPHAEROCARPACEAE

36. *Sphaerocarpos europaeus* Lorb. Loc: 30, 39, 70; Substrate: Soil.
37. *S. michelii* Bellardi Loc: 26; Substrate: Soil bank.

BRYOPHYTA

POLYTRICHACEAE

1. *Atrichum undulatum* (Hedw.) P. Beauv. Loc: 4, 64; Substrate: Soil.
2. *Pogonatum aloides* (Hedw.) P. Beauv. Loc: 4, 28, 53, 64, 65, 68; Substrate: Soil bank, soil.
3. *Polytrichum juniperinum* Hedw. Loc: 64, 70; Substrate: Soil, rock.

ENCALYPTACEAE

4. *Encalypta vulgaris* Hedw. Loc: 41, 46, 49; Substrate: Soil, soil covering the rock.

FUNARIACEAE

5. *Entosthodon attenuatus* (Dicks.) Bryhn Loc: 48; Substrate: Soil.
6. *E. convexus* (Spruce) Brugués Loc: 45; Substrate: Soil.
7. *E. pulchellus* (H. Philib.) Brugués Loc: 28; Substrate: Soil.
8. *Funaria hygrometrica* Hedw. Loc: 14, 29, 38, 41, 43, 78; Substrate: Soil.

TIMMIELLACEAE

9. *Timmiella barbuloidea* (Brid.) Mönk. Loc: 1, 27; Substrate: Soil, soil covering the rock.

DICRANELLACEAE

10. *Dicranella heteromalla* (Hedw.) Schimp. Loc: 4, 11; Substrate: Soil.
11. *D. howei* Renauld & Cardot Loc: 14, 26, 27, 64, 72; Substrate: Wet soil, soil, soil bank.
12. *D. varia* (Hedw.) Schimp. Loc: 24, 30; Substrate: Soil, soil covering the rock.

FISSIDENTACEAE

13. *Fissidens adianthoides* Hedw. Loc: 49; Substrate: Soil, rock.
14. *F. arnoldi* R. Ruthe Loc: 33, 75; Substrate: Soil.
15. *F. bryoides* Hedw. Loc: 9, 28, 29, 75; Substrate: Soil, soil bank.
16. *F. taxifolius* Hedw. Loc: 1, 4, 5, 9, 10, 13, 14, 15, 16, 18, 22, 24, 28, 29, 30, 33, 34, 40, 54, 55, 57, 59, 62, 63, 65, 70; Substrate: Soil, *Pinus brutia*, soil bank.
17. *F. rivularis* (Spruce) Schimp. Loc: 27, 38, 65, 67; Substrate: Soil.
18. *F. viridulus* (Sw.) Wahlenb. Loc: 13, 30, 33, 52, 54, 67, 72, 76; Substrate: Soil.

DICRANACEAE

19. *Dicranum scoparium* Hedw. Loc: 4, 49, 64, 65; Substrate: Soil, soil covering the rock.

RHABDOWEISIACEAE

20. *Dicranoweisia cirrata* (Hedw.) Lindb. ex Milde Loc: 11, 28, 42, 45, 59, 62, 63; Substrate: Soil, *Pinus brutia*.

DITRICHACEAE

21. *Cheilothea chloropus* (Brid.) Lindb. Loc: 32, 33, 35, 45, 46, 50, 53; Substrate: Soil, soil covering the rock.
22. *Pleuridium acuminatum* Lindb. Loc: 9, 48, 64, 65, 67; Substrate: Soil.

POTTIACEAE

23. *Acaulon muticum* Müll. Hal. Loc: 31; Substrate: Soil.
24. *A. triquetrum* Müll. Hal. Loc: 26; Substrate: Soil.
25. *Aloina aloides* (W.D.J. Koch ex Schultz) Kindb. Loc: 26; Substrate: Soil.
26. *Barbula unguiculata* Hedw. Loc: 9, 14, 39, 59; Substrate: Soil, soil bank, soil covering the rock.
27. *Bryoerythrophyllum recurvirostrum* (Hedw.) P.C.Chen Loc: 70, 72; Substrate: Rock, Soil covering the rock.
28. *Cinclidotus fontinaloides* (Hedw.) P. Beauv. Loc: 49; Substrate: Wet rock.
29. *Dialytrichia mucronata* (Brid.) Broth. Loc: 14, 22, 55; Substrate: Soil, *Castanea sativa*.
30. *Didymodon acutus* (Brid.) K. Saito Loc: 1, 7, 9, 73, 76, 78; Substrate: Soil, rock.
31. *D. australasiae* (Hook. & Grev.) R.H. Zander Loc: 7, 8, 49, 75; Substrate: Soil, soil covering the rock.

32. *D. cordatus* Jur. Loc: 19; Substrate: Wall.
33. *D. insulanus* (De Not.) M.O. Hill Loc: 1, 7, 12, 13, 14, 17, 26, 27, 29, 31, 49, 52, 58, 59, 68, 72, 76; Substrate: Soil, rock, soil covering the rock.
34. *D. luridus* Hornsch. ex Spreng. Loc: 7, 9, 13, 14, 16, 27, 32, 43, 45, 50, 55, 58, 59, 75; Substrate: Soil, rock, soil bank, soil covering the rock.
35. *D. rigidulus* Hedw. Loc: 49, 55, 76; Substrate: Rock.
36. *D. sinuosus* (Mitt.) Delogne Loc: 8, 55; Substrate: Rock.
37. *D. spadiceus* (Mitt.) Limpr. Loc: 20; Substrate: Soil.
38. *D. tophaceus* (Brid.) Lisa Loc: 4, 9, 10, 26, 27, 62, 78; Substrate: Rock, soil, soil covering the rock.
39. *D. umbrosus* (Müll. Hal.) R.H. Zander Loc: 7; Substrate: Soil.
40. *D. vinealis* (Brid.) R.H. Zander Loc: 2, 12, 54, 55, 58; Substrate: Soil, rock, soil covering the rock.
41. *Ephemerum serratum* (Schreb. ex Hedw.) Hampe Loc: 67; Substrate: Soil.
42. *Eucladium verticillatum* (With.) Bruch & Schimp. Loc: 15, 78; Substrate: Tufa.
43. *Gymnostomum calcareum* Nees & Hornsch. Loc: 14, 26; Substrate: Soil.
44. *Microbryum starckeanum* (Hedw.) R.H. Zander Loc: 26; Substrate: Soil.
45. *Pottiopsis caespitosa* (Brid.) Blockeel & A.J.E.Sm. Loc: 33, 34; Substrate: Soil.
46. *Pseudocrossidium hornschuchianum* (Schultz) R.H. Zander Loc: 32, 40, 48, 51, 59, 64; Substrate: Soil, peat.
47. *Syntrichia princeps* (De Not.) Mitt. Loc: 1, 27, 41, 50; Substrate: *Quercus* sp., *Quercus cerris*, soil covering the rock.
48. *S. ruralis* (Hedw.) F. Weber & D. Mohr. Loc: 27, 40, 41, 45, 46, 53, 75; Substrate: Soil covering the rock, soil.
49. *S. ruraliformis* (Besch.) Mans. Loc: 27, 40; Substrate: Soil covering the rock.
50. *S. virescens* (De Not.) Ochyra Loc: 14; Substrate: Rock.
51. *Tortella humilis* (Hedw.) Jenn. Loc: 1, 18, 27, 30, 38, 40, 46, 60, 75, 76; Substrate: Soil, rock.
52. *T. inclinata* (R. Hedw.) Limpr. Loc: 27, 76; Substrate: Soil covering the rock.
53. *T. squarrosa* (Brid.) Limpr. Loc: 1, 2, 12, 14, 17, 27, 28, 32, 35, 40, 43, 45, 46, 49, 50, 51, 53; Substrate: Soil, rock, soil covering the rock.
54. *T. tortuosa* (Schrad. ex Hedw.) Limpr. Loc: 4, 7, 8, 9, 12, 14, 17, 32, 41, 78; Substrate: Soil, rock, root.

55. *Tortula acaulon* (With.) R.H. Zander Loc: 25, 26, 28, 30; Substrate: Soil.
56. *T. atrovirens* (Sm.) Lindb. Loc: 16; Substrate: Soil.
57. *T. brevissima* Schiffn. Loc: 10, 16, 48, 57, 58, 61; Substrate: Soil, Rock.
58. *T. inermis* (Brid.) Mont. Loc: 7, 9, 16, 32, 37, 49, 58, 75; Substrate: Soil, Soil covering the rock, rock.
59. *T. muralis* Hedw. Loc: 4, 6, 7, 9, 13, 16, 19, 31, 55, 58, 61, 75; Substrate: Rock, Soil, Wall.
60. *T. schimperi* M.J. Cano, O. Werner & J. Guerra Loc: 53, 64; Substrate: Soil.
61. *T. subulata* Hedw. Loc: 5, 7, 12, 17, 26, 27, 28, 30, 31, 35, 41, 43, 47, 55, 59, 62, 65, 66, 78; Substrate: Soil, ock, Soil covering the rock.
62. *Trichostomum brachydontium* Bruch Loc: 9, 14, 33, 34, 37, 54, 55, 60; Substrate: Soil, Soil bank, Rock.
63. *Weissia condensa* (Voit) Lindb. Loc: 67; Substrate: Soil.
64. *W. controversa* Hedw. Loc: 1, 2, 9, 10, 20, 22, 28, 30, 32, 37, 38, 40, 41, 53, 54, 55, 56, 59, 62, 63, 65, 66, 67, 70, 75; Substrate: Soil, *Pinus brutia*, *Styrax officinalis*, *Quercus cerris*, Root, Soil covering the rock, Soil bank.

GRIMMIACEAE

65. *Grimmia decipiens* (Schultz) Lindb. Loc: 2, 13, 49; Substrate: Rock, Soil covering the rock.
 66. *G. dissimulata* E. Maier Loc: 60; Substrate: Rock.
 67. *G. funalis* (Schwägr.) Bruch & Schimp. Loc: 2, 11, 33, 75; Substrate: Rock.
 68. *G. laevigata* (Brid.) Brid. Loc: 11, 17, 33, 46, 56; Substrate: Soil, Soil covering the rock, Rock.
 69. *G. lisae* De Not. Loc: 8, 14, 17, 56, 73, 75; Substrate: Rock.
 70. *G. pulvinata* (Hedw.) Sm. Loc: 1, 2, 7, 8, 9, 10, 11, 13, 14, 16, 17, 22, 27, 31, 41, 46, 49, 54, 55, 56, 58, 60, 61, 62, 75, 78; Substrate: Rock, *Quercus* sp., *Quercus cerris*, *Pyrus* sp., Soil covering the rock, Root.
 71. *G. trichophylla* Grev. Loc: 56, 61; Substrate: Soil, Rock.
 72. *Racomitrium lanuginosum* (Hedw.) Brid. Loc: 70; Substrate: Rock.
 73. *Schistidium apocarpum* (Hedw.) Bruch & Schimp. Loc: 55; Substrate: Rock.
 74. *S. confertum* (Funck) Bruch & Schimp. Loc: 14, 55, 56; Substrate: Rock.
- #### HEDWIGIACEAE
75. *Hedwigia ciliata* (Hedw.) Boucher Loc: 56; Substrate: Rock.
 76. *H. stellata* Hedenäs Loc: 10; Substrate: Rock.

BARTRAMIACEAE

77. *Anacolia webbii* (Mont.) Schimp. Loc: 70; Substrate: Rock.
78. *Bartramia aprica* Müll. Hal. Loc: 4, 12, 41; Substrate: Soil, Root.

BRYACEAE

79. *Bryum argenteum* Hedw. Loc: 30, 33, 45, 61; Substrate: Soil, Rock.
80. *B. dichotomum* Hedw. Loc: 12; Substrate: Soil.
81. *Ptychostomum capillare* (Hedw.) Holyoak & N. Pedersen Loc: 2, 3, 4, 6, 7, 9, 10, 11, 12, 17, 19, 20, 21, 26, 28, 31, 49, 53, 54, 55, 59, 60, 63, 64, 75, 76, 78; Substrate: Rock, Soil, *Quercus cerris*, Soil covering the rock, Wet soil.
82. *P. imbricatulum* (Müll.Hal.) Holyoak & N. Pedersen Loc: 7, 8, 9, 14; Substrate: Soil, Rock.
83. *P. torquescens* (Bruch & Schimp.) Ros & Mazimpaka Loc: 9, 12, 13, 60; Substrate: *Styrax officinalis* undergrowth, Rock.

MNIACEAE

84. *Plagiomnium medium* (Bruch & Schimp.) T.J. Kop. Loc: 4; Substrate: Soil.
85. *P. undulatum* (Hedw.) T.J. Kop. Loc: 14, 18, 55, 57, 70, 76; Substrate: Soil.
86. *Pohlia cruda* (Hedw.) Lindb. Loc: 2; Substrate: Soil.
87. *P. melanodon* (Brid.) A.J. Shaw Loc: 15, 62; Substrate: Soil.

ORTHOTRICHACEAE

88. *Codonoblepharon forsteri* (Dicks.) Goffinet Loc: 28; Substrate: *Fagus orientalis*.
89. *Lewinskya acuminata* (H. Philib.) F. Lara, Garilleti & Goffinet Loc: 54; Substrate: *Quercus* sp.
90. *L. affinis* (Brid.) F. Lara, Garilleti & Goffinet Loc: 1, 2, 3, 4, 5, 8, 13, 14, 18, 20, 21, 22, 27, 33, 47, 48, 53, 54, 55, 57, 60, 62, 63, 64, 65, 66, 67, 68, 70, 76; Substrate: *Quercus* sp., *Quercus infectoria*, *Phillyrea latifolia*, *Quercus frainetto*, *Quercus petraea*, *Tilia* sp., *Arbutus unedo*, *Pyrus* sp., *Platanus* sp., *Juniperus* sp., *Hedera helix* L., *Quercus cerris*.
91. *L. breviseta* (F. Lara, Garilleti & Mazimpaka) F. Lara, Garilleti & Goffinet Loc: 75; Substrate: *Quercus* sp.
92. *L. rupestris* (Schleich. ex Schwägr.) F. Lara, Garilleti & Goffinet Loc: 2, 45, 55, 60; Substrate: Rock, *Phillyrea latifolia*.
93. *L. shawii* (Wilson) F. Lara, Garilleti & Goffinet Loc: 5, 8, 21; Substrate: *Quercus* sp.
94. *L. speciosa* (Nees) F. Lara, Garilleti & Goffinet Loc: 1, 3, 4, 7, 8, 10, 13, 17, 20, 42, 54, 62, 66; Substrate: *Quercus infectoria*, *Quercus frainetto*, *Quercus* sp., *Quercus cerris*, *Pinus brutia*.

95. *L. striata* (Hedw.) F. Lara, Garilleti & Goffinet Loc: 1, 3, 4, 5, 17, 20, 22, 23, 47, 48, 54, 62, 63, 65, 66, 67, 70; Substrate: *Quercus* sp., *Quercus frainetto*, *Pyrus*, *Quercus cerris*.
96. *L. tortidontia* (F. Lara, Garilleti & Mazimpaka) F. Lara, Garilleti & Goffinet Loc: 7; Substrate: *Quercus* sp.
97. *Orthotrichum anomalum* Hedw. Loc: 27, 54, 55, 56; Substrate: Soil covering the rock, Rock.
98. *O. cupulatum* Hoffm. ex Brid. Loc: 5; Substrate: Rock.
99. *O. diaphanum* Schrad. ex Brid. Loc: 1, 3, 7, 10, 13, 14, 17, 18, 20, 27, 33, 48, 54, 55, 57, 60, 62, 63, 64, 67, 75; Substrate: *Quercus cerris*, *Quercus infectoria*, *Quercus* sp., *Platanus orientalis*, *Juglans regia* L., *Tilia* sp., *Pyrus* sp., *Fagus* sp.
100. *O. pallens* Bruch ex Brid. Loc: 1, 8, 13, 54; Substrate: *Quercus cerris*, *Quercus* sp.
101. *O. pulchellum* Brunt Loc: 27, 55; Substrate: Soil covering the rock.
102. *O. pumilum* Sw. Loc: 1, 7, 8, 18, 29, 48, 55, 64, 65; Substrate: *Quercus cerris*, *Quercus* sp., *Pyrus* sp., *Fagus* sp.
103. *O. scanicum* Grönvall Loc: 67; Substrate: *Quercus* sp.
104. *O. schimperii* Hammar Loc: 4, 7, 53, 64; Substrate: *Quercus* sp., *Fagus* sp.
105. *O. stellatum* Brid. Loc: 7, 17, 76; Substrate: *Quercus* sp., *Quercus infectoria*.
106. *O. tenellum* Bruch ex Brid. Loc: 1, 5, 7, 10, 14, 17, 18, 27, 53, 54, 57, 60, 62, 64, 67, 68, 76; Substrate: *Quercus cerris*, *Quercus infectoria*, Rock, *Quercus* sp., *Juglans regia*, *Pyrus* sp., *Fagus* sp., *Platanus orientalis*, *Quercus frainetto*.
107. *Pulviger a lyellii* (Hook. & Taylor) Plášek, Sawicki & Ochrya. Loc: 3, 5, 22, 23, 27, 45, 48, 53, 62, 64; Substrate: *Quercus* sp., *Carpinus* sp., *Pyrus* sp., *Phillyrea latifolia*, *Fagus orientalis*.
108. *Zygodon rupestris* Schimp. ex Lorentz Loc: 1, 4, 10, 13, 20, 22, 28, 29, 42, 53, 54, 55, 62, 64, 65, 66, 67, 68; Substrate: *Pinus brutia*, *Quercus* sp., *Platanus orientalis*, *Arbutus unedo*, *Fagus* sp., *Quercus frainetto*.
109. *Z. viridissimus* (Dicks.) Brid. Loc: 10, 42, 56, 62, 63; Substrate: *Quercus cerris*, *Pinus brutia*.

FONTINALACEAE

110. *Fontinalis antipyretica* Hedw. Loc: 49; Substrate: Rock in water.

PLAGIOTHECIACEAE

111. *Plagiothecium cavifolium* (Brid.) Z. Iwats. Loc: 68; Substrate: Rock.

112. *P. denticulatum* (Hedw.) Schimp. Loc: 4, 5, 14, 53; Substrate: Soil, *Cornus mas*, *Pinus brutia*, *Quercus* sp., Rock.

113. *P. nemorale* (Mitt.) A. Jaeger Loc: 4; Substrate: Soil.

PTERIGYNANDRACEAE

114. *Pterigynandrum filiforme* Hedw. Loc: 5, 53, 64, 65; Substrate: *Fagus orientalis*, *Quercus* sp., Decayed *Fagus orientalis*.

HABRODONTACEAE

115. *Habrodon perpusillus* (De Not.) Lindb. Loc: 21; Substrate: *Quercus* sp.

CLIMACIACEAE

116. *Climacium dendroides* (Hedw.) F. Weber & D. Mohr. Loc: 14; Substrate: *Quercus* sp.

AMBLYSTEGIACEAE

117. *Amblystegium serpens* (Hedw.) Schimp. Loc: 3, 16, 27, 55, 76; Substrate: Soil covering the rock, Soil.

118. *A. varium* (Hedw.) Lindb. Loc: 54, 76; Substrate: Soil.

119. *Cratoneuron filicinum* (Hedw.) Spruce. Loc: 13; Substrate: Soil.

120. *Hygroamblystegium humile* (P. Beauv.) Vanderp., Hedenäs & Goffinet. Loc: 30; Substrate: Soil covering the rock.

121. *H. tenax* (Hedw.) Jenn. Loc: 46, 76; Substrate: Soil covering the rock.

SCORPIDIACEAE

122. *Scorpidium revolvens* (Sw.) Rubers. Loc: 4; Substrate: Soil covering the rock.

BRACHYTHECIACEAE

123. *Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen. Loc: 3, 4, 5, 7, 13, 14, 18, 24, 27, 28, 53, 64, 65, 76; Substrate: Soil covering the rock, Soil, *Quercus coccifera* L.

124. *Brachythecium albicans* (Hedw.) Schimp. Loc: 7, 9, 14, 24, 26, 30, 62, 72; Substrate: Soil covering the rock, *Styrax officinalis*.

125. *B. campestre* (Müll. Hal.) Schimp. Loc: 39; Substrate: Soil covering the rock.

126. *B. capillaceum* (F. Weber & D. Mohr) Giacom. Loc: 13, 14, 27, 54, 76, 78; Substrate: Wet soil, Rock, Soil covering the rock.

127. *B. geheebii* Milde. Loc: 27; Substrate: Soil covering the rock.

128. *B. laetum* (Brid.) Schimp. Loc: 70; Substrate: Soil covering the rock.

129. *B. rivulare* Schimp. Loc: 13, 14; Substrate: Wet rock, Rock.

130. *B. rutabulum* (Hedw.) Schimp. Loc: 4, 9, 12, 14, 16, 19, 24, 27, 28, 29, 31, 40, 49, 54, 70; Substrate: Soil covering the rock, Wet rock, Soil bank, *Platanus orientalis*, Wet branch, Soil covering the rock.

131. *Cirriphyllum crassinervium* (Taylor ex Wilson) Loeske & M. Fleisch. Loc: 12; Substrate: Soil covering the rock.

132. *Eurhynchiastrum pulchellum* (Hedw.) Ignatov & Huttunen. Loc: 13; Substrate: Soil covering the rock.

133. *Eurhynchium striatum* (Schreb. ex Hedw.) Schimp. Loc: 29; Substrate: Soil covering the rock.

134. *Homalothecium lutescens* (Hedw.) H. Rob. Loc: 14, 21, 27, 52, 63; Substrate: Soil covering the rock, *Quercus* sp., Soil covering the rock, *Platanus orientalis* bark, Soil.

135. *H. sericeum* (Hedw.) Schimp. Loc: 1, 2, 3, 7, 10, 12, 13, 14, 15, 17, 19, 20, 22, 27, 28, 29, 41, 42, 45, 53, 54, 55, 56, 57, 58, 59, 62, 63, 65, 66, 70, 76; Substrate: Soil covering the rock, Soil, Rock, *Quercus* sp., *Cornus mas* L., Log, Soil covering the rock, *Quercus infectoria*, *Platanus orientalis*, *Fagus orientalis*.

136. *Kindbergia praelonga* (Hedw.) Ochyra. Loc: 14, 15, 18, 24, 26, 59, 68; Substrate: *Quercus* sp., Soil, Root.

137. *Microeurhynchium pumilum* (Wilson) Ignatov & Vanderp. Loc: 14, 15, 24, 28, 29, 57, 70; Substrate: Soil, rock, *Cornus mas*, soil bank.

138. *Oxyrrhynchium hians* (Hedw.) Loeske. Loc: 7, 14, 18, 27, 28, 29, 55, 57; Substrate: Soil, wet rock, rock.

139. *O. schleicheri* (R. Hedw.) Röhl. Loc: 9, 30, 59; Substrate: Soil, *Pinus brutia*.

140. *O. speciosum* (Brid.) Warnst. Loc: 9, 29, 31, 76; Substrate: Soil.

141. *Pseudoscleropodium purum* (Hedw.) M. Fleisch. Loc: 31, 42, 49; Substrate: Soil, soil covering the rock.

142. *Rhynchostegiella tenella* (Dicks.) Limpr. Loc: 20, 24, 60; Substrate: Soil, wet rock.

143. *R. curviseta* (Brid.) Limpr. Loc: 27; Substrate: Soil covering the rock.

144. *Rhynchostegium riparioides* (Hedw.) Cardot. Loc: 12, 28, 46, 49, 64, 76; Substrate: Rock, wet pool, wet rock.

145. *Sciuro-hypnum starkei* (Brid.) Ignatov & Huttunen. Loc: 4, 9, 18; Substrate: Soil bank, rock.

146. *Scleropodium cespitans* (Müll. Hal.) L.F. Koch. Loc: 17, 52; Substrate: Soil.

147. *S. touretii* (Brid.) L.F. Koch. Loc: 4, 7, 9, 14, 28, 54, 59, 62, 65, 68, 75; Substrate: Soil, *Fagus orientalis*.

148. *Scorpiurium circinatum* (Brid.) M. Fleisch. & Loeske. Loc: 10, 12, 13, 14, 15, 27, 29, 59, 68, 76; Substrate: Soil, rock, soil covering the rock.

149. *S. sendtneri* (Schimp.) M. Fleisch. Loc: 19, 78; Substrate: Soil.

HYPNACEAE

150. *Hypnum bambergeri* Schimp. Loc: 63; Substrate: *Juniperus* sp.

151. *H. cupressiforme* Hedw. Loc: 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 27, 28, 31, 33, 34, 40, 41, 42, 45, 47, 48, 49, 52, 53, 54, 55, 57, 58, 60, 62, 63, 64, 65, 66, 67, 68, 71, 75, 77, 78; Substrate: *Quercus* sp., *Pinus brutia*, soil, *Quercus infectoria*, rock, *Quercus frainetto*, decayed log, *Fagus orientalis*, *Quercus cerris*, soil covering the rock, *Platanus orientalis*, log, *Arbutus unedo*, *Erica arborea*, *Castanea sativa*, *Pyrus* sp., *Phillyrea latifolia*, *Hedera helix*.

152. *H. cupressiforme* var. *lacunosum* Brid. Loc: 1; Substrate: *Pinus brutia*.

153. *H. resupinatum* Taylor. Loc: 3, 4, 7, 11, 14, 17, 22, 29, 42, 47, 53, 54, 64, 67; Substrate: Rock, base of *Carpinus* sp., *Quercus* sp., soil, *Fagus* sp.

LEUCODONTACEAE

154. *Leucodon sciurioides* (Hedw.) Schwägr. Loc: 1, 3, 7, 13, 14, 15, 21, 22, 45, 52, 53, 54, 55, 64, 65, 75; Substrate: *Quercus cerris*, *Quercus* sp., soil, *Quercus infectoria*, *Phillyrea latifolia*, *Platanus orientalis*, decayed *Fagus orientalis*.

155. *Nogopterium gracile* (Hedw.) Crosby & W.R. Buck. Loc: 12, 41, 49, 54, 56, 76; Substrate: Rock, root.

ANTITRICHACEAE

156. *Antitrichia californica* Sull. ex Lesq. Loc: 5, 14; Substrate: Rock, *Quercus* sp.

157. *A. curtipendula* (Hedw.) Brid. Loc: 4, 64; Substrate: Rock, soil.

NECKERACEAE

158. *Alleniella complanata* (Hedw.) S. Olsson, Enroth & D. Quandt. Loc: 14, 53, 64; Substrate: Rock, *Corylus* sp., *Quercus cerris*, *Fagus orientalis*, *Cornus mas*.

159. *Homalia trichomanoides* (Hedw.) Brid. Loc: 14, 29; Substrate: *Quercus* sp., *Cornus mas*.

160. *Leptodon smithii* (Dicks. ex Hedw.) F. Weber & D. Mohr. Loc: 7, 14, 76; Substrate: *Quercus* sp., *Cornus mas*, *Pinus brutia*.

161. *Thamnobryum alopecurum* (Hedw.) Gangulee. Loc: 14, 68; Substrate: Rock.

LEMBOPHYLLACEAE

162. *Isoetecium alopecuroides* (Lam. ex Dubois) Isov. Loc: 5; Substrate: Log.

ANOMODONTACEAE

163. *Anomodon viticulosus* (Hedw.) Hook. & Taylor. Loc: 14, 29, 68, 76; Substrate: *Quercus* sp., rock.

Discussion

Among the bryophyte samples evaluated in this study, only one hornwort taxon was encountered. Liverworts, the second largest group, were represented by 37 taxa. The taxa comprising two or more families and genera are presented graphically in Figures 3 and 4, respectively.

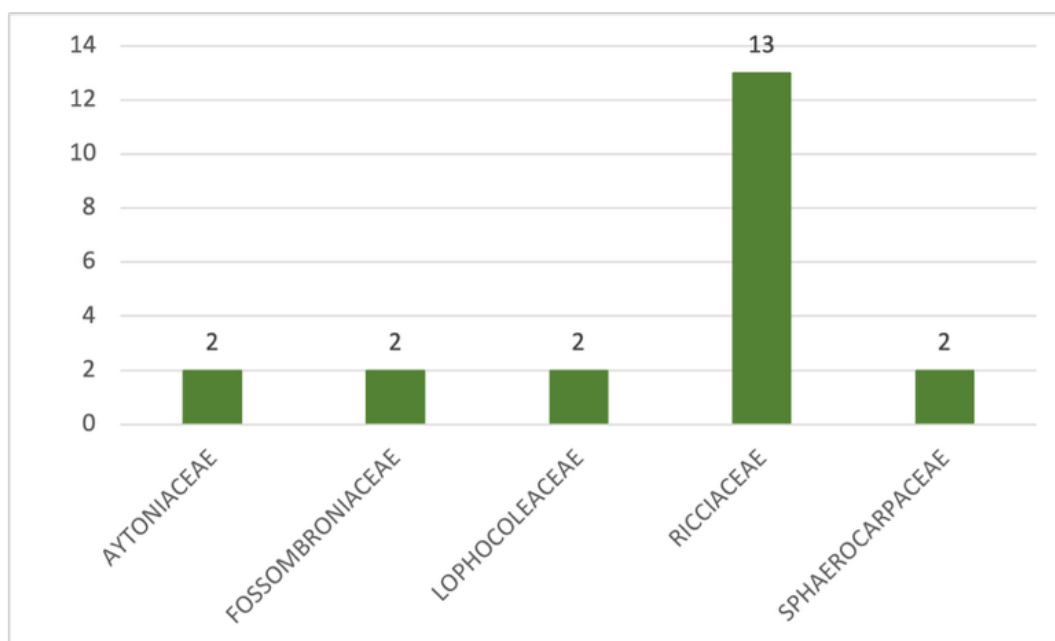


Figure 3. Liverwort families containing two or more taxa

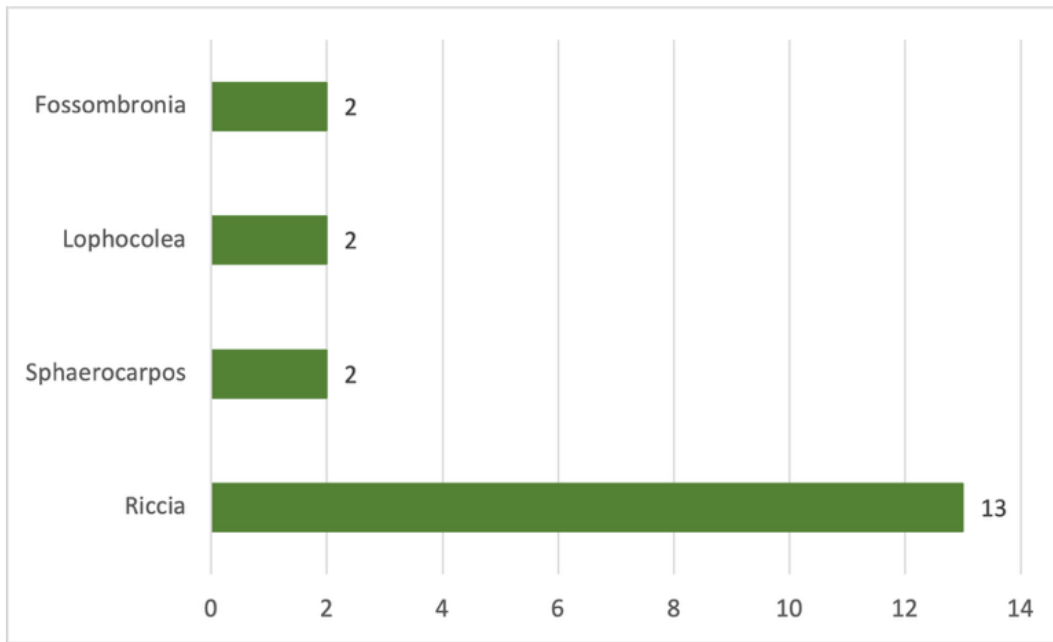


Figure 4. Liverwort genera containing two or more taxa

The study area exhibits transitional characteristics between the Mediterranean and oceanic climates. Several taxa typical of the Black Sea region of Türkiye including *Calypogeia azurea*, *Lophocolea bidentata*, *L. heterophylla*, and *Plagiochila porelloides* were recorded particularly in localities influenced by the oceanic climate. Additionally, species with restricted distributions and rarely reported in previous studies, such as *Cephaloziella hampeana*, *Scapania undulata*, *Mesoptychia turbinata*, *Southbya tophacea*, and *Plagiochila porelloides*, were encountered. The most widespread taxa in the study area were *Frullania dilatata* and *Lunularia cruciata*. The presence of moisture-demanding species such as *Scapania undulata*, *Plagiochila porelloides*, *Calypogeia azurea*, *Lophocolea bidentata*, and *L. heterophylla* clearly indicates that parts of the study area are under the influence of an oceanic climate.

When evaluated in terms of liverwort diversity, the findings show that the research area is predominantly under Mediterranean climatic influence. The genus *Riccia* is represented by 13 taxa (Fig. 3), accounting for nearly half of the 29 taxa known from Türkiye. This indicates that the study area serves as a biogenetic reserve for this genus. Among these, *Riccia cavernosa* is particularly noteworthy due to its restricted distribution and ecological specificity. Previously known only from Sinop and Karabük, this species has now been recorded for the third time from Lapseki (Fig.

5). Its survival depends on the continuity of habitats exposed by receding water bodies.

Bryophyta is represented by a total of 162 taxa, comprising 30 families and 80 genera, indicating the high diversity of mosses within the study area. As illustrated in Figure 6, the Mediterranean character of the area is also supported by the abundance of xerophilous families such as Pottiaceae, Orthotrichaceae, and Grimmiaceae. Within Orthotrichaceae, *Codonoblepharon forsteri* previously reported from Baba Mountain (Muğla) and later from Ayancık (Sinop) was collected for the third time from this area (Fig. 7). This species typically occupies tree cavities that temporarily collect water following rainfall.

Although numerous streams are active during early spring, most dry up in summer. Moisture-retaining microhabitats within these dry stream beds provide vital refugia for sensitive bryophyte taxa. The only continuously flowing stream is Alpagut Creek. These hydrological features strongly shape bryophyte distribution, with water availability functioning as a limiting ecological factor. Taxa such as *Rhynchostegium riparioides*, *Cinclidotus fontinaloides*, *Dialytrichia mucronata*, *Amblystegium* spp., and *Fontinalis antipyretica* were recorded from moist habitats.



Figure 5. Habitat and morphological appearance of *Riccia cavernosa*

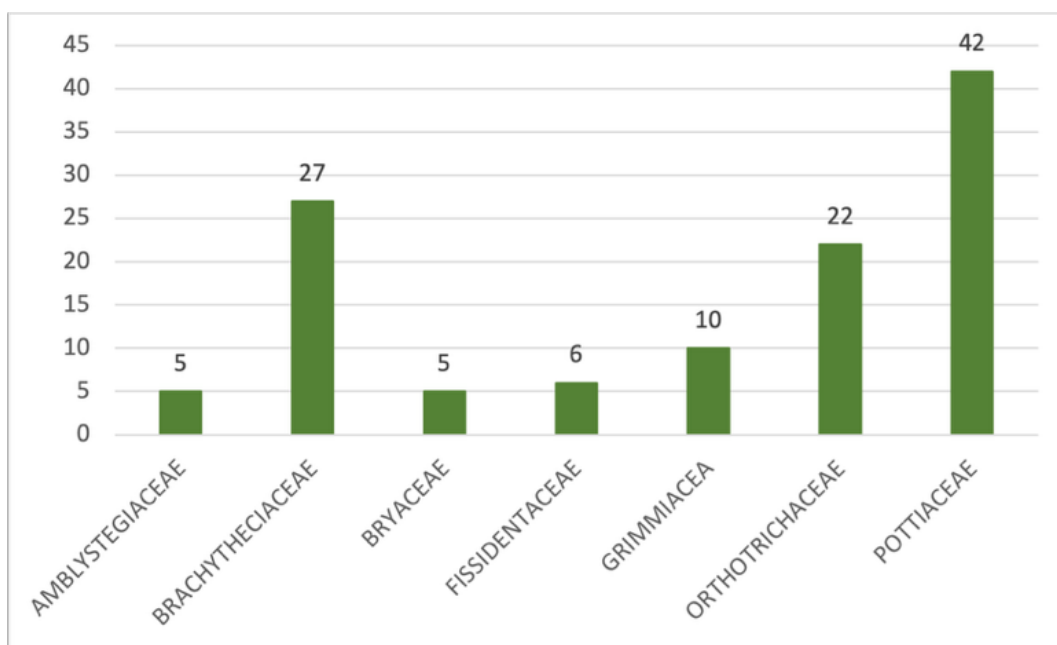


Figure 6. Families with the highest number of moss taxa



Figure 7. *Codonoblepharon forsteri* and its Habitat

Ephemeral bryophytes were frequently observed in early spring before the emergence of grassland vegetation. Among liverworts, *Riccia* species were common, while *Pleuridium acuminatum*, *Acaulon* spp., and *Tortula acaulon* were also encountered. *Ephemerum serratum*, a well-known ephemeral taxon, was found in plowed fields. Taxa typical of the Black Sea region *Atrichum undulatum*, *Plagiothecium cavifolium*, *P. denticulatum*, *P. nemorale*, and *Climacium dendroides* were collected from beech forests, which represent highly sensitive habitats requiring strict conservation.

Bryophytes lack true organs such as roots, stems, and leaves; therefore, they utilize a wide range of substrates. An example from the study area showed bryophytes growing even on discarded fabric materials. Different vegetation units in the area host diverse bryophyte communities, particularly rich in epiphytes. As presented in Table 2, oak trees especially *Quercus cerris* harbored the highest epiphytic diversity. Epiphyte richness varied depending on tree age, bark roughness, and environmental moisture.

A total of 200 bryophyte records were obtained from the study area, a number comparatively high

relative to previous floristic studies in nearby regions (Table 3).

Although the numbers reported in the last two studies appear high when compared to the bryophytes of the Lapseki Mountains, approaching the comparison of study areas in different regions from a single perspective will inevitably lead to misleading conclusions. This is also true for the floras of nearby regions where bryophyte diversity is considered lower. Such differences may stem from factors including the year the study was conducted, the increase in the number and accessibility of floristic and revisionary works, the timing and frequency of field visits, the number of localities surveyed, and the knowledge and experience of the researchers, particularly their ability to collect ephemeral taxa. Alternatively, they may arise from area-specific characteristics such as geomorphological structure, elevation above sea level, and the presence of diverse vegetation types.

However, direct comparisons between studies may be misleading due to factors such as differences in fieldwork periods, accessibility of taxonomic literature, number of surveyed localities, researchers' expertise (especially in collecting ephemeral taxa), geomorphological structure, altitude, and vegetation diversity.

Table 2. Epiphytic bryophytes

Taxon	<i>Arbutus unedo</i>	<i>Carpinus betulus</i>	<i>Castanea sativa</i>	<i>Cornus mas</i>	<i>Corylus</i> sp.	<i>Erica</i> sp.	<i>Fagus orientalis</i>	<i>Hedera helix</i>	<i>Juglans regia</i>	<i>Juniperus</i> sp.	<i>Phillyrea latifolia</i>	<i>Pinus brutia</i>	<i>Platanus orientalis</i>	<i>Pyrus</i> sp.	<i>Quercus</i> sp.	<i>Quercus cerris</i>	<i>Quercus coccifera</i>	<i>Quercus frainetto</i>	<i>Quercus infectoria</i>	<i>Quercus petraea</i>	<i>Styrax officinalis</i>	<i>Tilia</i> sp.
<i>Frullania dilatata</i> (L.) Dumort.	x	x	x			x	x			x	x	x			x	x	x	x	x	x	x	
<i>Porella cordaeana</i> (Huebener) Moore															x							
<i>Radula complanata</i> (L.) Dumort.					x		x						x		x							
<i>Metzgeria furcata</i> (L.) Corda							x															
<i>Fissidens taxifolius</i> Hedw.												x										
<i>Dicranoweisia cirrata</i> (Hedw.) Lindb. ex Milde												x										
<i>Dialytrichia mucronata</i> (Brid.) Broth.			x																			
<i>Weissia controversa</i> Hedw.												x				x					x	
<i>Grimmia pulvinata</i> (Hedw.) Sm.														x	x	x						
<i>Ptychostomum capillare</i> (Hedw.) Holyoak & N. Pedersen																x						
<i>Codonoblepharon forsteri</i> (Dicks.) Goffinet							x															
<i>Lewinskya acuminata</i> (H. Philib.) F. Lara, Garilleti & Goffinet															x							
<i>L. affinis</i> (Brid.) F. Lara, Garilleti & Goffinet	x							x		x	x		x	x	x	x		x	x	x		x
<i>L. breviseta</i> (F. Lara, Garilleti & Mazimpaka) F. Lara, Garilleti & Goffinet															x							
<i>L. rupestris</i> (Schleich. ex Schwägr.) F. Lara, Garilleti & Goffinet											x											
<i>L. shawii</i> (Wilson) F. Lara, Garilleti & Goffinet															x							
<i>L. speciosa</i> (Nees) F. Lara, Garilleti & Goffinet												x				x		x	x			
<i>L. striata</i> (Hedw.) F. Lara, Garilleti & Goffinet														x	x	x		x				
<i>L. tortidontia</i> (F. Lara, Garilleti & Mazimpaka) F. Lara, Garilleti & Goffinet																x						x
<i>Orthotrichum diaphanum</i> Schrad. ex Brid.							x		x				x	x	x	x		x				
<i>O. pallens</i> Bruch ex Brid.															x	x						
<i>O. pumilum</i> Sw.							x							x	x	x						
<i>O. scanicum</i> Grönvall															x							
<i>O. schimperi</i> Hammar							x								x							
<i>O. stellatum</i> Brid.															x				x			
<i>O. tenellum</i> Bruch ex Brid.							x		x				x	x	x	x		x	x			
<i>Pulvigeria lyellii</i> (Hook. & Taylor) Plášek, Sawicki & Ochyra			x				x				x			x	x							
<i>Zygodon rupestris</i> Schimp. ex Lorentz	x						x					x	x		x			x				
<i>Z. viridissimus</i> (Dicks.) Brid.												x				x						
<i>Plagiothecium denticulatum</i> (Hedw.) Schimp.				x																		

Table 3. Comparison of the bryophyte flora recorded in the Lapseki Mountains and in nearby regions

	Hornwort	Liverwort	Moss
Taxonomy and ecology of liverworts of Kaz Dağı National Park and its environs	-	22	-
The moss flora of Bozcaada	-	-	36
Mosses of Çal Mountain (Manisa)	-	-	38
Cryptogam flora of Çanakkale and Gökçeada I: Mosses (Musci)	-	-	31
Contribution to the moss flora of western Turkey: Biga Peninsula (Çanakkale) and Thrace region	-	-	119
Liverwort (Marchantiophyta) and hornwort (Anthocerotophyta) flora of Yenice District (Çanakkale): New floristic findings from the northern part of Mount Ida (Kaz Dağı)	1	29	-
The Bryophyte Flora of Lapseki Mountains	1	37	164

Conclusion

The Lapseki Mountains, situated at the intersection of Mediterranean and oceanic climatic zones, host a rich

and ecologically diverse bryophyte flora comprising 200 taxa. The coexistence of Mediterranean and Black Sea elements, the presence of rare and restricted

taxa, and the persistence of moisture-dependent species highlight the region as an ecologically significant and sensitive area. The study demonstrates that the continuity of bryophyte diversity in the region depends heavily on the preservation of microhabitats regulated by hydrological seasonality and forest canopy structure. Accordingly, sustainable forest management particularly avoiding interventions in deciduous forests is essential. Furthermore, mining activities in the region pose a growing threat to natural habitats, and, combined with the increasing frequency of forest fires, present serious risks to ecosystem stability.

Overall, the findings emphasize the urgent need for effective conservation measures to protect the bryophyte diversity and ecological integrity of the Lapseki Mountains.

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Ethical Approval

No need to ethical approval for this study.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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