

The Moss Flora of the Uludağ National Park (Bursa/Turkey)

Barbaros ÇETİN

Ankara University, Faculty of Science, Department of Biology, Ankara-TURKEY

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Abstract: Field studies were conducted to determine the flora of Uludağ (Bursa) National Park during 1988, 1989 and 1996. Almost 180 plant specimens were collected in these studies. After the identification of these specimens, 85 taxa at specific and sub-specific ranks were determined. Of these, 28 taxa are new to the A1 grid-square. In addition, *Polytrichum commune* var. *perigoniale* (Michx.) Hampe is a new record for the moss flora of Turkey.

Key Words: Bryophyte, Flora, Turkey.

Uludağ (Bursa/Türkiye) Milli Parkı'nın Karayosunu Florası

Özet: Uludağ (Bursa) Milli Parkı'nın Karayosunu Florası'nın belirlenmesi için arazi çalışmaları 1988, 1986 ve 1996 yıllarında yapılmıştır. Bu çalışmalarda yaklaşık 180 bitki örneği toplanmıştır. Bu örneklerin teşhisiyle tür ve türaltı düzeyde 85 takson saptanmıştır. Bunlardan 28 tanesi A1 karesi için yenidir. Bunlara ilave olarak *Polytrichum commune* var. *perigoniale* (Michx.) Hampe Türkiye karayosun florası için yeni bir taksondur.

Anahtar Sözcükler: Karayosunları, Flora, Türkiye.

Introduction

The identification of the wild plants in the Uludağ national park (abbreviated as U.N.P. from now on and in the floristik list.) will help the evaluation of the primary genetic centers and buffer zones in the area. The biomass of mosses is an important part of the forestal ecosystem of the region. They have an important contribution to the ecological balance, keeping the land wet due to their significant moisture retaining capacity. They also provide a suitable breeding and living medium for many types of insects.

There is no single publication covering all the flora of mosses in Turkey. This study will therefore shed light on the flora of mosses and contribute to the documentation of the flora of the country. It is impossible to ensure protection and utilisation of a special environmental protection plan in a scientific manner without having full knowledge of flora and fauna of the area. That is why the aim of this paper is to study the flora of the mosses of the region.

The study area is in the A1 grid-square, according to the system adopted by Henderson (1).

Description of the Study Area

Uludağ is the highest mountain in the Marmara region, where Europe meets Asia around the Marmara sea, and which includes the whole of European Turkey and North Western Anatolia. The mountain previously known as Olympus Misius, Bithyninn Olympus and Keşiş Dağı was renamed Uludağ in 1925. Uludağ is in the province of Bursa, which is an important centre in this region, 250 kilometre SW of İstanbul. The city of Bursa is located at the NW foot of Uludağ. The mountain range is about 40 km long and 15–20 km wide. There are some high plateaus on the northern side of the mountain, such as Sarıalan yaylası, Kirazlı yayla, and Kadıyayla (Figure 1). The high summits of the Mountain have glacial valleys. Glacial lakes (Aynalı Göl, Karagöl, Kilimli Göl) are evidence of this glaciation.

Geologically, this mountain varies considerably. It is formed of a nucleus consisting largely of granite, gneiss and marble of Paleozoic age, and Mesozoic ophiolite. Serpentine is found especially in the south, with diorite and peridotites. This mountain range was probably uplifted as a result of subsidence of the surrounding area during a more recent geological period. Between the

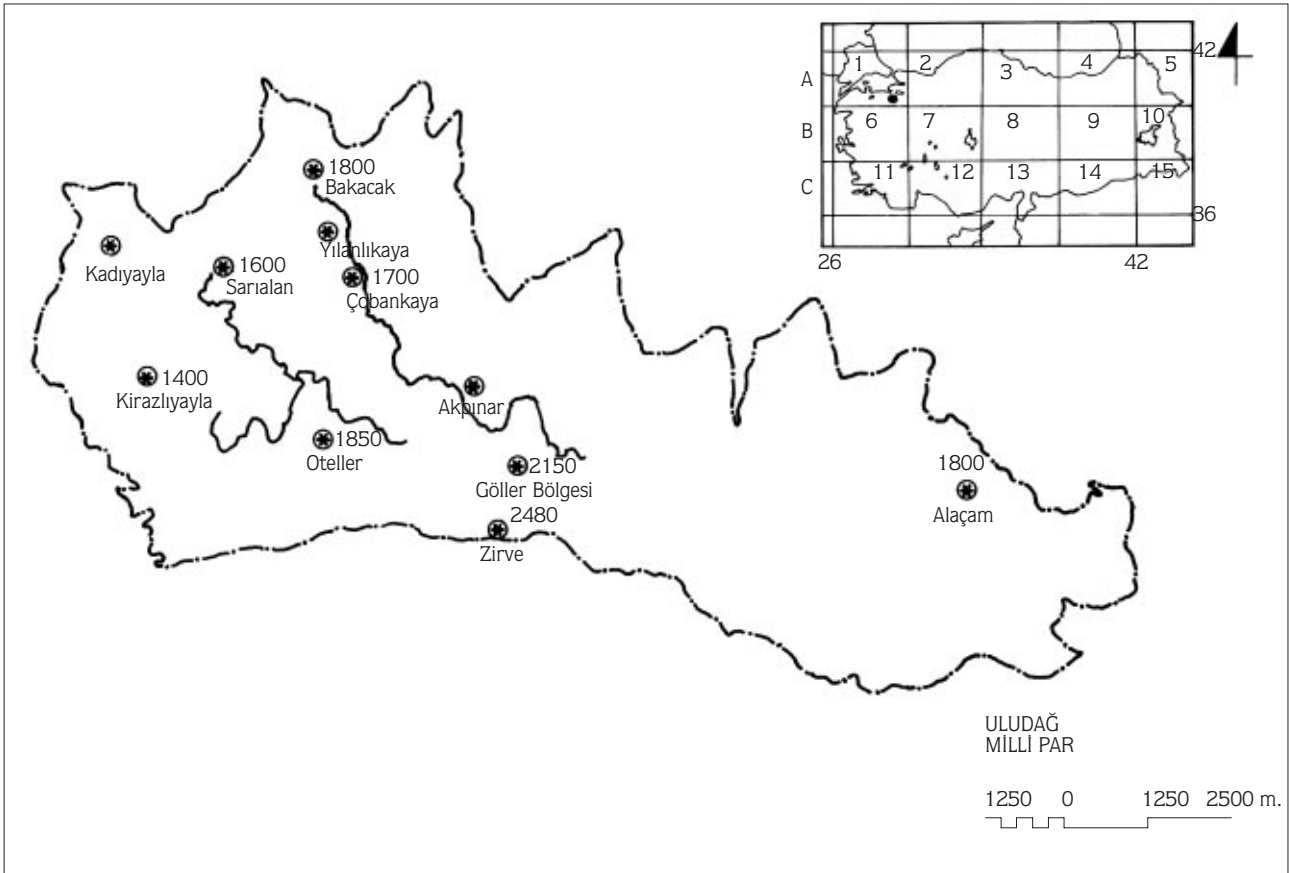


Figure 1. Uludağ National Park.

crystalline massifs, there are veins and beds of minerals scattered around. The wolfram deposits is found only here in Turkey.

The region has a mild climate. In general, the Mediterranean climate with very cold winters is modified by the climatic conditions of the Black Sea Region, and also the Central Anatolian Region. There are 3 meteorological stations on Uludağ: Yeşilkonak (1025 m), Sarıalan (1620 m) and Zirve (1920 m). According to the data of these stations, the mean annual temperature is 10°C, with average decreases to 3–4 °C at higher altitude (2000–2500 m). The mean annual rainfall is 1180 mm in Yeşilkonak 1330 mm in Sarıalan, and 1550 mm in Zirve. Rainfall reaches a maximum in December and a minimum in August

Vegetation of the Study Area

The combination of long geographical isolation, an unusual range of climatic conditions, and the meeting of Mediterranean and Euro–Siberian floristic regions have resulted in a unique vegetation in this area.

Up 350–700 m: The foothills are covered with 2 well–developed maquis, dominated by *Castanea sativa* Miller. Pseudomaquis cover the area where once *C. sativa* grew. For example: *Pillyrea latifolia* L., *Cercis Siliquastrum* L., *Juiperus oxycedrus* L., *Arbutus unedo* L., *Pistacia terebinthus* L., *Quercus infectoria* Olivier, *Fagus orientalis* Lipsky, *Carpinus betulus* L., *Pinus nigra* Arn. subsp. *pallasiana* (Lamp) Holmboe, *Daphne pontica* L.

750–1500 m: *Fagus arientalis* Lipsky predominant in this zone, appears at 600–700 m, forming up to 1800 m mixed forests in many places *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe. Scattered trees of *Castanea sativa* Miller., *Carpinus betulus* L. and *Populus tremula* L. are also observed at this altitude.

1500–2100 m: *Albies nordmanniana* (Stev.) Spach ssp. *bornmüelleriana* (Matt.) Coode & Collen is dominant in this area, forming forests between 1500 to 2100 m. *Fagus orientalis*, *Pinus nigra*, subsp. *pallasiana*, *Carpinus betulus*, *Juniperus communis* subsp. *nana* Syme, *Vaccinium myrtillus* L., *Salix caprea* L. and *Daphne pontica* L., etc. are also found as scattered trees.

Alpine zone: Up to 2100 m, *Juniperus communis* subsp. *nana* Syme is predominant forming a continuous belt. Also some alpine cushion species occur, such as genera of *Festuca* sp., *Astragalus* sp., *Acantholimon* sp., *Dalphe oleoides* Schreber and *Vaccinium myrtillus* L. (2).

Material and Method

The material for the study was collected during studies in the area at different times in 1988, 1989 and 1996.

The plant samples were collected using implements such as a large knife and an iron bar, with utmost care not to deform their natural appearance. The samples were cleaned of soil, mud and stones, and temporarily stored in slightly wet nylon bags. The labels contained such information as the location of the collection, the name of the predominating plant in the surrounding vegetation, the medium where the sample was originally found i.e. (stone, branch of tree, stream bed, rotten root, etc.), the altitude of the region and the date of collection. The samples were deposited in the herbarium of the University of Ankara, Faculty of Science, Department of Biology, using suitable envelopes after positive identification.

The samples were identified using the appropriate literature (3–5). The plant list was arranged according to the system proposed by Corley et al. (6). Species new to the grid-square are shown with the sign (*).

Discussion and Result

In this study, 41 Genera belonging to 20 families and 85 taxa were identified from the moss samples collected from Uludağ (Bursa) National Park at different times.

Families are shown in decreasing order of species diversity below (Table 1). The first 7 families make up 67.3% of the total taxa in the study area, and the other 13 families constitute 32.7%.

Polytrichum commune var. *perigoniale* (Michx.) Hampe and *Hygrohypnum duriusculum* (De Not.) Jamieson were recorded as new taxa for Turkey during these studies (7–8). According to Henderson's grid system, the number of new records in the study area, A1, is 28 (1, 9, 10).

The taxa below, previously known to exist in Turkey only in one square, have now been identified in the A1

square: *Sphagnum subsecundum*, *Encalypta raptocarpa*, *E. streptocarpa*, *T. ruralis* ssp. *hirsuta* var. *hirsuta*, *Didymodon ferrugineus*, *Tortella densa*, *Grimmia montana* and *Brachythecium albicans*.

Table 1. The Families list.

Grimmiaceae	11	12.9
Brachytheciaceae	10	11.8
Pottiaceae	10	11.8
Polytrichaceae	8	9.5
Bryaceae	8	9.5
Bartramiaceae	5	5.9
Orthotrichaceae	5	5.9
Dicranaceae	4	4.7
Mniaceae	4	4.7
Amblystegiaceae	4	4.7
Encalyptaceae	3	3.6
Leskeaceae	3	3.6
Hypnaceae	2	2.4
Sphagnaceae	2	2.4
Plagiotheciaceae	1	1.1
Leucodontaceae	1	1.1
Fontinalaceae	1	1.1
Hedwigiaceae	1	1.1
Funariaceae	1	1.1
Seligeriaceae	1	1.1

The species found near water banks are *Sphagnum platyphyllum*, *S. subsecundum*, *Pohlia cruda*, *Bryum pseudotriquetrum*, *Mnium stellare*, *Rhizomnium punctatum*, *Plagiomnium undulatum*, *Aulacomnium palustre*, *Philonotis fontana*, *P. seriata*, *P. tomentella*, *P. calcarea*, *Fontinalis antipyretica*, *Calliergon stramineum*, *Brachythecium rivulare* and *Rhynchostegium riparioides*.

The species found on tree trunks or branches are *Orthotrichum affine*, *O. affine* var. *fastigiatum*, *O. pallens*, *O. rupestre*, *O. striatum*, *Leucodon sciuroides*, *Habrodon perpusillus*, *Pterigynandrum filiforme* and *Grimmia laevigata*.

The following moss species are seen especially on rocks in places where they grow in communities. *Polytrichum urnigerum*, *Tortula norvegica*, *Tortula subulata*, *Tortella tortuosa*, *Schistidium apocarpum*, *S. apocarpum* var. *confertum*, *Grimmia alpestris*, *G. ovalis*, *G. pulvinata*, *G. trichophylla*, *Hedwigia ciliata*, *Hypnum cupressiforme* and *H. cupressiforme* var. *lacunosum*.

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The Floristic List

Divisio: BRYOPHYTA

Clasis: BRYOPSIDA

Sphagnaceae

Sphagnum platyphyllum (Lindb. ex Braithw.) Sull. ex Warnst.

Al–Bursa; Uludağ National Park, Kirazlıyayla, *Pinus nigra*, stream side, 1300 m., 6.8.1989, Çetin 773.

Distribution: Al, Circumpolar, boreal and north temperate, Europe.

S. subsecundum Nees

Al–U.N.P., east side of the hotels, Çobankaya stream, 1800 m., 6.8.1989, Çetin 771.

Distribution: A2, Circumpolar, mainly north temperate zone.

Polytrichaceae

Pogonatum aloides (Hedw.) P. Beauv.

A1–U.N.P., Kirazlıyayla, *P. nigra*, on soil, 1300 m., 7.8.89, Çetin 776.

A2, A4, Europe, Asia, New Zealand.

* *P. urnigerum* (Hedw.) P. Beauv.

A1–U.N.P., Bakacak hill, on rock, 1700 m., 26.8.89, Çetin 776.

A2, A3, A4, Europe, Asia, N. America.

Polytrichum alpinum Hedw.

A1–U.N.P., hotels, on soil, 1500 m., 27.8.88, Çetin 744.

A1, A2, A5, Europe, America, Antarctica.

P. commune Hedw. var. *commune*

A1–U.N.P., 5 km down the hotels, on soil, 1700 m., 27.8.88, Çetin 752.

A1, A2, Europe, Asia, Australia.

* *P. commune* Hedw. var. *perigoniale* (Michx.) Hampe

A1–U.N.P., hotels, on soil, 1750 m., 27.8.88, Çetin 750.

A new record for Turkey. Europa, N. Africa, N. America, Australia.

1– Plants 0.5–4 cm, apical cells of lamellae grooved in section, 16–20 µ wide, inner perichaetial leaves toothed above var. *commune*.

1– Plants to 6 cm, apical cells of lamellae hardly grooved, 10–14 µ wide, inner perichaetial leaves entire.....var. *perigoniale*.

P. piliferum Hedw.

A1–U.N.P., Bakacak hill, on soil, 1700 m., 26.8.88, Çetin 747.

A1, A2, B7, Europe, Asia, N. America.

P. juniperinum Hedw.

A1–U.N.P., Çobankaya, on soil, 1659 m., 26.8.88, Çetin 742.

Cosmopolitan.

* *Atrichum undulatum* (Hedw.) P. Beauv.

A1–U.N.P., Lakes district, on soil, 2100 m., 2.9.89, Çetin 757.

A2, A3, A4, Europe, Asia, N. America.

Dicranaceae

Dicranum bonjeanii De Not.

U.N.P., Kirazlıyayla, on soil, *P. nigra*, 1300 m., 7.8.89, Çetin 713.

A1, C. Europe, N. America, C. Africa.

D. scoparium Hedw.

U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 717.

A1, A2, A3, A4, A5, Europe, America, New Zealand.

Ceratodon purpureus (Hedw.) Brid.

U.N.P., Bakacak hill, on soil, 1600 m., 26.8.88, Çetin 753.

Cosmopolitan

Distichium capilleceum (Hedw.) B.S. & G.

U.N.P., Lake district, on soil, 2100 m., 2.9.89, Çetin 780.

A1, A3, England, Europe, N. America.

Encalyptaceae

* *Encalypta ciliata* Hedw.

U.N.P., Çobankaya stream, on soil, 1800 m., 3.8.89, Çetin 772.

A2, B8, B9, Europe, C. Africa, Australia.

* *E. rhapsocarpa* Schwaegr.

U.N.P., Kadiyayla, on soil, 100 m., 6.7.96, Çetin 950.

- A2, Europe, C. Asia, N. America.
- * **E. streptocarpa** Hedw.
U.N.P., Kadiyayla, *Carpinus betulus*, on rock, 1000 m., 5.8.89, Çetin 770.
A2, Europe, Morocco, N. America.
- Pottiaceae**
- * **Tortula handelii** Schiffn
U.N.P., on dry soil in *P. nigra* wood, 1300 m., 5.7.96, Çetin 947.
B6, B7, C11, C14, Europe, Asia.
- * **T. norvegica** (Web.) Wohl. & Lindb.
U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 741.
A1, A2, A3, W. Europe, N. Asia, N. America.
- T. ruralis** (Hedw.) Gaertn., Meyer & Scherb
U.N.P., Çobankaya, on rock, 1700 m., 27.8.88, Çetin 745.
- Cosmopolitan**
- * **T. ruralis** ssp. *hirsuta* (Vent) W. Kramer var. *hirsuta* W. Kramer
U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 756.
A2, Europe, Asia.
- T. subulata** Hedw.
U.N.P., Bakacak hill, on rock, 1650 m., 26.8.88, Çetin 743. Very common.
- Barbula unguiculata** Hedw.
U.N.P., Çobankaya, on soil, 1700 m., 18.7.96, Çetin 953.
A1, A2, A3, B6, B7, C11, Europe, Asia.
- * **Didymodon ferrugineus** (Schimp. ex Besch) M. Hill
U.N.P., Bakacak hill, on soil, 1580 m., 7.7.97, Çetin 951.
A2, Europe, Asia.
- Trichostomum brachydontium** var. *littorale* (Mitt.) C. Jens
U.N.P., hotels, on soil, 1700 m. 28.8.88, Çetin 719.
A1, A4, B6, B7, C11, C12, C13, Europe, Asia, Africa
- * Tortella densa** (lor. & Mol.) Crundw. et Nyholm
U.N.P., Lakes district, in rock crevices, 2100 m., 8.7.96, Çetin 959.
A2, W. and C. Europe.
- T. tortuosa** (Hedw.) Limpr.
U.N.P., Çobankaya, on rock, 1800 m., 3.8.89, Çetin 782.
- Cosmopolitan**
- Grimmiaceae**
- Schistidium apocarpum** (Hedw.) B., S. & G.
U.N.P., Sarıalan, on rock in, 1700 m., 28.8.88, Çetin 720.
- Cosmopolitan**
- * **S. apocarpum** var. *confertum* (Funck) Moll
U.N.P., Kirazlıyayla, *P. nigra*, on rock, 1300 m., 6.7.96, Çetin 960.
A2, A4, B6, B8, B9, C13, C14, Europe, Asia Japan.
- * **Grimmia alpestris** (Web. & Mohr.) Schleich. ex Hornsch.
U.N.P., on rock in *A. nordmanniana* subsp. *bornmülleriana* 1700 m., 28.8.88, Çetin 731.
A4, B10, Europe, Kashmir, N. America.
- C. caespiticia** (Brid.) Jur.
U.N.P., Çobankaya, on rock, 1700 m., 26.8.88, Çetin 727.
A1, A4, Scandiaiva.
- G. laevigata** (Brid.) Brid.
U.N.P., Yılanlıkaya, on pine bark, 1600 m., 28.8.89, Çetin 766.
Very common
- * **G. montana** B., S. & G.
U.N.P., Çobankaya, on rock, 1650 m., 26.8.88, Çetin 726.
B6, Europe, N. America.
- G. ovalis** (Hedw.) Lindb.
U.N.P., Çobankaya, on rock, 1700 m., 26.8.88, Çetin 729.
Common.
- G. pulvinata** (Hedw.) Sm.
U.N.P., Bakacak hill, on rock, 1580 m., 3.8.89, Çetin 767.
- Cosmopolitan**
- G. trichophylla** Grev.
U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 730.
Common.
- Rhacomitrium aciculare** (Hedw.) Bird.
U.N.P., hotels, near the stream, on soil, 1500 m., 5.7.96, Çetin 946.
A1, A4, Europe, W. Asia, America.
- R. canescens** (Timm ex Hedw) Brid.
U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 715.
A1, A2, A4, Europe, China, Japan, N. America.
- Seligeriaceae**
- Blindia acuta** (Hedw.) B., S. & G.
U.N.P., Bakacak hill, on rock, 1700 m., 28.8.88, Çetin 750a.
A1, A4, Europe, Asia, N. America.
- Funariaceae**
- Funaria hygrometrica** Hedw.
U., N.P., Sarıalan, on rock, 1600 m., 26.8.88, Çetin 754.
- Cosmopolitan**
- Bryaceae**
- Pohlia cruda** (Hedw.) Lindb.
U.N.P., Çobankaya, on wet soil, 1650 m., 26.8.88, Çetin 751.
A1, A2, A3, A4, B6, B7, B8, Europe, Asia, Africa, Scandinavia.
- * **Bryum alpinum** With
U.N.P., Sarıalan, on rock, 1600 m., 27.8.88, Çetin 716.
A2, B6, B7, B8, Europe, Asia, America.
- B. argenteum** Hedw.

U.N.P., Alaçam, on wet soil, 1800 m.,
3.8.89, Çetin 763.

Cosmopolitan

B. capillare Hedw.

U.N.P., lakes district, on soil, 2100 m.,
2.9.89, Çetin 762

Very common

B. caespiticum Hedw.

U.N.P., around the hotels, on soil, 1300
m., 10.7.96, Çetin 954. very common,
Europe, Asia, America.

* **B. inclinatum** (Brid.) Bland.

U.N.P., Lakes district, on soil, 2000 m.,
31.7.87, Çetin 739.

A2, A4, Europe, Asia, N. America.

B. pseudotriquetrum (Hedw.) Gaertn.
Meyer & Scherb.

U.N.P., Akpınar bridge, near streambed,
1400 m., 26.8.88, Çetin 738.

A1, A2, A3, B6, B8, C13, C. Europe,
Asia, W. Afric, America.

B. torquescens B., S. & G.

U.N.P., Kadiyayla on wet soil, 1000 m.,
5.8.89, Çetin 778.

Common

Mniaceae

Mnium stellare Hedw.

U.N.P., Sarıalan, on wet soil, 1500 m.,
26.8.88, Çetin 723.

A1, A2, A4, Europe, Himalayas, Japan, N.
America.

Rhizomnium punctatum (Hedw.) T.
Kop.

U.N.P., Sarıalan, on wet soil, 1500 m.,
26.8.88, Çetin 723.

A1, A2, A3, A4, B8, Europe, Asia, N.
America.

* **Plagiomnium undulatum** (Hedw.) T.
Kop.

U.N.P., Sarıalan, on wet soil, 1500 m.,
26.8.88, Çetin 721.

A2, A3, A4, B6, C13, C. Europe, Asia, N.
and W. Africa.

Aulocominaceae

Aulocomnium palustre (Hedw.)
Schwaegr.

U.N.P., Çobankaya, on wet soil, 1900 m.,
2.7.89, Çetin 775.

A1, A4, Europe, Asia, N. Africa, N.
America.

Bartramiaceae

Bartramia ithyphylla Brid.

U.N.P., Bakacak hill, on rock, 1700 m.,
26.8.89, Çetin 748.

A1, A2, A4, Europe, Asia, East Africa,
America.

Philonotis fontana (Hedw.) Brid.

U.N.P., Lakes district, on lake shore,
2100 m., 2.9.89, Çetin 781.

A1, A2, A3, B6, B7, B9, B10, Europe,
Asia, America.

P. seriata Mitt.

U.N.P., Akpınar, near streambed, 1400
m., 26.8.88, Çetin 735.

A1, A2, A4, B6, Europe, Himalayas, N.
Africa.

* **P. tomentella** Mol.

U.N.P., Akpınar, near streambed, 1420
m., 26.8.88, Çetin 732.

A4, B9, Europe, C. Asia, N. America.

* **P. calcarea** (B., S. & G.) Schimp.

U.N.P., lakes district, on wet soil, 2000
m., 31.7.89., Çetin 764.

A2, A3, A4, B7, B10, C13, Asia, Europe,
America.

Orthotrichaceae

Orthotrichum affine Brid.

U.N.P., Çobankaya, on bark, 1650 m.,
26.8.88, Çetin 722.

A1, A2, A3, B6, Europe, Caucasus, N.
Africa, N. America.

O. affine var. **fastigiatum** (Brid.) Hueb.

U.N.P., Kirazlyayla, on pine bark, 1100
m., 6.7.96, Çetin 952a.

A1, A3, B6 Britain, Europe, Scandinavia.

* **O. pallens** Bruch ex Brid.

U.N.P., Çobankaya, on bark, 1700 m.,
26.8.88, Çetin 748.

A2, A3, Europe, Caucasus, N. America.

O. rupestre Schleich. ex Schwaegr.

U.N.P., Lake district, on bark, 2100 m.,
10.7.96, Çetin 975.

A1, A2, B5, B6, B7, B8, C13, Europe,
India, N. America.

O. striatum Hedw.

U.N.P., Bakacak, on fir bark, 1600 m.,
26.8.88, Çetin 746.

A1, A2, A3, B6, C. Europe, N. America.

Hedwigiaceae

Hedwigia ciliata (Hedw.) P: Beauv.

U.N.P., east side of the hotels, on rock,
1800 m. 31.7.89, Çetin 785.

Cosmopolitan

Fontinalaceae

Fontinalis antipyretica Hedw.

U.N.P., Lakes district, near water, 2100
m., 2.9.89, Çetin 774.

A1, A2, A4, B6, B7, C11, C12, Europe,
Africa, N. America.

Leucodontaceae

Leucodon sciuroides (Hedw.) Schwaegr.

U.N.P., Kirazlyayla, on bark, 1000 m.,
6.7.96, Çetin 952.

Cosmopolitan

Leskeaceae

* **Habrodon perpusillus** (De Not.) Lindb.

U.N.P., Kadiyayla, on bark, 1000 m.,
5.8.89, Çetin 777.

A3, B6, C12, Europe, Algeria.

* **Lescuraea incurvata** (Hedw.) Lawt.

U.N.P., Bakacak hill, on bark, 1700 m.,
26.8.89, Çetin 784a.

A4, C13, Europe, C. Asia, N. America.

Pterigynandrum filiforme Hedw.

U.N.P., Sarıalan, on fir bark, 1300 m.,
26.8.88, Çetin 724.

A2, A3, Europe, N. America, Japan.

Amblystegiaceae

* *Amblystegium serpens* (Hedw.) B., S. & G.

U.N.P., Sarılan, on rock, 1300 m., 6.7.96, Çetin 956.

A2, A4, B7, B8, Europe, N. America, Japan.

* *Cratoneuron commutatum* (Hedw.) Roth.

U.N.P., around hotels, near streambed, 1500 m., 26.8.88, Çetin 740.

A2, A3, B7, B8, B9, C13, C15, Europe, Asia, N. America.

* *C. commutatum* var. *falcatum* (Brid.) Moenk.

U.N.P., Lake district, near water, 2100 m., 2.9.89, Çetin 759.

A2, A3, B8, B10, C11, C13, C15, Europe, Iceland, N. Africa, N. America.

Calliergon stramineum (Brid.) Kindb.

U.N.P., Hotels, on wet soil, 1800 m., 31.7.89, Çetin 786.

A1, Europe, C. Asia, Australia.

Brachytheciaceae

Isothecium alopecuroides (Dubois) Isov

U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 754.

A1, A2, A3, B6, C13, Europe, Asia, Scandinavia.

Homalothecium sericeum Hedw.

U.N.P., Çobankaya, on rock, 1700 m., 26.8.88, Çetin 718.

Common

* *Brachythecium albicans* (Hedw.) B., S. & G.

U.N.P., Bakacak hill, on rock, 1700 m., 26.8.88, Çetin 765.

A2, Europe, N. America.

B. collinum (C. Müll.) B., S. & G.

U.N.P., North slope of Uludağ, on rock, 1600 m., 6.8.89, Çetin 769.

A1, A4, A5, B8, B9, B10, Europe, Asia.

* *B. erythrorrhizon* B., S. & G.

U.N.P., Çobankaya, on soil, 1650 m., 26.8.88, Çetin 728.

A2, Scandinavia, Alps, N. America.

B. rivulare B., S. & G.

U.N.P., Hotels, near streambed, 1500 m., 26.8.88, Çetin 733.

Very common, Europe, Asia, N. America.

B. rutabulum (Hedw.) B., S. & G.

U.N.P., Kadiyayla, *Carpinus betulus*, on soil, 1000 m., 5.8.89, Çetin 768.

Cosmopolitan.

B. salebrosum (WEB. & Mohr.) B., S. & G.

U.N.P., Çobankaya, on rock, 1800 m., 26.8.88, Çetin 725.

A2, A3, A4, B6, C13, N. and C. Asia, Europe, N. America.

B. velutinum var. *salicinum* (B., S. & G.)

Moenk.

U.N.P., at northern part of Uludağ, on soil, 1500 m., 7.7.96, Çetin 957.

A1, A3, C12, C. Europe, Asia, N. America.

Rhynchostegium riparioides (Hedw.) C. Jens.

U.N.P., Akpınar, near streambed, 1400 m., 26.8.88, Çetin 736.

Very common, Europe, Asia, America.

Plagiotheciaceae

Plagiothecium denticulatum (Hedw.) B., S. & G.

U.N.P., east part of hotels, on wet soil, 1800 m., 31.7.89, Çetin 761.

A1, A3, A4, C. Europe, Asia, N. America.

Hypnaceae

Hypnum cupressiforme Hedw.

U.N.P., Kadiyayla, on rock, 1000 m., 5.8.89, Çetin 760.

Cosmopolitan

* *H. cupressiforme* var. *lacunosum* Brid.

U.N.P., Bakacak hill, on rock, 1500 m., 3.8.89, Çetin 758.

A2, A3, B6, Europe, C. America.