

The Bryophyte Flora of Aladağlar National Park (Turkey)

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Abstract: In this study, the bryophyte flora of Aladağlar National Park was investigated. Based on the result of identifications of 3672 bryophyte specimens collected from the national park, total of 249 taxa were found (13 liverworts, 236 mosses). Among them, *Marchantia polymorpha* L. subsp. *ruderalis* Bischl. & Boisselier, *Preissia quadrata* (Scop.) Nees, *Physcomitrium eurystomum* Sendtn, *Schistidium sordidum* I.Hagen, *Brachythecium capillaceum* (F.Weber & D.Mohr) Giacom, and *Hypnum bambergieri* Schimp. are recorded for the second time from Turkey. Also, a total of 57 taxa were reported for the first time from C13, according to the grid-square in the system of Turkey adopted by Henderson.

Keywords: Bryophyte, Moss, Liverwort, Flora, Aladağlar National Park, Turkey

INTRODUCTION

Turkey is an ecological bridge between Europe and Asia so it is very rich in terms of floral diversity. Turkey belongs to three phytogeographical regions: the Euro-Siberian region is located in the northern Anatolia, the Mediterranean region includes the southern part of Turkey and the Irano-Turanian region covers Inner and Eastern Anatolia. These phytogeographical regions have provided Turkey with large diversity of habitats, ecosystems and climate. The vascular plants, also vascular cryptogams have been studied more thoroughly in Turkey, but the floristic studies about bryophytes in Turkey are still insufficient.

The majority of floristic studies on bryophytes have been focused on the western, northern and southern Turkey (Özenoğlu & Gökler, 2002; Papp, 2004; Savaroğlu & Tokur, 2006; Özenoğlu Kiremit, 2007; Uyar et al., 2007; Cangül & Ezer, 2010; Düzenli et al., 2011; Batan & Özdemir, 2011). There are also quite a few published studies for the Inner Anatolia region (Can et al., 2013; Ariöz et al., 2012; Kara et al., 2013; Kara et al., 2014). Although there is a recent lichen flora, several moss records and vascular vegetation studies of the area (Halıcı & Aksoy, 2009; Kürschner, 1982; Tüfekçi et al., 2002; Ünalı & Toroğlu, 2007; Tonguç Yayıntaş & Yayıntaş, 2010), no detailed study has yet been made on the bryophyte flora of Aladağlar National Park. Therefore, the aim of the present study is to compile the bryophyte flora of Aladağlar National Park, one of the largest national parks in Turkey, and to make contribution to the whole

Turkish bryoflora. This study can be used as a guide for future bryological studies in Turkey.

MATERIALS AND METHODS

Study area: Aladağlar National Park is one of the largest national parks in Turkey. It is covering an area of approximately 55.000 ha. It has many habitats and ecosystems due to ecotones intermingled between Mediterranean and Irano-Turanian. The Irano-Turanian which forms the north-western and western parts are within Niğde province and the northern parts are within Kayseri province. The Mediterranean which forms the southern and eastern parts are within Adana province (Halıcı & Aksoy, 2009). These phytogeographical regions have given Aladağlar National Park the richness of floristic diversity. It is situated in the C13 square in grid system of Turkey adopted by Henderson (1961) (Fig. 1).

Unfortunately, there is no weather station in the Aladağlar National Park. The nearest stations are located in Pozantı (Adana), Yahyalı (Kayseri) and Çamardı (Niğde). According to the values from these stations, the climate type of the research area is mainly Mediterranean characterized by dry and warm summers. Average annual precipitation at Pozantı is 707.2 mm, 451.2 mm at Yahyalı, and 388.7 mm at Çamardı. Accordingly, the study area has an arid climate type in Kayseri and Niğde and semi-arid Mediterranean climate type in Adana (Akman, 1990).

The main types of vegetation in Aladağlar National Park are forest, steppe and rock vegeta-

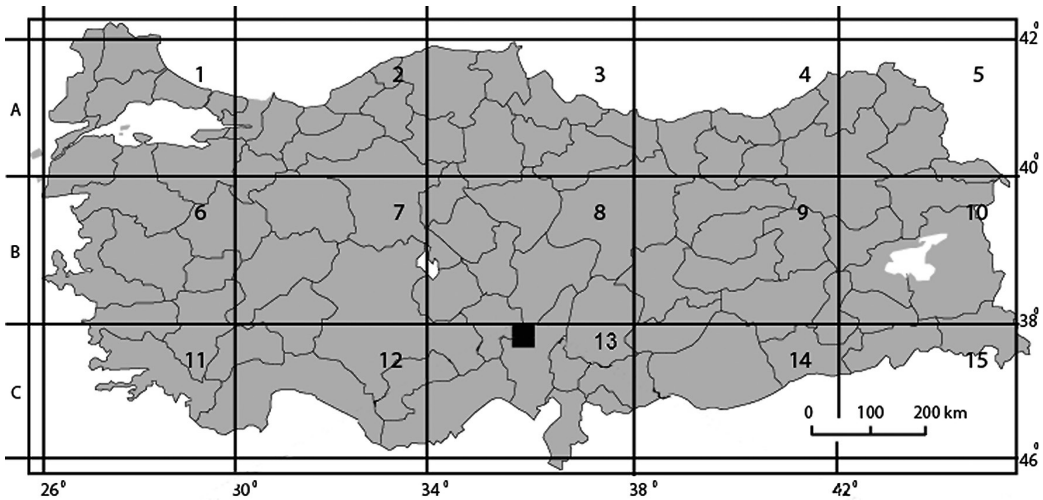


Fig. 1. Aladağlar National Park (■) in Turkey

tion. But south-east part of the study area has maquis elements with *Pinus brutia* Ten., *Quercus coccifera* L., *Q. infectoria* Olivier, *Q. cerris* L., *Q. pubescens* Willd., *Styrax officinalis* L., *Pistacia terebinthus* L., *Juniperus oxycedrus* L., *Pyrus elaeagnifolia* Pall., *Prunus spinosa* L., *Crataegus orientalis* Pall. Ex M. Bieb., *Rosa canina* L., *Amygdalus orientalis* Mill. and *Platanus orientalis* L. The forest vegetation in the study area has been formed by *Pinus nigra* Arn., *Juniperus excelsa* Bieb., *Cedrus libani* A. Rich., *Abies cilicica* (Antoine & Kotschy) Carriere subsp. *cilicica*. The steppe and rock vegetation consist mainly of *Artemisia* spp., *Stipa* spp., *Bromus* spp., *Acantholimon* spp., *Astragalus* spp., *Convolvulus* spp., *Ajuga* spp., *Salvia* spp., *Euphorbia* spp., *Muscari* spp., *Allium* spp., *Gypsophila* spp., *Minuartia* spp. and *Verbascum* spp. (Davis, 1965-1985; Ünalı & Torođlu, 2007; Tüfekçi et al., 2002).

Data Source: The materials of the study were collected from aquatic and wet habitats, rock and soil surface, trunks of living and dead trees in Aladağlar National Park between the years 2011 and 2013. The bryological investigations were carried out at 117 localities (Appendix 1). The specimens collected from the study area were identified by using appropriate literature which is widely used by European and Turkish bryologists (Zander, 1993; Greven, 1995; Muñoz, 1999; Paton, 1999; Pedrotti, 2001; 2006; Greven, 2003; Heyn & Herrnstadt, 2004; Smith, 1990; 2004; Guerra et al., 2006; 2007; Bruges

et al., 2007). Specimens are deposited in the herbarium of the Niğde University.

The latest taxonomic and distributional status of taxa in regional scale for Turkey and Southwest Asia was determined by reviewing the recent literatures (Uyar & Çetin, 2004; Kürschner & Erdağ, 2005; Özenođlu Kiremit & Keçeli, 2009; Kürschner & Frey, 2011). Nomenclature of the floristic list follows Ros et al. (2007) and Hill et al. (2006). For each taxon, only one specimen number (i.e., A 268) was given to avoid repetition in the floristic list. The second records for Turkey and the new records for the C13 are indicated in the floristic list presented in Appendix 2.

RESULTS AND DISCUSSION

As the result of the study, 236 moss taxa belonging to 29 families and 75 genera, 13 liverwort taxa belonging to 8 families and 9 genera were recorded. Hornworts were not found in the study area. A total of 13 liverwort taxa were found in the Aladağlar National Park. The number of liverwort taxa and their abundance is very low in the study area because liverworts are more sensitive to drought than mosses.

In total of 57 bryophyte taxa were reported for the first time from C13, according to the grid-square system of Turkey adopted by Henderson (1961). *Pseudocalliergon turgescens* (T.Jensen) Loeske, *Cephalozia ambigua* C. Massal., and *Orthotrichum consimile* Mitt. were recorded for

the first time for Turkish bryoflora during fieldworks of this study (Ezer & Kara, 2012; Ezer et al., 2014a; Ezer et al., 2014b). In addition to, *Schistidium brunnescens* Limpr. subsp. *griseum* (Nees & Hornsch.) H.H.Blom was reported for the second time from the national park by Ezer et al. (2013). Also, *Marchantia polymorpha* L. subsp. *ruderalis* Bischl. & Boisselier, *Preissia quadrata* (Scop.) Nees, *Physcomitrium eurystomum* Sendtn, *Schistidium sordidum* I.Hagen, *Brachythecium capillaceum* (F.Weber & D.Mohr) Giacom, and *Hypnum bambergeri* Schimp. are recorded for the second time in Turkey.

Marchantia polymorpha subsp. *ruderalis* was reported by Ros et al. (2007) from Turkey without details on the collecting locality. In the present study, the taxon was reported for the second time from Turkey and Southwest Asia with locality details. *Preissia quadrata* was recorded by Şimşek et al. (2010) from Ilgaz Mountain in Turkey. *Physcomitrium eurystomum* was recorded for the first time from Yamanlar Mountain by Walter & Leblebici (1969). *Schistidium sordidum* has been reported from Ağrı Mountain by Batan et al. (2013). *Brachythecium capillaceum* has been reported from Erciyes Mountain by Kara et al. (2014). *Hypnum bambergeri* was reported for the first time from Gerede-Aktaş forests (Bolu) by Çetin & Yurdakulol (1985). The taxa are reported for the second time from Aladağlar National Park in the present study.

The Pottiaceae (26.7%) is the most species-rich moss family in the Aladağlar National Park, with 66 taxa in 20 genera. Pottiaceae contains many species tolerant to long drought seasons. Therefore, it is not a surprise that it is the most common and abundant family in the study area. Other dominating families are Grimmiaceae (28 taxa in 2 genera), Brachytheciaceae (28 taxa in 11 genera), Bryaceae (22 taxa in 1 genera), Orthotrichaceae (16 taxa in 2 genera) and Amblystegiaceae (12 taxa in 8 genera). These six families form 68.7% of the total taxa in this study, and the other families constitute 31.3%.

The dominant liverwort family is Marchantiaceae with 4 taxa in 2 genera. Liverworts are more drought-sensitive than mosses. As a consequence they grow under more humid, shady and hygrophytic conditions in the study area.

The genera with the highest number of taxa are *Bryum* (22), *Orthotrichum* (15), *Schistidium* (15), *Grimmia* (13), *Syntrichia* (12) and *Didymo-*

don (11). The other genera are represented with seven or less taxa in the Aladağlar National Park.

Due to the distribution of the arid (in Kayseri and Niğde) and semi-arid (in Adana) Mediterranean climate type in the national park, the proportion of acrocarpous mosses (68%) that grow usually under xerophytic and sunny conditions is higher than pleurocarpous mosses (32%) that usually grow under more humid, shaded and hygrophytic conditions.

As might be expected from the vegetation types in the Aladağlar National Park, especially steppe and rocky vegetation, epilithic bryophyte taxa (55%) are dominant there. These are followed by epigeic taxa (18.7%), taxa on thin soil layer overlying rocks (18.3%) and then epiphytic taxa (3.7%). The high rate of epilithic bryophyte taxa found in national park in turn indicates that the majority of the investigated area consists of steppe and rocky vegetation. In addition, the area has subalpine and alpine zones.

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Appendix 1. Details of the study sites. L.N.: Locality number

L.N.	Date of collection	Altitude (m)	GPS coordinate	Locality name	Vegetation type
1	15.10.2011	766	37°46'540"N35°23'250"E	Kapuzbaşı waterfall	Forest
2	16.10.2011	2043	37°49'280"N35°07'150"E	Entrance of Narpuz valley	Steppe
3	16.10.2011	2606	37°49'330"N35°08'190"E	Narpuz valley, Taşpınar place	Steppe
4	31.03.2012	692	37°46'530"N35°23'220"E	Under the Kapuzbaşı (Elif) waterfalls	Forest
5	31.03.2012	694	37°46'500"N35°23'280"E	North of the Kapuzbaşı (Elif) waterfalls	Forest
6	31.03.2012	698	37°46'300"N35°23'380"E	Northern slopes of Kapuzbaşı Kapuzbaşı (Elif) waterfalls	Forest
7	31.03.2012	726	37°46'280"N35°23'400"E	Northern slopes of Kapuzbaşı Kapuzbaşı (Elif) waterfalls	Forest
8	31.03.2012	785	37°46'911"N35°25'180"E	Northern slopes of Büyükçakır village	Forest
9	31.03.2012	725	37°50'619"N35°29'113"E	Northern slopes of Büyükçakır village, under the <i>Platanus orientalis</i> gallery forest	Forest
10	01.04.2012	1615	37°52'753"N35°06'608"E	Upper rocky slopes of Pınarbaşı village	Steppe
11	01.04.2012	1664	37°52'770"N35°06'664"E	Upper rocky slopes of Pınarbaşı village	Steppe
12	01.04.2012	1675	37°52'746"N35°06'711"E	Upper rocky slopes of Pınarbaşı village	Steppe
13	01.04.2012	1616	37°51'709"N35°06'148"E	Entrance of Cimbar valley	Steppe and Rock
14	01.04.2012	1572	37°52'709"N35°06'444"E	Pınarbaşı village - Demirkazık village	Steppe
15	12.05.2012	1560	37°47'913"N35°17'868"E	Hacer forests (Fasıcı)	Forest
16	12.05.2012	1565	37°47'901"N35°17'886"E	Hacer forests (Fasıcı)	Forest
17	13.05.2012	1608	37°47'900"N35°17'887"E	Hacer forests (Fasıcı)	Forest
18	13.05.2012	1600	37°48'048"N35°18'159"E	Hacer forests (Peynirini)	Forest
19	13.05.2012	1627	37°48'157"N35°18'307"E	Hacer forests (Bozarmut)	Forest
20	13.05.2012	1488	37°48'231"N35°18'860"E	Hacer forests (Çanak)	Forest
21	13.05.2012	1560	37°47'913"N35°17'868"E	Hacer forests (Hacerçukuru)	Forest
22	09.06.2012	1862	37°45'962"N35°06'733"E	Emli valley (Belik forest)	Forest
23	09.06.2012	1869	37°45'962"N35°06'751"E	Emli valley (Belik forest)	Forest
24	09.06.2012	1970	37°45'991"N35°07'845"E	Emli valley (Belik forest)	Forest
25	09.06.2012	1742	37°46'093"N35°07'850"E	Southern slopes of Emli valley (Belik forest)	Forest
26	09.06.2012	1968	37°45'939"N35°07'790"E	Emli valley, under the <i>Abies cilicica</i> forest	Forest
27	09.06.2012	1992	37°45'933"N35°07'976"E	Emli valley, under the <i>Abies cilicica</i> forest	Forest
28	09.06.2012	2051	37°45'865"N35°07'978"E	Emli valley, under the <i>Abies cilicica</i> forest	Forest
29	09.06.2012	2103	37°45'858"N35°08'004"E	Emli valley, under the <i>Abies cilicica</i> forest	Forest
30	09.06.2012	1947	37°45'986"N35°07'849"E	Emli valley, under the <i>Abies cilicica</i> forest	Forest
31	09.06.2012	1738	37°46'173"N35°05'531"E	Emli valley (Sarimehmetler)	Steppe
32	09.06.2012	1850	37°45'940"N35°06'631"E	Emli valley (Sarimehmetler)	Steppe
33	09.06.2012	1686	37°46'650"N35°04'905"E	Emli valley (Sarimehmetler)	Steppe
34	10.06.2012	2150	37°39'574"N35°03'658"E	Mazmılı plateau summit	Steppe and Rock
35	10.06.2012	2140	37°39'228"N35°03'531"E	Mazmılı Mountain, Çağılı	Steppe
36	10.06.2012	2110	37°38'870"N35°02'991"E	Mazmılı Mountain, Kocaçayır	Steppe
37	10.06.2012	2050	37°38'802"N35°02'628"E	Mazmılı Mountain, İbrecarının yurdu	Steppe
38	10.06.2012	1722	37°38'863"N35°01'072"E	Mazmılı Mountain	Steppe and Rock
39	10.06.2012	1647	37°39'238"N35°00'716"E	Mazmılı Mountain, under the <i>Pinus brutia</i> and <i>Pinus nigra</i> mixed forest	Forest
40	18.07.2012	1270	37°46'629"N35°19'152"E	Tekeboyun	Steppe and Rock
41	18.07.2012	1367	37°46'615"N35°19'329"E	Karapınar	Steppe and Rock
42	18.07.2012	1820	37°43'812"N35°17'588"E	Acıman (Tırak)	Steppe and Rock
43	18.07.2012	1928	37°43'811"N35°17'584"E	Upper slopes of Acıman (Tırak)	Steppe and Rock
44	19.07.2012	1912	37°44'030"N35°17'303"E	Yamalıkıkaya	Steppe and Rock

L.N.	Date of collection	Altitude (m)	GPS coordinate	Locality name	Vegetation type
45	19.07.2012	1980	37°44'381"N35°19'185"E	Kurttaşı	Steppe and Rock
46	19.07.2012	1787	37°44'669"N35°18'218"E	Karadere	Steppe and Rock
47	19.07.2012	1913	37°45'219"N35°18'172"E	Çardaklı	Steppe and Rock
48	19.07.2012	1886	37°45'274"N35°18'029"E	Çıkrıkkeleri	Steppe and Rock
49	19.07.2012	1559	37°45'835"N35°18'827"E	Darlık	Steppe and Rock
50	19.07.2012	1774	37°45'404"N35°18'201"E	Yalağındibi - tatlısu	Steppe and Rock
51	19.07.2012	1677	37°45'588" K 35°18'775"E	Katranlıtaş	Steppe and Rock
52	19.07.2012	1455	37°46'226"N35°18'932"E	Güçügüntarlası	Steppe and Rock
53	19.07.2012	1322	37°46'515"N35°19'044"E	Guatrçşemesi	Steppe and Rock
54	12.09.2012	2007	37°45'986"N35°07'851"E	Çayırılık	Steppe
55	12.09.2012	2095	37°45'677"N35°08'779"E	Kocadölek	Steppe
56	12.09.2012	2228	37°46'153"N35°08'249"E	Eznevıt	Steppe
57	12.09.2012	2450	37°46'440"N35°07'767"E	Eznevıtkafası 1	Steppe
58	12.09.2012	2467	37°46'461"N35°07'482"E	Eznevıtkafası 2	Steppe
59	12.09.2012	2480	37°46'355"N35°07'346"E	Eznevıtkafası	Steppe
60	12.09.2012	2510	37°46'768"N35°07'033"E	Near the irrigation channel	Steppe
61	12.09.2012	2418	37°47'388"N35°06'816"E	Northern slopes of Pınar	Steppe
62	12.09.2012	2175	37°46'172"N35°06'203"E	Ahıllar valley	Steppe
63	12.09.2012	2085	37°45'228"N35°05'479"E	Kocadölek, Emli valley	Steppe and Rock
64	12.09.2012	2092	37°45'158"N35°05'505"E	Entrance of the Kocadölek	Steppe and Rock
65	12.09.2012	2084	37°45'233"N35°05'471"E	Kocadölek, Belik forest	Forest and Rock
66	12.09.2012	2090	37°45'212"N35°05'460"E	Road of the Kocadölek	Forest and Rock
67	12.09.2012	2089	37°45'670"N35°08'772"E	Kocadölek 2	Steppe and Rock
68	13.09.2012	1650	37°51'582"N35°06'386"E	Cimbar valley 1	Steppe and Rock
69	13.09.2012	1770	37°51'540"N35°06'603"E	Cimbar valley 2	Steppe and Rock
70	13.09.2012	1735	37°51'585"N35°06'743"E	Cimbar valley 3	Steppe and Rock
71	13.09.2012	1930	37°51'284"N35°06'858"E	Cimbar valley summit	Rock
72	13.09.2012	1825	37°51'552"N35°06'523"E	Cimbar valley summit	Rock
73	13.09.2012	1890	37°51'689"N35°06'667"E	Cimbar valley	Steppe and Rock
74	13.09.2012	1718	37°51'204"N35°05'738"E	Upper slopes of the Demirkazık chalet	Steppe and Rock
75	13.09.2012	1850	37°50'490"N35°06'023"E	South-western slopes of the Sokullupınar	Steppe and Rock
76	13.09.2012	1623	37°51'570"N35°05'841"E	Demirkazık chalet and it's vicinity	Steppe and Rock
77	13.09.2012	1564	37°53'051"N35°07'139"E	Toluyarığı	Rock
78	03.11.2012	2127	37°28'973"N35°30'677"E	Kaleboğazı	Steppe and Rock
79	03.11.2012	2170	37°54'147"N35°09'692"E	Kaleboğazı 2	Steppe and Rock
80	03.11.2012	1776	37°54'491"N35°07'557"E	Northern slopes of the Kaleboğazı	Steppe and Rock
81	03.11.2012	1673	37°45'198"N35°02'653"E	Lorut Mountain	Forest
82	03.11.2012	1705	37°45'668"N35°02'989"E	Lorut Mountain (Yarıkpınarı)	Steppe and Rock
83	04.11.2012	1656	37°47'450"N35°04'182"E	Emli plateau	Steppe
84	13.04.2013	1332	38°03'108"N35°17'590"E	Derebağ waterfall	Forest
85	13.04.2013	1395	38°03'095"N35°17'595"E	Derebağ waterfall 2	Forest
86	13.04.2013	1475	38°03'072"N35°17'590"E	Derebağ waterfall 3	Forest
87	14.04.2013	1336	38°03'098"N35°17'595"E	Derebağ waterfall	Forest
88	14.04.2013	1266	38°04'440"N35°19'517"E	Çağlayan	Forest
89	14.04.2013	1235	38°04'703"N35°21'206"E	Kirazlı	Forest
90	25.05.2013	2011	37°40'440"N35°04'200"E	Mazmılı Mountain	Steppe
91	25.05.2013	1980	37°40'292"N35°03'223"E	Mazmılı Mountain	Steppe
92	25.05.2013	2120	37°40'129"N35°03'858"E	Mazmılı Mountain, Rocky slope	Steppe and Rock
93	26.05.2013	1970	37°39'857"N35°03'840"E	Damızlıtaş	Steppe and Rock

L.N.	Date of collection	Altitude (m)	GPS coordinate	Locality name	Vegetation type
94	26.05.2013	1670	37°39'177"N35°00'685"E	Dağdibi Village, Under the <i>Pinus brutia</i> and <i>Pinus nigra</i> mixed forest	Forest
95	26.05.2013	2150	37°39'238"N35°03'537"E	Musallagediği	Steppe and Rock
96	22.06.2013	2245	37°53'941"N35°10'382"E	Eşektaş	Steppe and Rock
97	22.06.2013	2228	37°53'966"N35°10'305"E	Kaleboynu	Steppe and Rock
98	23.06.2013	1695	37°55'068"N35°08'103"E	Entrance of Maden boğazı	Steppe and Rock
99	23.06.2013	1685	37°55'053"N35°08'033"E	Totarınçayı	Steppe and Rock
100	23.06.2013	1735	37°55'128"N35°08'531"E	Demircikleri Cave	Steppe and Rock
101	04.07.2013	735	37°55'203"N35°07'191"E	Güney waterfall	Forest
102	04.07.2013	705	37°55'129"N35°08'526"E	Büyükçakır	Steppe and Rock
103	05.07.2013	2225	37°50'320"N35°06'540"E	Cimbar valley (Arpalık)	Steppe and Rock
104	05.07.2013	1635	37°46'093"N35°07'850"E	Near the Ecemiş River	Steppe
105	25.08.2013	1925	37°49'543"N35°06'857"E	Sokullupınar camping area 1	Steppe and Rock
106	25.08.2013	2036	37°49'541"N35°06'867"E	Sokullupınar camping area 2	Steppe and Rock
107	26.08.2013	3090	37°48'008"N35°10'925"E	Yedigöller	Rock
108	26.08.2013	3070	37°48'008"N35°10'925"E	Büyükgöl Lake	Rock
109	26.08.2013	3080	37°48'215"N35°10'840"E	Rocky slopes of the Yedigöller	Rock
110	26.08.2013	2045	37°49'474"N35°07'075"E	Direktaş	Rock
111	26.08.2013	2310	37°49'555"N35°07'682"E	Kayacıküstü valley	Rock
112	26.08.2013	3120	37°48'120"N35°10'185"E	Road of the Hasta hoca Lake and it's environment	Rock
113	26.08.2013	3010	37°48'250"N35°10'256"E	Upper slopes of the Hasta hoca Lake	Rock
114	27.08.2013	3350	37°47'991"N35°08'967"E	Kızılkaya	Rock
115	27.08.2013	3438	37°48'074"N35°09'248"E	Road of the Emler Summit	Rock
116	27.08.2013	2940	37°47'990"N35°08'040"E	Dinlenmetaşı	Rock
117	27.08.2013	2637	37°48'510"N35°07'501"E	Kapı	Rock

Appendix 2. The Bryophyte Flora of Aladağlar National Park

L.N.: Locality number (see Appendix 1)

^Δ: new record for the C13, according to the grid-square in the system of Turkey adopted by Henderson (1961).

*: second record for Turkey

A 69b: voucher specimen number (A: Aladağlar)

Marchantiophyta

Aneuraceae

Aneura pinguis (L.) Dumort., L.N.: 4, 5, on soil, on soil covered rocks and in the water, A 69b.

Cleveaceae

^Δ*Athalamia hyalina* (Sommerf.) S. Hatt., L.N.: 3, 35, 68, 69, 78, 83, 85, 95, 108, on rock, soil and on soil covered rocks, A 24a.

Cephaloziaceae

^Δ*Cephalozia ambigua* C. Massal., L.N.: 108, on rock and on soil covered rocks, A 1018g.

^Δ*C. bicuspidata* (L.) Dumort., L.N.: 3, on soil, A 19b.

Lunulariaceae

Lunularia cruciata (L.) Lindb., L.N.: 4, on soil covered rocks, A 68a.

Marchantiaceae

Marchantia polymorpha L. subsp. *montivagans* Bischl. & Boisselier., L.N.: 42, on soil, A 516a.

M. polymorpha L. subsp. *polymorpha*., L.N.: 4, 15, 16, 42, 51, 70, on rock, soil, on soil covered rocks and in the water, A 38a.

^Δ*M. polymorpha* L. subsp. *ruderalis* Bischl. & Boisselier., L.N.: 42, on soil, A 527a.

^Δ*Preissia quadrata* (Scop.) Nees., L.N.: 51, on rock, A 585a.

Pelliaceae

Pellia epiphylla (L.) Corda., L.N.: 1, 4, 40, 101, on rock, soil and on soil covered rocks, A 2c.

Porellaceae

Porella pinnata L., L.N.: 46, 77, on rock and in the water, A 559c.

P. platyphylla (L.) Pfeiff., L.N.: 7, 15, 16, 21, 35, 40, 68, 77, 93, 95, on rock, on soil covered rocks and shrub root, A 111b.

Aytoniaceae

Reboulia hemisphaerica (L.) Raddi., L.N.: 1, 3, 4, 5, 6, 7, 13, 16, 21, 40, 68, 69, 102, 107, 108, on rock, soil, on soil covered rocks and rock cleft, A 6a.

Bryophyta

Polytrichaceae

Polytrichum juniperinum Hedw., L.N.: 42, 46, 47, on soil and on soil covered rocks, A 513a.

Timmiaceae

Timmia bavarica Hessel., L.N.: 15, 16, 19, 77, on rock, soil and on soil covered rocks, A 228b.

T. norvegica J.E.Zetterst., L.N.: 3, 16, 117, on rock, soil and on soil covered rocks, A 30a.

Encalyptaceae

Encalypta streptocarpa Hedw., L.N.: 1, 4, 5, 6, 10, 40, 77, on rock, soil and on soil covered rocks, A 6d.

^Δ*E. alpina* Sm., L.N.: 34, 39, 77, 92, on rock, soil and on soil covered rocks, A 387a.

E. rhaptocarpa Schwägr., L.N.: 14, 29, 40, 69, on rock, on soil covered rocks and tree (*Populus tremula* L.), A 200a.

E. spathulata Müll.Hal., L.N.: 11, 14, 26, 52, 70, 78, 80, 81, 84, 85, 87, 89, 97, on rock, soil, on soil covered rocks and tree (*Salix alba* L., *Juglans regia* L.), A 166e.

E. vulgaris Hedw., L.N.: 4, 5, 6, 9, 11, 12, 13, 14, 16, 19, 20, 25, 28, 29, 30, 31, 32, 35, 39, 40, 52, 54, 62, 66, 67, 68, 69, 70, 77, 78, 83, 84, 85, 92, 95, 97, 98, 100, 103, 105, 106, 109, on rock, soil, on soil covered rocks, rock cleft and tree (*Abies cilicica* Carr., *Juniperus oxycedrus* L.), A 33a.

E. ciliata Hedw., L.N.: 11, 106, on rock and on soil covered rocks, A 166f.

E. microstoma Bals.-Criv. & De Not., L.N.: 70, on rock, A 967a.

Funariaceae

Funaria hygrometrica Hedw., L.N.: 4, 6, 33, 42, 46, 52, 83, 85, 89, 93, 106, on rock, soil, on soil covered rocks, in the water and the rotten tree root, A 52c.

^Δ*Physcomitrium eurystomum* Sendtn., L.N.: 1, on soil, A 7.

Grimmiaceae

Grimmia alpestris (F. Weber & D. Mohr) Schleich., L.N.: 35, 91, 93, 94, on rock, A 400c.

G. anodon Bruch & Schimp., L.N.: 2, 4, 10, 11, 13, 14, 19, 24, 25, 26, 29, 30, 31, 32, 33, 34, 35, 37, 44, 54, 55, 56, 57, 58, 61, 65, 67, 68, 69, 75, 76, 77, 78, 80, 81, 83, 84, 85, 88, 89, 91, 92, 93, 94, 97, 98, 104, 105, 106, 110, 111, 114, 115, 117, on rock, soil and on soil covered rocks, A 15a.

G. dissimulata E.Maier., L.N.: 5, 9, on rock, A 89d.

G. laevigata (Brid.) Brid., L.N.: 4, 6, 7, 8, 11, 34, 90, 99, 101, 104, on rock and on soil covered rocks, A 76c.

G. lisae De Not., L.N.: 9, on rock, A 136c.

G. montana Bruch & Schimp., L.N.: 31, 34, 35, 37, 39, 42, 72, 75, 91, on rock, A 372g.

G. orbicularis Bruch ex Wilson., L.N.: 4, 7, 8, 9, 46, 80, 81, 82, on rock and soil, A 48d.

G. ovalis (Hedw.) Lindb., L.N.: 4, 6, 7, 8, 9, 34, 37, 39, 40, 42, 49, 51, 53, 81, 84, 90, 91, 92, 94, 98, 105, on rock, soil, on soil covered rocks and tree (*Juglans regia* L.), A 31h.

G. plagiopodia Hedw., L.N.: 70, 76, 106, on rock, A 706c.

G. pulvinata (Hedw.) Sm., L.N.: 4, 5, 6, 7, 8, 9, 10, 12, 14, 19, 20, 30, 31, 32, 39, 40, 46, 52, 68, 70, 73, 76, 77, 81, 84, 87, 88, 89, 90, 91, 92, 94, 98, 101, on rock, soil, on soil covered rocks, rock cleft and tree (*Malus sylvestris* (L.) Mill.), A 36c.

^Δ*G. reflexidens* Müll.Hal., L.N.: 31, 39, on rock, A 372h.

- G. trichophylla* Grev., L.N.: 4, 40, on rock, A 51a.
G. unicolor Hook., L.N.: 39, 55, on rock, A 430e.
Schistidium agassizi Sull. & Lesq., L.N.: 24, 39, 56, 69, 70, 77, 83, 105, on rock, A 314b.
S. apocarpum (Hedw.) Bruch & Schimp., L.N.: 4, 5, 6, 7, 15, 16, 17, 19, 20, 23, 24, 25, 26, 30, 31, 32, 44, 46, 54, 63, 65, 68, 69, 70, 71, 84, 85, 89, 105, on rock, soil and on soil covered rocks, A 371.
S. atrofusum (Schimp.) Limpr., L.N.: 4, 5, 25, 26, 30, 34, 35, 40, 42, 54, 65, 77, 83, 92, 95, on rock and on soil covered rocks, A 45c.
^Δ*S. brunnescens* Limpr. subsp. *brunnescens*, L.N.: 40, 54, on rock, A 476f.
^{*Δ}*S. brunnescens* Limpr. subsp. *griseum* (Nees & Hornsch.) H.H.Blom., L.N.: 6, 10, 17, 20, 40, 43, 44, 46, 71, on rock and rock cleft, A 101d.
S. confertum (Funck) Bruch & Schimp., L.N.: 12, 24, 26, 28, 35, 40, 42, 51, 55, 63, 77, on rock, A 177c.
S. crassipilum H.H.Blom., L.N.: 5, 18, on rock and on soil covered rocks, A 86c.
S. dupretii (Thér.) W.A.Weber., L.N.: 15, 26, on rock, A 233c.
S. elegantulum H.H.Blom., L.N.: 6, 24, 25, 26, 27, 40, 77, on rock, A 94c.
S. flaccidum (De Not.) Ochyra., L.N.: 12, 14, 39, 47, 57, 68, on rock, A 175d.
S. papillosum Culm., L.N.: 40, 51, 52, 53, on rock and soil, A 443a.
S. platyphyllum (Mitt.) H.Perss., L.N.: 4, 9, 10, 12, 15, 16, 19, 21, 24, 28, 29, 31, 44, 49, 68, 69, 71, 77, 84, 94, 106, on rock and soil, A 48e.
^Δ*S. pruinatum* (Wilson ex Schimp.) G.Roth., L.N.: 40, on rock, A 452g.
S. rivulare (Brid.) Podp., L.N.: 4, 5, 6, 7, 37, 44, 69, 77, 84, on rock and on soil covered rocks, A 46d.
^{*Δ}*S. sordidum* I.Hagen., L.N.: 33, 48, 68, on rock and soil, A 381c.

Fissidentaceae

- Fissidens dubius* P.Beauv., L.N.: 1, 4, 16, 68, 69, 70, on rock, soil and on soil covered rocks, A 6c.
F. serrulatus Brid., L.N.: 7, 70, on rock, A 117a.
F. viridulus (Sw. ex anon.) Wahlenb., L.N.: 4, on soil, A 75.

Ditrichaceae

- Ceratodon conicus* (Hampe) Lindb., L.N.: 13, 92, on soil, A 192e.
C. purpureus (Hedw.) Brid., L.N.: 3, 5, 40, 92, on rock, soil and on soil covered rocks, A 29b.
^Δ*Distichum capillaceum* (Hedw.) Bruch & Schimp., L.N.: 3, 28, 40, 53, 68, 69, 70, 71, 77, 95, 97, 98, 103, 107, 108, 117, on rock, soil and on soil covered rocks, A 19c.
^Δ*D. inclinatum* (Hedw.) Bruch & Schimp., L.N.: 3, 20, 21, 28, 95, on rock, soil and on soil covered rocks, A 27b.
^Δ*Ditrichum heteromallum* (Hedw.) E.Britton., L.N.: 3, 40, 42, 51, on rock, soil and on soil covered rocks, A 30d.
^Δ*D. subulatum* Hampe., L.N.: 3, on soil, A 29a.

Dicranaceae

- Dicranella howei* Renaud & Cardot., L.N.: 4, 5, 7, on soil and on soil covered rocks, A 57a.
D. varia (Hedw.) Schimp., L.N.: 1, 4, 5, 8, on rock, soil, on soil covered rocks and in the water, A 6b.
^Δ*Dicranum viride* (Sull. & Lesq.) Lindb., L.N.: 84, on rock, A 804f.

Pottiaceae

- ^Δ*Anoetangium aestivum* (Hedw.) Mitt., L.N.: 4, 117, on rock and on soil covered rocks, A 965b.
^Δ*A. handelii* Schiffn., L.N.: 3, on soil covered rocks, A 20a.
Eucladium verticillatum (With.) Bruch & Schimp., L.N.: 4, 5, 40, 68, on rock and on soil covered rocks, A 62c.
Gymnostomum calcareum Nees & Hornsch., L.N.: 17, 35, 51, 71, 83, on rock, soil and in the water, A 267c.
G. viridulum Brid., L.N.: 4, 5, 6, 70, 103, on rock, soil and on soil covered rocks, A 62d.
Gyroweisia tenuis (Hedw.) Schimp., L.N.: 4, 7, 52, 85, 86, 90, on rock, soil and on soil covered rocks, A 59g.
Tortella flavovirens (Bruch) Broth., L.N.: 7, on rock, A 110d.
T. inclinata (R.Hedw.) Limpr., L.N.: 9, 67, on rock and soil, A 137d.
T. inflexa (Bruch) Broth., L.N.: 84, on rock, A 804a.
T. nitida (Lindb.) Broth., L.N.: 31, on rock, A 371a.
T. tortuosa (Hedw.) Limpr., L.N.: 5, 6, 7, 10, 11, 15, 16, 17, 18, 19, 20, 21, 24, 25, 26, 27, 28, 32, 35, 39, 40, 44, 49, 51, 53, 54, 55, 56, 65, 67, 68, 69, 70, 71, 72, 73, 77, 81, 83, 92, 94, 95, 98, 100, 105, 106, 111, 116, 117, on rock, soil, on soil covered rocks, rock cleft and tree (*Abies cilicica* Carr., *Juniperus oxycedrus* L., *Populus tremula* L.), A 83i.
Trichostomum brachydontium Bruch., L.N.: 4, 7, on soil and on soil covered rocks, A 70d.
T. crispulum Bruch., L.N.: 4, 6, 10, 16, 29, 39, 76, on rock, soil, on soil covered rocks and rock cleft, A 33b.
Weissia brachycarpa (Nees & Hornsch.) Jur., L.N.: 39, on rock and on soil covered rocks, A 429c.
^Δ*W. condensa* (Voit) Lindb. var. *armata* (Thér. & Trab.) M.J.Cano, Ros & J.Guerra., L.N.: 11, on soil, A 171a.
W. condensa (Voit) Lindb. var. *condensa*, L.N.: 4, 6, 7, 8, 9, 11, 12, 13, 16, 31, 69, on rock, soil, on soil covered rocks and rock cleft, A 31f.
W. controversa Hedw., L.N.: 4, 5, 40, 61, 68, 70, 73, 78, on rock and on soil covered rocks, A 44c.
W. rutilans (Hedw.) Lindb., L.N.: 5, on soil covered rocks, A 86d.
Aloina aloides (Koch ex Schultz) Kindb., L.N.: 4, on soil covered rocks, A 44a.
A. ambigua (Bruch & Schimp.) Limpr., L.N.: 6, on rock, A 109a.
Barbula bolleana (Müll.Hal.) Broth., L.N.: 9, tree roots (*Platanus orientalis* L.), A 139c.
B. convoluta Hedw., L.N.: 3, 46, 69, on rock, soil and on soil covered rocks, A 24f.
B. unguiculata Hedw., L.N.: 1, 4, 5, 7, 42, 46, on rock, soil and on soil covered rocks, A 3a.
Bryoerythrophyllum recurvirostrum (Hedw.) P.C.Chen.,

- L.N.: 13, 29, 35, 40, 55, 63, 65, 77, 95, 107, 113, on rock, soil and on soil covered rocks, A 198b.
- ^Δ*B. rubrum* (Jur. ex Geh.) P.C.Chen., L.N.: 15, 35, 69, 77, 95, 97, 100, 105, 106, 107, 108, on rock, soil and on soil covered rocks, A 229e.
- Cinclidotus aquaticus* (Hedw.) Bruch & Schimp., L.N.: 4, 86, on rock and soil, A 32a.
- C. danubicus* Schiffn. & Baumgartner, L.N.: 77, on rock, A 739h.
- C. fontinaloides* (Hedw.) P.Beauv., L.N.: 2, 4, 9, 69, 86, on rock, soil and in the water, A 16.
- ^Δ*C. pachylomoides* Bizot., L.N.: 9, 99, 101, on rock and tree roots (*Platanus orientalis* L.), A 133a.
- C. riparius* (Host ex Brid.) Arn., L.N.: 3, 86, on rock and soil, A 20c.
- Crossidium squamiferum* (Viv.) Jur. var. *pottioideum* (De Not.) Mönk., L.N.: 4, 6, 8, 9, on rock, soil and on soil covered rocks, A 36a.
- Didymodon acutus* (Brid.) K.Saito., L.N.: 3, 5, 6, 8, 54, 83, on rock, soil and on soil covered rocks, A 29c.
- D. cordatus* Jur., L.N.: 4, 5, 21, 28, 69, 84, 85, on rock, soil and on soil covered rocks, A 48a.
- D. fallax* (Hedw.) R.H.Zander., L.N.: 4, on soil covered rocks, A 56c.
- D. insulanus* (De Not.) M.O.Hill., L.N.: 6, 40, on rock and on soil covered rocks, A 99c.
- D. luridus* Hornsch., L.N.: 3, 4, 8, 12, 13, 84, on rock, soil, on soil covered rocks and rock cleft, A 30e.
- ^Δ*D. nicholsonii* Culm., L.N.: 29, on rock, A 357c.
- D. rigidulus* Hedw., L.N.: 4, 6, 7, 8, 13, 25, 39, 40, 46, 83, 84, 85, 88, 89, 103, on rock, soil and soil covered rocks, A 31c.
- ^Δ*D. sinuosus* (Mitt.) Delogne., L.N.: 84, 85, on rock, A 808c.
- D. spadiceus* (Mitt.) Limpr., L.N.: 3, on soil and on soil covered rocks, A 28a.
- D. tophaceus* (Brid.) Lisa., L.N.: 4, 33, 34, 40, 42, 81, 82, 91, 98, on rock, soil, on soil covered rocks, in the water and tree roots (*Platanus orientalis* L.), A 42d.
- D. vinealis* (Brid.) R.H.Zander., L.N.: 4, 5, 6, 8, 9, 13, 29, 40, 49, 77, 83, 87, on rock, soil, on soil covered rocks and rock cleft, A 37b.
- ^Δ*Microbryum floerkeanum* (F. Weber & D. Mohr) Schimp., L.N.: 35, on soil, A 406.
- M. starckeianum* (Hedw.) R. H. Zander., L.N.: 54, on soil, A 605c.
- Phascum cuspidatum* Hedw. var. *piliferum* (Hedw.) Hook. & Taylor., L.N.: 7, 10, 12, 13, 14, 31, 54, 70, 85, 91, 93, on rock, soil, rock cleft and tree (*Populus tremula* L.), A 121i.
- Protobryum bryoides* J. Guerra & M. J. Cano., L.N.: 31, on soil, A 368d.
- Pseudocrossidium revolutum* (Brid.) R.H.Zander., L.N.: 40, on rock, A 469c.
- Pterygoneurum ovatum* (Hedw.) Dixon., L.N.: 8, 10, 11, 12, 13, 14, 31, 33, 84, 88, 105, on rock, soil, on soil covered rocks and rock cleft, A 125f.
- ^Δ*Syntrichia calcicola* J.J.Amann., L.N.: 11, on soil, A 171d.
- S. caninervis* Mitt. var. *gypsophila* (J.J.Amann ex G.Roth) Ochyra., L.N.: 104, on soil, A 989b.
- S. handelii* (Schiffn.) S.Agnew & Vondr., L.N.: 9, 12, 14, 16, 20, 25, 33, 83, on rock, on soil covered rocks and tree (*Pinus nigra* J.F.Arnold, *Populus tremula* L.), A 133e.
- S. laevipila* Brid., L.N.: 4, 9, 25, on rock, A 46e.
- S. montana* Nees., L.N.: 7, 39, 47, on rock and soil, A 116f.
- S. norvegica* F.Weber, L.N.: 16, 24, 25, 26, 30, 39, 43, 54, 93, 107, 108, 109, 112, 113, 117, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr.), A 246b.
- S. papillosissima* (Copp.) Loeske., L.N.: 10, 11, 14, 16, 17, 18, 26, 28, 31, 40, 44, 46, 69, 70, 75, 76, 80, 81, 83, 84, 87, 88, 89, 100, on rock, soil, on soil covered rocks and tree (*Populus tremula* L., *Abies cilicica* Carr., *Malus sylvestris* (L.) Mill., *Juglans regia* L.), A 149b.
- S. princeps* (De Not.) Mitt., L.N.: 4, 13, 34, 35, 40, 54, 57, 83, 84, 91, 92, 94, 115, on rock, soil, on soil covered rocks, rock cleft and tree (*Juglans regia* L.), A 35a.
- S. ruralis* (Hedw.) F.Weber & D.Mohr var. *ruraliformis* (Besch.) Delogne., L.N.: 4, 9, 10, 11, 12, 13, 14, 16, 19, 20, 22, 24, 25, 34, 35, 39, 40, 54, 56, 62, 63, 65, 68, 69, 72, 73, 77, 81, 82, 83, 85, 91, 92, 94, 95, 97, 98, 103, on rock, soil, on soil covered rocks, rock cleft, tree (*Carpinus orientalis* Mill., *Abies cilicica* Carr., *Pinus nigra* J.F.Arnold) and the rotten tree stump, A 31e.
- S. ruralis* (Hedw.) F.Weber & D.Mohr var. *ruralis*, L.N.: 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 24, 25, 26, 28, 29, 30, 31, 32, 34, 39, 40, 41, 44, 46, 47, 49, 54, 59, 64, 67, 68, 69, 70, 71, 72, 77, 78, 79, 80, 81, 84, 85, 91, 92, 93, 94, 95, 97, 100, 105, 106, 117, on rock, soil, on soil covered rocks, rock cleft and tree (*Abies cilicica* Carr., *Salix alba* L., *Platanus orientalis* L., *Juniperus oxycedrus* L., *Prunus* sp.), A 120.
- ^Δ*S. subpapillosissima* (Bizot & R.B.Pierrot ex W.A.Kramer) M.T.Gallego & J.Guerra., L.N.: 10, 13, 86, 98, on rock, soil and tree (*Salix alba* L.), A 157c.
- S. virescens* (De Not.) Ochyra., L.N.: 4, 6, 7, 25, 33, 39, 40, 54, 55, 56, 65, 94, 98, 104, 115, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr., *Salix alba* L., *Platanus orientalis* L.), A 49d.
- Tortula atrovirens* (Sm.) Lindb., L.N.: 8, 69, on rock, soil and on soil covered rocks, A 126e.
- T. brevissima* Schiffn., L.N.: 1, 4, 76, 83, 84, 89, on rock, soil and on soil covered rocks, A 8a.
- T. inermis* (Brid.) Mont., L.N.: 4, 5, 6, 8, 13, 19, 25, 31, 33, 35, 39, 63, 69, 77, 83, 88, 91, 94, 95, 104, 110, on rock, soil, on soil covered rocks, rock cleft and tree (*Juniperus oxycedrus* L., *Platanus orientalis* L.), A 31a.
- T. lanceola* R.H.Zander., L.N.: 4, 8, 11, 12, on rock, on soil covered rocks and rock cleft, A 36e.
- T. muralis* Hedw., L.N.: 4, 6, 7, 9, 14, 76, 86, 89, 98, 99, on rock, soil, on soil covered rocks and rock cleft, A 40d.
- T. subulata* Hedw., L.N.: 4, 10, 12, 14, 16, 17, 20, 25, 26, 28, 31, 32, 39, 40, 42, 44, 47, 49, 52, 53, 62, 68, 69, 70, 71, 76, 77, 81, 83, 84, 85, 88, 89, 93, 94, 96, 98, 100, 104, 106, on rock, soil, on soil covered rocks, tree (*Abies cilicica* Carr., *Pinus nigra* J.F.Arnold, *Populus tremula* L.) and in the water, A 48b.

Meesiaceae

^Δ*Leptobryum pyriforme* (Hedw.) Wilson., L.N.: 5, on soil covered rocks, A 79b.

Orthotrichaceae

Orthotrichum anomalum Hedw., L.N.: 4, 7, 10, 12, 14, 19, 20, 26, 28, 40, 44, 46, 63, 68, 70, 71, 80, 81, 83, 86, 87, 89, 98, 101, 106, 110, on rock, on soil covered rocks and tree (*Platanus orientalis* L., *Malus sylvestris* (L.) Mill., *Abies cilicica* Carr., *Juglans regia* L.), A 37h.
O. cupulatum Hoffm. ex Brid. var. *bistratosum* Schiffn., L.N.: 9, on rock, A 136g.

O. cupulatum Hoffm. ex Brid var. *cupulatum*., L.N.: 3, 4, 6, 7, 9, 10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 23, 24, 25, 26, 31, 32, 40, 46, 49, 52, 53, 54, 58, 63, 65, 68, 69, 70, 73, 77, 80, 81, 82, 83, 84, 85, 86, 89, 92, 98, 105, 106, 110, on rock, soil, on soil covered rocks, rock cleft, tree (*Salix alba* L., *Prunus sp.*, *Abies cilicica* Carr., *Populus tremula* L.) and shrub root, A 21.

O. urnigerum Myrin., L.N.: 31, 32, 84, 87, 88, 89, 98, 99, on rock, on soil covered rocks and tree (*Juglans regia* L.), A 371b.

O. alpestre Bruch & Schimp., L.N.: 4, 11, 30, 32, 33, 63, 65, 70, 77, 83, 98, 110, on rock, on soil covered rocks and tree (*Platanus orientalis* L., *Abies cilicica* Carr.), A 49e.

^Δ*O. consimile* Mitt., L.N.: 89, tree (*Juglans regia* L.), A 849b.

O. diaphanum Schrad. ex Brid., L.N.: 4, 40, 87, on soil covered rocks and tree (*Platanus orientalis* L., *Malus sylvestris* (L.) Mill., *Juglans regia* L.), A 37d.

O. pallens Bruch ex Brid., L.N.: 19, 25, 70, 73, 83, 98, 100, on rock and tree (*Abies cilicica* Carr.), A 280h.

O. pumilum Sw. ex anon., L.N.: 40, on tree (*Juniperus oxycedrus* L.), A 478b.

O. stramineum Hornsch. ex Brid., L.N.: 7, 40, 83, on rock, tree (*Malus sylvestris* (L.) Mill.) and shrub root, A 115c.

O. tenellum Bruch ex Brid., L.N.: 40, on tree (*Platanus orientalis* L.), A 444d.

O. laevigatum J.E.Zetterst., L.N.: 83, on rock, A 789d.

O. rupestre Schleich. ex Schwägr., L.N.: 6, 10, 25, 35, 37, 40, 63, 81, 84, 87, 91, 92, 93, 98, on rock and tree (*Abies cilicica* Carr., *Juglans regia* L., *Prunus sp.*, *Platanus orientalis* L.), A 103b.

O. affine Schrad. ex Brid., L.N.: 41, 89, on rock and tree (*Juniperus oxycedrus* L.), A 508b.

O. speciosum Nees., L.N.: 17, 40, on tree (*Juniperus oxycedrus* L., *Abies cilicica* Carr., *Platanus orientalis* L., *Malus sylvestris* (L.) Mill.), A 268.

^Δ*Ulota bruchii* Hornsch. ex Brid., L.N.: 16, on tree (*Abies cilicica* Carr.), A 251.

Hedwigiaceae

Hedwigia ciliata (Hedw.) P.Beauv var. *leucophaea* Bruch & Schimp., L.N.: 40, on rock, A 438d.

Bartramiaceae

Philonotis arnellii Husn., L.N.: 4, 5, 40, 42, 89, on rock, on soil covered rocks, in the water and tree (*Juglans regia* L.), A 52f.

^Δ*P. caespitosa* Jur., L.N.: 4, 5, 40, 42, 47, 48, 85, 91, 93, on rock, soil, on soil covered rocks and in the water, A 45a.

P. calcarea (Bruch & Schimp.) Schimp., L.N.: 4, 37, 40, 42, 43, 46, 48, 50, 51, 59, 91, 101, on rock, soil, on soil covered rocks and in the water, A 76g.

P. fontana (Hedw.) Brid., L.N.: 3, 5, 42, on soil and on soil covered rocks, A 24e.

^Δ*P. seriata* Mitt., L.N.: 4, on soil and on soil covered rocks, A 57d.

Bryaceae

Bryum alpinum Huds. ex With., L.N.: 34, 36, 42, 43, 44, 45, 46, 49, 59, 85, 90, 91, 93, 96, 97, on rock, soil, on soil covered rocks, in the water and the rotten tree root, A 394a.

B. archangelicum Bruch & Schimp., L.N.: 4, 10, 11, 12, 13, 14, 15, 16, 19, 21, 26, 28, 30, 31, 33, 39, 44, 45, 46, 49, 68, 69, 70, 72, 76, 78, 82, 89, 90, 99, 100, 101, 107, 108, 113, on rock, soil, on soil covered rocks, rock cleft, in the water and tree (*Salix alba* L., *Abies cilicica* Carr., *Carpinus orientalis* Mill.), A 56d.

B. argenteum Hedw., L.N.: 1, 3, 4, 8, 9, 11, 13, 14, 31, 33, 34, 37, 42, 44, 55, 69, 76, 77, 84, 85, 88, 98, 107, 108, on rock, soil, on soil covered rocks, in the water and tree (*Salix alba* L.), A 3b.

B. caespiticium Hedw., L.N.: 4, 5, 6, 7, 9, 13, 15, 16, 17, 20, 21, 24, 25, 26, 31, 32, 33, 34, 35, 36, 39, 40, 42, 44, 46, 53, 54, 55, 58, 59, 63, 67, 68, 69, 70, 71, 77, 78, 81, 84, 85, 87, 88, 89, 91, 92, 93, 94, 95, 96, 97, 98, 104, 105, 106, 107, 108, 110, 111, 112, 114, 115, 116, on rock, soil, on soil covered rocks, in the water, tree (*Abies cilicica* Carr., *Platanus orientalis* L.) and the rotten root, A 36f.

B. capillare Hedw., L.N.: 4, 6, 11, 15, 20, 21, 24, 25, 31, 39, 40, 54, 64, 68, 69, 70, 71, 77, 78, 84, 94, 98, 100, 106, 107, 108, 112, 117, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr., *Platanus orientalis* L., *Pinus nigra* J.F.Arnold), A 33f.

B. dichotomum Hedw., L.N.: 4, 5, 6, 7, 13, 25, 39, 47, 66, 67, 69, 70, 91, 104, 108, 111, 112, 114, 115, 117, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr.), A 61e.

B. donianum Grev., L.N.: 3, 4, 28, 40, on rock, soil and on soil covered rocks, A 17a.

^Δ*B. elegans* Nees., L.N.: 77, 95, 97, on rock and on soil covered rocks, A 771

B. funckii Schwägr., L.N.: 3, on soil covered rocks, A 28d.

B. gemmiparum De Not., L.N.: 4, 9, 37, 76, 91, on rock, soil and on soil covered rocks, A 38c.

^Δ*B. klinggraeffii* Schimp., L.N.: 42, on rock, A 524b.

B. kunzei Hornsch., L.N.: 4, 9, 31, on rock, soil and on soil covered rocks, A 56e.

B. mildeanum Jur., L.N.: 4, 8, 9, 14, 33, 34, 40, 42, 43, 44, 46, 48, 50, 59, 91, 93, 104, on rock, soil, on soil covered rocks, in the water, the rotten tree root and rock cleft, A 39.

B. moravicum Podp., L.N.: 16, 57, 108, on soil and on soil covered rocks, A 262b.

B. pallens Sw. ex anon., L.N.: 4, 57, 59, 60, on soil and on soil covered rocks, A 78e.

B. pallescens Schleich. ex Schwägr., L.N.: 2, 3, 4, 6, 7, 30, 34, 39, 91, on rock, soil, on soil covered rocks, in the water and rock cleft, A 15b.

B. pseudotriquetrum (Hedw.) P.Gaertn. et al., L.N.: 1, 2, 3, 4, 5, 16, 17, 34, 40, 42, 43, 46, 51, 52, 57, 59, 78, 81, 82, 85, 86, 90, 91, 95, 96, 97, 103, 107, 108, 110, 115, on rock, soil, on soil covered rocks and in the water, A 9b.

B. radiculosum Brid., L.N.: 40, 42, 60, 90, on soil and in the water, A 488b.

B. ruderale Crundw & Nyholm., L.N.: 42, on soil, A 525d.

B. schleicheri DC., L.N.: 37, 42, 43, 57, 90, 91, 96, 97, 108, on rock, soil, on soil covered rocks and in the water, A 415.

B. torquescens Bruch & Schimp., L.N.: 4, 5, 18, 26, 39, 40, on rock and on soil covered rocks, A 63b.

B. weigelii Spreng., L.N.: 4, 37, on rock, soil and on soil covered rocks, A 52b.

Mielichhoferiaceae

^Δ*Pohlia cruda* (Hedw.) Lindb., L.N.: 16, 28, 42, 51, 69, 71, 107, 108, 109, on rock, soil, on soil covered rocks and the rotten tree root, A 239b.

P. elongata Hedw., L.N.: 40, 117, on rock and on soil covered rocks, A 464b.

^Δ*P. annotina* (Hedw.) Lindb., L.N.: 4, on soil and on soil covered rocks, A 65b.

^Δ*P. drummondii* (Müll.Hal.) A.L.Andrews., L.N.: 3, 40, on soil and on soil covered rocks, A 27d.

P. ludwigii (Spreng. ex Schwägr.) Broth., L.N.: 9, 91, on soil and in the water, A 140.

^Δ*P. atropurpurea* (Wahlenb.) H.Lindb., L.N.: 5, on soil and in the water, A 90b.

^Δ*P. melanodon* (Brid.) A.J.Shaw., L.N.: 4, 102, on soil and on soil covered rocks, A 58b.

Mniaceae

^Δ*Mnium marginatum* (Dicks.) P.Beauv., L.N.: 3, on soil, A 19a.

Plagiomniaceae

^Δ*Plagiomnium ellipticum* (Brid.) T.J.Kop., L.N.: 1, on soil covered rocks, A 5a.

P. undulatum (Hedw.) T.J.Kop., L.N.: 1, 4, 101, on rock, soil and on soil covered rocks, A 4.

Amblystegiaceae

Amblystegium serpens (Hedw.) Schimp., L.N.: 51, 89, 108, on soil covered rocks, the rotten tree trunk and tree (*Juglans regia* L.), A 588.

Campyliadelphus chrysophyllus (Brid.) R.S.Chopra., L.N.: 1, 6, on rock and soil, A 6f.

Cratoneuron flicinum (Hedw.) Spruce., L.N.: 1, 4, 5, 9, 14, 33, 34, 40, 44, 46, 51, 52, 57, 59, 70, 82, 83, 84, 85, 86, 90, 91, 96, 104, on rock, soil, on soil covered rocks, the rotten tree root, in the water and tree (*Platanus orientalis* L.), A 2b.

Hygroamblystegium fluviatile (Hedw.) Loeske., L.N.: 1, 14, 40, on rock, on soil covered rocks and in the water, A 12b.

H. tenax (Hedw.) Jenn., L.N.: 3, 4, 14, 15, on rock, soil, on soil covered rocks, in the water and tree (*Populus tremula* L., *Platanus orientalis* L., *Prunus* sp.), A 25b.

H. varium (Hedw.) Mönk., L.N.: 5, on soil covered rocks, A 85a.

Leptodictyum riparium (Hedw.) Warnst., L.N.: 76, on rock, A 732f.

Palustriella commutata (Hedw.) Ochyra., L.N.: 1, 2, 5, 59, 78, 85, 86, 96, on rock, soil and on soil covered rocks, A 1.

^Δ*P. decipiens* (De Not.) Ochyra., L.N.: 4, 101, 110, on rock, on soil covered rocks and the rotten tree stump, A 954b.

P. falcata (Brid.) Hedenäs., L.N.: 4, 74, 78, 101, on rock, on soil covered rocks and tree stump, A 726.

^Δ*Pseudocalliergon turgescens* (T.Jensen) Loeske., L.N.: 3, on soil covered rocks, A 20d.

Calliergonaceae

^Δ*Calliergon cordifolium* (Hedw.) Kindb., L.N.: 4, on rock, A 76d.

Leskeaceae

^Δ*Pseudoleskeella catenulata* (Brid. ex Schrad) Kindb., L.N.: 16, 21, 24, 25, 28, 40, 77, 80, 97, 99, 110, on rock and on soil covered rocks, A 252d.

^Δ*P. nervosa* (Brid.) Nyholm., L.N.: 15, on rock, A 230c.

^Δ*P. tectorum* (Funck ex Brid.) Kindb. ex Broth., L.N.: 32, 86, on rock and tree (*Juglans regia* L.), A 375c.

Thuidiaceae

^Δ*Thuidium tamariscinum* (Hedw.) Schimp., L.N.: 3, on soil, A 18a.

Brachytheciaceae

Scorpiurium circinatum (Bruch) M.Fleisch. & Loeske., L.N.: 4, 6, 7, 9, on rock, on soil covered rocks, rock cleft and in the water, A 70g.

S. deflexifolium (Solms) M.Fleisch. & Loeske., L.N.: 4, on soil covered rocks, A 37a.

Eurhynchium striatum (Hedw.) Schimp., L.N.: 4, 5, on soil covered rocks, A 60c.

^Δ*Platyhypnidium lusitanicum* (Schimp.) Ochyra & Bednarek-Ochyra., L.N.: 4, on rock, A 74a.

P. riparioides (Hedw.) Dixon., L.N.: 1, 4, 14, 40, 42, 86, 108, on rock, soil, on soil covered rocks, in the water and tree (*Platanus orientalis* L., *Populus tremula* L.), A 5c.

Rhynchostegium confertum (Dicks.) Schimp., L.N.: 1, 40, on rock and on soil covered rocks, A 6g.

Rhynchostegiella litorea (De Not.) Limpr., L.N.: 16, 20, 26, 30, 69, 70, 78, on rock, soil, on soil covered rocks, tree (*Abies cilicica* Carr., *Pinus nigra* J.F.Arnold) and the rotten tree stump, A 249b.

R. tenella (Dicks.) Limpr., L.N.: 16, 21, 39, 70, 84, on rock, soil, on soil covered rocks and the rotten tree trunk, A 243d.

Oxyrrhynchium hians (Hedw.) Loeske., L.N.: 1, 4, 24, 26, 49, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr.), A12a.

O. schleicheri (R.Hedw.) Röhl., L.N.: 46, on rock and soil, A 563b.

O. speciosum (Brid.) Warnst., L.N.: 5, 26, on soil covered rocks and tree (*Abies cilicica* Carr.), A 81c.

^Δ*Sciuro-hypnum oedipodium* (Mitt.) Ignatov & Huttunen., L.N.: 30, on soil, A 360a.

S. plumosum (Hedw.) Ignatov & Huttunen., L.N.: 5, on soil covered rocks, A 85b.

S. starkei (Brid.) Ignatov & Huttunen., L.N.: 39, 40, on rock and tree (*Platanus orientalis* L.), A 422a.

Brachythecium albicans (Hedw.) Schimp., L.N.: 3, 16, 24, 35, 39, 40, 42, 62, 94, 95, 97, 117, on rock, soil, on soil covered rocks and tree (*Abies cilicica* Carr., *Malus sylvestris* (L.) Mill., *Pinus nigra* J.F.Arnold), A 28e.

^Δ*B. capillaceum* (F.Weber & D.Mohr) Giacom., L.N.: 24, 26, 27, 29, 58, on rock, soil and on soil covered rocks, A 318f.

B. glareosum (Bruch ex Spruce) Schimp., L.N.: 3, 14, 16, 17, 21, 24, 25, 35, 39, 40, 46, 54, 63, 64, 65, 71, 77, 78, 82, 83, 93, 94, 95, 103, 109, 110, 116, 117, on rock, soil, on soil covered rock, tree (*Abies cilicica* Carr., *Populus tremula* L.), the rotten tree stump and rock cleft, A 21b.

B. mildeanum (Schimp.) Schimp. ex Milde., L.N.: 26, 32, on soil and tree (*Abies cilicica* Carr.), A 347d.

B. rivulare Schimp., L.N.: 4, 40, 46, 91, 97, 104, on rock, soil, on soil covered rocks, the rotten tree root and in the water, A 52g.

B. rutabulum (Hedw.) Schimp., L.N.: 3, 4, 14, 30, 42, 46, 77, 78, on rock, soil, on soil covered rocks, in the water and tree (*Populus tremula* L.), A 17b.

B. salebrosum (F. Weber & D. Mohr) Schimp., L.N.: 46, on soil, A 562c.

Eurhynchiastrum pulchellum (Hedw.) Ignatov & Huttunen., L.N.: 16, 26, 31, 39, 53, 68, 91, 101, 108, on rock, soil and on soil covered rocks, A 252c.

^Δ*Brachytheciastrum collinum* (Mül. Hal.) Schimp., L.N.: 46, on soil, A 555b.

B. trachypodium (Brid.) Ignatov & Huttunen., L.N.: 26, 28, on rock, soil and on soil covered rocks, A 340d.

B. velutinum (Hedw.) Ignatov & Huttunen., L.N.: 15, 16, 17, 18, 24, 25, 26, 28, 30, 35, 39, 40, 46, 68, 78, 94, 95, on rock, soil, on soil covered rocks and tree (*Platanus orientalis* L.), A 228a.

Homalothecium lutescens (Hedw.) H.Rob., L.N.: 3, 4, 6, 7, 10, 11, 14, 21, 28, 31, 32, 40, 69, 70, 71, 103, on rock, soil, on soil covered rocks, rock cleft and tree (*Prunus* sp.), A 28c.

H. philippeanum (Spruce) Schimp., L.N.: 4, 14, 15, 16, 18, 19, 20, 21, 23, 24, 25, 28, 29, 30, 31, 35, 39, 40, 49, 54, 62, 65, 68, 69, 70, 71, 72, 73, 77, 80, 81, 83, 84, 85, 86, 91, 92, 94, 95, 97, 100, 103, 105, 106, 110, on rock, soil, on soil covered rocks and tree (*Pinus nigra* J.F.Arnold, *Juglans regia* L., *Platanus orientalis* L., *Populus tremula* L., *Abies cilicica* Carr.), A 70h.

H. sericeum (Hedw.) Schimp., L.N.: 4, 7, 9, 12, 15, 16, 17, 18, 19, 39, 40, 44, 46, 52, 53, 61, 68, 69, 70, 72, 77, 81, 83, 91, 92, 94, 98, 100, on rock, soil, on soil covered rocks and tree (*Juniperus oxycedrus* L., *Platanus orientalis* L., *Carpinus orientalis* Mill., *Abies cilicica* Carr.), A 49c.

Fabroniaceae

Fabronia pusilla Raddi., L.N.: 9, on rock, A 134b.

Hypnaceae

Ctenidium molluscum (Hedw.) Mitt., L.N.: 7, 15, 17, on rock and soil, A 119a.

Hypnum andoi A.J.E. Sm., L.N.: 40, on rock, A 479g.

^Δ*H. bambergeri* Schimp., L.N.: 69, 73, 84, 87, 98, on rock, soil and on soil covered rocks, A 695a.

^Δ*H. callichroum* Brid., L.N.: 117, on rock, A 1053b.

H. cupressiforme Hedw., L.N.: 4, 6, 7, 28, 40, 53, 66, 69, 70, 71, 77, 84, 103, on rock, soil and on soil covered rocks, A 33d.

H. revolutum (Mitt.) Hedw., L.N.: 69, 70, 77, 117, on rock, A 686c.

H. vaucheri Lesq., L.N.: 10, 28, 40, 68, 72, 80, 106, on rock, on soil covered rocks and tree (*Prunus* sp.), A 159a.

Pterigynandraceae

Habrodon perpusillum (De Not.) Lindb., L.N.: 4, 18, 19, 25, 28, 68, 70, 71, 73, 78, 105, on rock, on soil covered rocks and tree (*Platanus orientalis* L., *Populus tremula* L., *Abies cilicica* Carr.), A 49f.

^Δ*Heterocladium heteropterum* (Brid.) Schimp., L.N.: 117, on rock, A 1052c.

Pterigynandrum filiforme Hedw., L.N.: 18, 51, on rock and tree (*Abies cilicica* Carr.), A 273.

Plagiotheciaceae

^Δ*Myurella julacea* (Schwägr.) Schimp., L.N.: 3, on soil, A 27c.

^Δ*Plagiothecium denticulatum* (Hedw.) Schimp., L.N.: 42, on soil, A 528b.

Leucodontaceae

Leucodon sciuroides (Hedw.) Schwägr., L.N.: 4, 7, 9, 40, 41, 53, 101, on rock and tree (*Juglans regia* L., *Platanus orientalis* L., *Juniperus oxycedrus* L.), A 35b.

Pterogonium gracile (Hedw.) Sm., L.N.: 4, 6, 7, 9, 51, on rock, rock cleft and tree (*Platanus orientalis* L.), A 31d.

Neckeraceae

Neckera complanata (Hedw.) Huebener, L.N.: 7, on soil, A 119d.

N. crispa Hedw., L.N.: 4, on soil covered rocks, A 70c.

N. menziesii Drumm., L.N.: 40, on rock, A 447d.

Leptodontaceae

Leptodon smithii (Hedw.) F.Weber & D.Mohr., L.N.: 4, 6, 7, 9, 101, on rock, on soil covered rocks, shrub and tree (*Platanus orientalis* L.), A 31b.