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The Moss Flora of Trabzon and Environs

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Abstract: In this study, 120 taxa were identified by the authors. These belong to 27 families and 61 genera of Bryophytes. Of these 25 taxa are new for the A4 grid-square adopted by Henderson (1961).

Key Words: Bryophyte, Moss, Flora, Trabzon

Trabzon ve Çevresi Karayosunları Florası

Özet: Bu çalışmada, araştırma alanı olan Trabzon ve çevresinden toplanan Karayosunu örnekleri değerlendirilerek 27 familya ya ait 61 cins ve bunlara bağlı 120 takson tanımlanmıştır. Bunlardan 25 tanesi Henderson (1961) tarafından benimsenen kareleme sistemine göre A4 karesi için yenidir.

Anahtar Sözcükler: Bryophyta, Karayosunu, Flora, Trabzon

Introduction

The study area is in the A4 grid-square according to the system adopted by Henderson (1-2). The region is very interesting in terms of its natural structure and its climate. Its conditions encouraged us to conduct a study on the *Bryophyta*.

It is hoped that this study will contribute to the identification of the moss flora of Turkey and be useful as

a guide for future studies.

Trabzon is located in the Eastern Black Sea Region. The study area is surrounded by Giresun in the west, Rize in the east, Gümüşhane and Bayburt in the South. The lowest parts of the study area are along the sea coast. The highest parts of the area are Karadağ Mountain (2500 m), Kayabaşı High Plateau (1800 m) and Hıdırnebi High Plateau (1900m) (Figure 1).

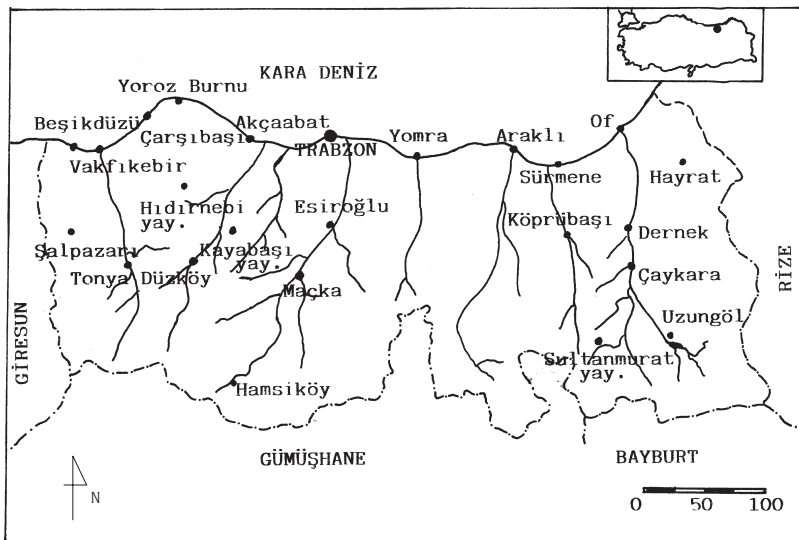


Figure 1. The Grid system which adopted by Henderson for Turkey

Materials and Methods

The materials were plant samples collected during studies in the area between 1992 and 1995.

The plant samples were collected using tools such as a large knife, an iron bar etc. These samples were cleaned of soil, mud and stones and temporarily stored in slightly wet nylon bags. The labels stating details such as the location of the collection, the name of the predominating plant in the surrounding vegetation, the medium where the sample was originally found (stone, branch of a tree, streambed, rotten root, etc.) the altitude of the region and the date of collection were put into each individual bag.

The samples were brought to the laboratory. As a result of the macroscopical and microscopical studies, the identification of the samples was done with various books on moss flora (3-5). In addition, the state of the species for the study area and for Turkey was determined by reviewing the related literature (6-8).

The plant list was given according to the system proposed by Smith and Watson (3-5). The samples were deposited at the Herbarium of Department of Biology at the Fatih Faculty of Education at Karadeniz Technical University.

Findings

Divisio: Bryophyta

Sphagnopsida

Sphagnaceae

Sphagnum L.

1. *S. palustre* L.

A4 Trabzon, sürmene, Çamburnu, on wet soil and in water, 250 m, 07.01.1996, Öz 195.

Mexico, Taiwan, England, N. America.

Bryopsida

Polytrichaceae

1. Capsule usually at least obscurely angled, apophysis present **Polytrichum**

1. Capsule not angled in section, apophysis absent **Pogonatum**

Polytrichum Hedw.

1. Nerve excurrent in long hyaline arista, not toothed at back above **P. piliferum**

1. Nerve excurrent in brownish arista, toothed at back above

2. Plant mostly 1-7 cm., tomentum if present brownish **P. juniperinum**

2. Plant (1-)2-40 cm

3. Apical cells of lamellae grooved or flat-topped in section **P. commune**

3. Apical cells of lamellae smooth, capsule angled

4. Capsule obscurely angled, lamina in mid-blade 6 or more cells wide,

lamina cells 14-25 im wide

P. longisetum

4. Capsule sharply 4 to 6 angled, lamina in mid-blade 1-5 cells wide, lamina cells 10-16 im wide

P. formosum

2. **P. commune** Hedw.

A4 Trabzon, Akçaabat, Düzköy, ışıklar, on soil, 750 m 12.08.1995, Maçka, Altındere Valley, Hamsiköy, on soil, in forest, 1200 m, 01.10.1993, Öz 196.

A1, A2, C. Europe, Faroes, iceland, Caucasus, N. and E. Asia, Macaronesia, E., W., and S. Africa, N. America, Greenland, Peru, Brazil, Australia, Tasmania, Chatham is.

3. **P. juniperinum** Hedw.

A4 Trabzon, Sürmene, Çamburnu, *Pinus sylvestris* and *Picea orientalis* forest, 150 m, 23.06.1992, 07.01.1996, Öz 198.

A1, A2, A3, A5, A6, A8, Cosmopolitan

4. **P. longisetum** Sw. ex Brid.

A4 Trabzon, Akçaabat, Bozdoğan, 950 m, şinik, 550m, 17.09.1995, Hıdırnebi High Plateau, 1750 m, 19.06.1994, on soil, in forest, Öz 199.

Europe, Faroes, iceland, Caucasus, N. Asia, Korea, Japan, New Guinea, N. America, Greenland, Chile, New Zealand.

A new record for A4 square

5. **P. piliferum** Hedw.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, 1750m, 08.10.1995, ışıklar, 750m, 12.08.1995, on soil, Öz 200.

A1, C. Europe, Faroes, iceland, Caucasus, N.,C., and E. Asia, Macaronesia, Congo, N. America, Greenland, Patagonia, Falkland and Juan Fernandez is., Australia, Hawaii, Antarctica.

Pogonatum P. Beauv.

1. Plants to 2 cm high, unbranched, shoots arising from persistent protenema, capsule smooth **P. aloides**

1. Plants (1) 2-40 cm, stems often branched and arising from underground rhizomes, capsule smooth or angled **P. urnigerum**

6. **P. aloides** Hedw:

A4 Trabzon, Maçka, Altındere Valley, on soil, 1250 m, 01.10.1993, Sürmene, Çamburnu, in forest, on soil, 200 m, 07.01.1996, Öz 201.

A2, A3, Europe, Faroes, Asia, Algeria, Congo, Uganda, Macaronesia, New Zealand.

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

A4 Trabzon, Düzköy, 900 m, ışıklar, 750 m, 12.08.1995, Maçka Altındere Valley, 1100 m, Akoluk, 750 m, 01.10.1993, Beşikdüzü, Çeşme, Adacık, 100 m, 26.11.1993, Sürmene, Çamburnu, 150 m, 07.01.1996,

on soil and in forest, Öz 202.

A2, C. Europe, Iceland, Faroes, W., C. and E. Asia, Azores, Canaries, N. America, Greenland, Caribbean.

Atrichum P. Beauv.

8. A. undulatum (Hedw.) P. Beauv.

A4 Trabzon, Söğütlü, 100 m, 05.12.1995, Uçarsu, 500 m, 15.10.1995, Maçka, Altındere, 1100m, Coşandere, 850 m, Esiroğlu, 600 m, 08.10.1993, on soil, Öz 203.

A2, A3, A6, C. Europe, Asia, Algeria, Azores, Madeira, N. America.

Dicranaceae

1. Nerve more than 1/4 width of leaf base

Campylopus

1. Nerve less than 1/4 width of leaf base

Dicranum

Dicranum Hedw.

1. Leaf margin recurved below, spinosely toothed above **D. polysetum**

1. Leaf margin plane below, denticulate to serrate above

2. Leaves falcato-secund, 9-15 mm. Long, seta yellowish-green **D. majus**

2. Leaves erect to secund to 10 mm. Long, seta reddish at least below

3. Leaves serrate and with low, toothed lamellae at back above **D. scoparium**

3. Leaves without lamellae or teeth at back, margin entire or denticulate above **D. fuscescens**

9. D. fuscescens Turn.

A4 Trabzon, Maçka, Altındere valley, 1250 m, Hamsiköy, 1200 m., Gürgenağaç, 1500 m, in forest, 13.10.1993, Vakfıkebir, ıshaklı, 500 m, 19.11.1995.

Europe, Faroes, Iceland, Caucasus, N. and C. Asia, N. America, Greenland.

10. D. majus Turn.

A4 Trabzon, Akçaabat, Arpaçılı, 700 m, Erikli, 550 m, 10.06.1995, Çaykara, şahinkaya, 850 m, 13.09.1993, under forest between roots and soil, Öz 206.

A1, A2, A3, A5, England, Europe, Faroes, Iceland, Caucasus, C. Asia, China, Japan, N. America, Greenland.

11. D. polysetum Sw.

A4 Trabzon, Akçaabat, Kuruçam, 750 m, 22.10.1995, Maçka, Meryemana, 1200 m, Hamsiköy, 1100 m, 13.10.1995, on tree roots, Öz 207.

A2, Europe, Siberia, N. and S. America.

12. D. scoparium Hedw.

A4 Trabzon, Maçka, Altındere, 1300 m, Gürgenağaç, 1500 m, 02.10.1993, under forest between roots, Öz 208.

A1, A2, A3, A5, A6, C. Europe, Faroes, Iceland, Macaronesia, America, New Zealand.

Dicranella (C. Müll.) Schimp.

13. D. heteromalla (Hedw.) Schimp.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on soil, 1600 m, 08.10.1995, Öz 204.

A5, Europe, Caucasus, Himalayas, Madeira, Kenya, N. America, Bolivia.

Ditrichaceae

Ditrichum Hampe.

14. D. heteromallum (Hedw.) Britt.

A4 Trabzon, Akçaabat, Yıldızlı, Demirtaş, 200 m, 11.11.1995.

Europe, Faroes, Iceland, N. America.

Campylopus Brid.

1. Hair-point present, though sometimes broken off, leaf margin entire below hair-point **C. atrovirens**

1. Hair-points absent, leaf toothed at least near apex **C. fragilis**

15. C. atrovirens De Not.

A4 Trabzon, Akçaabat, Yıldızlı, 200 m, 11.11.1995, Beşikdüzü, Çeşme, Adacık, 100 m, 26.11.1995, on soil, Öz 209.

A2, Norway, Alps, Pyrenees, China, Japan, N. America, N. Carolina.

16. C. fragilis (Brid.) B., S. & G.

A4 Trabzon, Vakfıkebir, Caferli, on wet soil, 150 m, 19.11.1995, Öz 215.

A2, England, C. Europe, Macaronesia, Japan, Florida, N. W. United States and British Columbia.

A new record for A4 square.

Paraleucobryum (Limpr.) Loeske.

17. P. longifolium (Hedw.) Loeske.

A4 Trabzon, Akçaabat, Hidirnebi, 1700 m, 19.06.1994, Bozdoğan Village, 950 m, şinik, 550 m, 17.09.1995, on rock, Öz 213.

A2, Europe, Caucasus, Siberia, Japan, N. America, Greenland.

Leucobryaceae

Leucobryum Brid.

18. L. glaucum (Hedw.) Angstr.

A4 Trabzon, Maçka, Sümela, 1000 m, on soil, 13.10.1993, Öz 214.

A2, England, Caucasus, Hong Kong, Japan, Macaronesia, N. America, Jamaica, Andes, Hawaii.

Fissidentaceae

1. Leaves irregularly dentate towards apex, 3-4 rows of marginal cells forming pale **F. adianthoides**

1. Leaves crenulate towards apex, marginal cells not differentiated **F. taxifolius**

Fissidens Hedw.

19. F. adianthoides Hedw.

A4 Trabzon, Yomra, 120 m, 03.12.1995,

Sürmene, Çarşamba, 10 m, 07.01.1996, on wet rock, Öz 215.

A11, Europe, Faroes, Iceland, Japan, Hong Kong, Algeria, N. America, New Zealand.

20. F. taxifolius Hedw.

A4 Trabzon, Çukurçayır, 250 m, on stone, 03.07.1993, Beşikdüzü, Çeşme, 50m, on rock, 26.11.1995, Öz 216.

A1, A2, A3, A6, A11, C. Europe, Faroes, Asia, Siberia, Kashmir, Nepal, Japan, Tunisia, Macaronesia, N. and C. America, S. Africa.

A new record for A4 square.

Encalyptaceae

Encalypta Hedw.

21. E. vulgaris Hedw.

A4 Trabzon, Akçaabat, Yıldızlı, on soil and rock, 11.11.1995, Öz 217.

Cosmopolitan.

Pottiaceae

1. Leaves mostly broad nerve in cross-section with one stereid band **Tortula**

1. Leaves mostly narrower, nerve in cross-section usually two stereid band

2. Leaf margin or lamina recurved

Barbula

2. Leaf margin or lamina incurved

3. Leaves blunt at apex

Gymnostomum

3. Leaves sharply pointed

4. The smooth, pale, thin walled basal cells passing gradually into papillose cells **Trichostomum**

4. The smooth, hyaline basal cells passing in V-shaped line abruptly into papillose cell **Tortella**

Tortula Hedw.

1. Hair-point denticulate to spinulose, plants (0.2-)1.0-10.0cm **T. intermedia**

1. Hair-point smoot, plants 0.2-1.5 (-3.0)cm **T. muralis**

22. T. intermedia (Brid.) De Not.

A4 Trabzon, Vakfikebir, Caferli, 150 m, Soğuksu, 400m, 19.11.1995, Yomra, Demirciler, 900m, 03.12.1995, on rock, Öz 218.

Cosmopolitan.

A new record for A4 square.

23. T. muralis Hedw.

A4 Trabzon, Vakfikebir, Caferli, 150 m, Soğuksu, 400m, 19.11.1995, Yomra, Demirciler, 900m, 03.12.1995, on rock Öz 218 a.

Cosmopolitan.

Barbula Hedw.

1. Leaves oblong-lanceolate to narrowly lingulate, tapering in upper part only

2. Seta yellowish, leaf margin plane or narrowly recurved in lower part of leaf, nerve ending below apex, to shortly excurrent **B. convoluta**

2. Seta dark red or purplish, margin recurved except near apex, nerve excurrent **B. unguiculata**

1. Leaves broadly ovate to linear-lanceolate, gradually tapering from below middle

B. acuta

24. B. acuta (Brid.) Brid.

A4 Trabzon, Akçaabat, Çiçeklidüz, on soil, 250m, 09.07.1995, Uçarsu, 500m, 15.10.1995, Yomra, 150m, 03.12.1995, Of, Cumapazarı, 450m., 26.08.1995, on soil, Öz 220.

A1, A2, A3, A6, A7, A8, A11, Europe, Kashmir, Caucasus, Morocco, Madeira, Azores, N. America.

25. B. convoluta Hedw.

A4 Trabzon, Vakfikebir, 100m, Caferli,

200m, on soil, 18.11.1995, Öz 221.

A1, A2, A3, A6, A11, A12, A13, C. Europe, Caucasus, Siberia, Japan, Tunisia, Algeria, Azores, N. America, Mexico, Australia.

A new record for A4 square.

26. B. unguiculata Hedw.

A4 Trabzon, Beşikdüzü, Çeşme, on soil, 70m, 26.11.1995, Of, Çamlı, on wet soil, 200m, 23.09.1995, Öz 222.

A1, A2, A3, A6, A7, A11, C. Europe, Faroes, Iceland, N., W. and C. Asia, China, Japan, Hong Kong, Algeria, N. America, Mexico, Australia.

27. Bryoerythrophyllum recurvirostre (Hedw.) Chen.

A4 Trabzon, Çukurçayır, on soil, 250m, 03.07.1993, Öz 223.

A1, A2, A3, A5 A8, A9, A13, C. Europe, Faroes, Iceland, Asia, N. Africa, N. America, Greenland.

A new record for A4 square.

28. Didymodon tophaceus (Brid.) Lisa.

A4 Trabzon, Center, on wet soil, 350 m, 03.07.1993, Yoroç, on wet soil, 20m, 16.12.1995, Öz 224.

A1, A2, A6, A11, A13, C. Europe, Iceland, W. Asia, Tibet, Kashmir, China, Macaronesia, Tunisia, Morocco, N. America, Mexico, Bolivia.

A new record for A4 square.

Gymnostomum Nees & Hornsch.

29. G. aeruginosum Sm.

A4 Trabzon, Akçaabat, Ortaalan, 550m, on soil, 17.09.1995, Öz 225.

A8, A9, A11, A15, Europe, Faroes, Iceland, Caucasus, China, Japan, Canaries, N., C. and S. America, W. Indies.

Trichostomum Hedw.

1. Leaf margin erect or incurved above, apex usually conculate **T. crispulum**

1. Leaf margin usually plane above, apex not cucullate **T. brachydonticum**

30. T. crispulum Bruch.

A4 Trabzon, Akçaabat, ışıklar, on rock, 750m, 12.08.1995, Öz 226.

A1, A2, A3, A6, A11, A12, A13, C. Europe, Caucasus, Siberia, E. Asia, N. Africa, Madeira, N. America.

31. T. brachydonticum Bruch.

A4 Trabzon, Cosmopolitan, Öz 227.

A1, A3, A6, A7, A11, A12, A13, C. Europe, Caucasus, Syria, China, Japan, N. and S. Africa, Macaronesia, Juan Fernandez, New Zealand.

Tortella Limpr.

1. Leaves straight but not twisted or crisped when dry, cells in upper part of leaf 6-8µm wide, 2-3 stratoze and forming with nerve long, trigonous, very fragile, setaceous point **T. fragilis**

1. Leaves usually strangely twisted, curled or incurved, when dry, cells unistratose throughout, apex various but never setaceous **T. tortuosa**

32. T. fragilis (Drumm.) Limpr.

A4 Trabzon, Akçaabat, Yıldızlı, 100m, 11.11.1995, Beşikdüzü, şahmelik, 400m, 25.11.1994, on soil, Öz 228.

Europe, Asia, Morocco, N. America.

33. T. tortuosa (Hedw.) Limpr.

A4 Trabzon, Akçaabat, ışıklar, 750m, Düzköy, 800m, on soil, 12.08.1995, Öz 229.

Cosmopolitan.

Pleurochaete Lindb.

34. P. squarrosa (Brid.) Lind.

A4 Trabzon, Akçaabat, Yıldızlı, 100m, 11.11.1995, Vakfikebir, Caferli, 150m,

19.11.1995, Yomra, Özdil, 600m, 03.12.1995, Çaykara, Cumapazarı, 400m, 27.08.1995, on soil, Öz 230.

A2, A6, A11, A12, A13, A14, Europe, Caucasus, Iran, Himalayas, China, Azores, Canaries, N. Africa, Kenya, Arizona.

Grimmiaceae

1. Seta very short, straight **Schistidium**

1. Seta tall, straight or curved **Grimmia**

Schistidium Brid.

1. Plant forming loose, greenish to brownish, patches or tufts **S. apocarpum**

1. Plank forming dense, dark brown to blackish **S. trichodon**

35. S. apocarpum (Hedw.) B.S.&G.

A4 Trabzon, Sürmene, Çiftköprü, 600m, Akçaabat, Aykut, 750m, Hıdırnebi High Plateau, 1750m, 19.06.1994, Kayabaşı High Plateau, 1700m, 08.10.1995, in forest, on soil, Öz 231.

Cosmopolitan.

36. S. trichodon (Brid.) Poelt.

A4 Trabzon, Vakfikebir, Caferli, on rock, 30m, 19.11.1995, Öz 232.

A2, Europe.

A new record for A4 square.

Grimmia Hedw.

1. Upper leaves ovate lanceolate or lanceolate, abruptly narrowed into hair-point **G. pulvinata**

1. Upper leaves lanceolate or narrowly lanceolate, gradually tapering into hair-point

2. Hair-points shorts, to 320(-400)µm long in upper leaves **G. hartmani**

2. Hair-points to as long as lamina in upper leaves **G. trichophylla**

37. G. hartmani Schimp.

A4 Trabzon, Akçaabat, Aykut, Akpınar, 750m, on rock, 12.08.1995, Öz 233.

A12, A13, Europe, Caucasus, N. Africa, N. America, England.

38. G. pulvinata (Hedw.) Sw.

A4 Trabzon, Vakfikebir, Akköy, Ortaköy, 750m, 19.11.1995, Yomra, Özdil, 600m, Kayabaşı, 400m, 03.12.1995, Çaykara, Uzungöl, 1900m, on rocks, Öz 234.

Cosmopolitan.

39. G. trichophylla Grev.

A4 Trabzon, Vakfikebir, Akköy, Ortaköy, 750m, 19.11.1995, Yomra, Özdil, 600m, Kayabaşı, 400m, 03.12.1995, Çaykara, Uzungöl, 1900m, on rocks, Öz 234 a.

Cosmopolitan.

Racomitrium Brid.

1. Leaf cells papillose, hair-point if present papillose and denticulate **R. canescens**

1. Leaf cells smooth or only slightly papillose, hair-point when present smooth or if papillose then coarsely toothed

2. Leaves with hair-points **R. lanuginosum**

2. Leaves without hair-points **R. aciculare**

40. R. aciculare (Hedw.) Brid.

A4 Trabzon, Akçaabat, ışıklar, on rock, 750m, 12.08.1995, Öz 236.

A1, Europe, Iceland, Faroes, W. Asia, Madeira, Southern Africa, N. America.

41. R. lanuginosum (Hedw.) Brid.

A4 Trabzon, Akçaabat, ışıklar, 750m, Alazlı, 800m, on rock, 22.10.1995, Haçka High Plateau, 1850 m, 09.07.1994, Çaykara, Sultan Murat High Plateau, 1950m, on rock, 13.08.1994, Öz 237.

Cosmopolitan.

42. *R. canescens* (Hedw.) Brid.

A4 Trabzon, Sürmene, Çamburnu, on rock, 400m, 01.07.1996, Öz 238.

A1, A2, Europe, Faroes, Iceland, Caucasus, Siberia, Sikkim, Nepal, Sri Lanka, China, Japan, Madeira, Azores, N. America.

Funariaceae

Funaria Hedw.

43. *F. hygrometrica* Hedw.

A4 Trabzon Çarşıbaşı, Yorožburnu, on soil, 40m, 16.12.1995, Öz 240 a.

A1, A2, A3, A6, A11, A12, A14, Cosmopolitan.

Physcomitrium (Brid.) Brid.

44. *P. pyriforme* (Brid.) Brid.

A4 Trabzon, Çarşıbaşı, Yorožburnu, on soil, 40m, 16.12.1995, Öz 240.

A6, C. Europe, Caucasus, Algeria, Morocco, Macaronesia, Australia.

Bryaceae

1. Leaf margin denticulate ± from middle
Pohlia

1. Leaf margin entire or denticulate only near apex
Bryum

Pohlia Hedw.

45. *P. cruda* (Hedw.) Lindb.

A4 Trabzon, Akçaabat, Yıldızlı, 200m, Demirtaş, 250m, 11.11.1995, on wet rock, Öz 241.

A1, A2, A6, A7, A8, A11, Europe, Faroes, Asia, Algeria, Azores, America, Australia, New Caledonia, Antarctica.

Bryum Hedw.

1. Leaves spirally twisted round stem when dry, widest above middle **B. capillare**

1. Leaves not spirally twisted round stem when dry, widest above middle or not

2. Outer Peritome teeth not perforated near base, exothelial cells near capsule mouth mostly 20-25 µm wide

B. inclinatum

2. Outer Peritome teeth frequently perforated near base, exothelial cells near mouth mostly 30-40 µm wide

3. Spores 18-20(-22)µm, process perforations 1.5-2 times as long as wide **B. pallescens**

3. Spores 14-16µm, Process perforations about as long as wide **B. creberrinum**

46. *B. capillare* Hedw.

A4 Trabzon, Akçaabat, ışıklar, 750m, Alazlı, 800m, on rock, 22.10.1995, Haçka High Plateau, 1850 m., 09.07.1994, Çaykara, Sultan Murat High Plateau, 1950m, on soil 13.08.1994, Öz 242.

Cosmopolitan.

47. *B. creberrinum* Tayl.

A4 Trabzon, Çarşıbaşı, Yorožburnu, on soil, 10m, 16.12.1995, Öz 243.

A2, A8, A9, A11, A13, Europe, N. Asia, India, N. America, Australia, New Zealand.

A new record for A4 square.

48. *B. pallescens* Schleich. ex Schwaegr.

A4 Trabzon, Akçaabat, Uçarsu, on soil, 500m, 15.10.1995, Öz 244.

A1, A6, A8, Europe, Asia, Africa, America.

A new record for A4 square.

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

A4 Trabzon, Akçaabat, Kuruçam, on rock, 800m, 31.03.1996, Öz 245.

A2, Europe, Iceland, Asia, Morocco, Algeria, N. America, Greenland, Tierra del Fuego, Australia, Antarctica.

Rhodobryum (Schimp.) Limpr.

50. *R. roseum* (Hedw.) Limpr.

A4 Trabzon, Akçaabat, ışıklar, 750m., Alazlı, 800m, on rock, 22.10.1995, Haçka High Plateau, 1850 m, 09.07.1994, Çaykara, Sultan Murat High Plateau, 1950m, on rock, 13.08.1994, Öz 246.

A2, Europe, Asia, N. America.

Mniaceae

1. Nerve mostly without stereids

Rhizomnium

1. Nerve mostly with stereids

2. Nerve mostly percurrent with both dorsal and ventral stereids **Mnium**

2. Nerve percurrent or excurrent with dorsal stereids **Plagiomnium**

Mnium Hedw.

1. Leaf base hardly decurrent, nerve ending below apex, lid mamillate **M. hornum**

1. Leaf Base distinctly decurrent, nerve ending in apex or excurrent at least in upper leaves of fertile stems, lid rostrate

M. marginatum

51. *M. hornum* Hedw.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, under forest, on soil, 1300m, 08.10.1995, Öz 247.

C. Europe, Faroes, Japan, Algeria, N. America.

52. *M. marginatum* (With.) P. Beauv.

A4 Trabzon, Akçaabat, ışıklar, on soil, 700m, 12.08.1996, Çaykara, Dernek, on soil in forest, 500m, 24.09.1995, Öz 248.

Caucasus, Siberia, N. America, Greenland, Europe.

Rhizomnium (broth.) Kop.

53. *R. punctatum* (Hedw.) T. Kop.

A4 Trabzon, Akçaabat, ışıklar, on soil, 700m, 12.08.1996, Çaykara, Dernek, on wet soil in

forest, 500m, 24.09.1995, Öz 249.

A1, A2, A3, A8, Europe, Faroes, Asia, Madeira, N. America, Greenland.

Plagiomnium Kop.

1. Upper leaves narrowly lingulate, strongly undulate, lower leaves shorter and wider, cells 12-25µm wide in mid-leaf

P. undulatum

1. Upper leaves broad ± ovate, not or scarcely undulate, cells mostly 20-50µm wide in mid-leaf

2. Cells in mid-leaf elongate-hexagonal, 15-30 times as long as wide, leaf base decurrent

3. Leaf base narrowly decurrent, cells 1.5-2.0 times as long as wide in mid-leaf, sterile shoots arcuate *P. affine*

3. Leaf base broadly decurrent, cells 2-3 times as long as wide mid-leaf, sterile shoots erect *P. elatum*

2. Cells in mid-leaf mostly ± isodiametric, leaf base decurrent or no *P. medium*

54. *P. affine* (Funk.) T. Kop.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on soil, 1250m, 08.10.1995, Öz 250.

A1, A2, A8, Europe, Faroes, Russia, Iran, Madeira.

55. *P. elatum* (Bland.) T. Kop.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on wet soil, 1250m, 08.10.1995, Öz 251.

A2, Europe, Iceland.

56. *P. medium* (B.S.&G.) T. Kop.

A4 Trabzon, Maçka, Altındere, 1400m, Hamsiköy, 1000m, 01.10.1993, on soil, in forest, Öz 252.

A2, Europe, Faroes, Iceland, Caucasus, Siberia, Chitral, Punjab, Kashmir, Japan, Korea, Morocco, N. America, Greenland.

57. *P. undulatum* (Hedw.) T. Kop.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on wet soil, 1250m, 08.10.1995, Öz 253.

A2, A3, A6, A13, Europe, Faroes, Asia, N. and W. Africa, Macaronesia.

Bartramiaceae

1. Leaves narrowly to linear-lanceolate

Bartramia

1. Leaves lanceolate, ovate or ovate-lanceolate

Philonotis

Bartramia Brid.

1. Leaves with white sheathing base, cells narrowly rectangular in upper part of leaf, spores 34-40 µm *B. ithyphylla*

1. Leaves without whitish sheathing base or if base sheathing than upper cells quadrate-rectangular, spores 20-32 µm

B. pomiformis

58. *B. ithyphylla* Brid.

A4 Trabzon, Yomra, Kiratlı, on soil, 500m, 03.12.1995, Öz 254.

A1, A2, Europe, Faroes, Iceland, N. and C. Asia, China, N. and E. Africa, N. America, Greenland, Patagonia.

59. *B. pomiformis* Hedw.

A4 Trabzon, Akçaabat, Çiçeklidüz, 200m, 09.07.1995, Maçka, Altındere, 900m, Esiroğlu, 500m, 28.09.1993, on soil, Öz 255.

A1, A11, England, C. Europe, Faroes, Caucasus, N. and C. Asia, Himalayas, China, Japan, Madeira, N. America, Greenland, Tierra del Fuego, New Zealand.

Philonotis Brid.

1. At least upper cells of leaves with only distal mamillae or if cells smooth then plants very slender with lanceolate, ± tapering leaves *P. marchica*

1. Mamillae proximal and sometimes also distal *P. fontana*

60. *P. fontana* (Hedw.) Brid.

A4 Trabzon, Akçaabat, Kemaliye, 650m, 28.10.1995, Maçka, Altındere, 1200m, on soil and rock, Kayabaşı High Plateau, 1550m, 19.06.1994, on soil, Öz 256.

A1, A2, A6, A7, A8, A9, A10, C. Europe, Asia, Algeria, Africa, America, Mexico, Greenland, England.

61. *P. marchica* (Hedw.)Brid.

A4 Trabzon, Sürmene, Çamburnu, on rock, 250m., 25.09.1994, Öz 257.

A5, W. Asia, Japan, Korea, N. America, Algeria, Madeira, England.

Orthotrichaceae

Orthotrichum Hedw.

1. Stomata superficial *O. affine*

1. Stomata immersed *O. anomalum*

62. *O. anomalum* Hedw.

A4 Trabzon, Akçaabat, Cevizlik, 100m, Uçarsu, 500m, on rocks, 15.10.1995, Öz 258.

A1, A2, A3, A6, A8, A11, A12, A13, C. Europe, Asia, Morocco, Algeria, N. and C. America, Greenland, England.

63. *O. affine* Brid.

A4 Trabzon, Akçaabat, Yıldızlı, on rock, 200m, 11.11.1995, Öz 259.

A1, A2, A3, A6, C. and N. Europe, Caucasus, Siberia, C. Asia, N. America.

A new record for A4 square.

Hedwigiaceae

Hedwigia P. Beauv.

64. *H. ciliata* (Hedw.) P. Beauv.

A4 Trabzon, Çaykara, Near Uzungöl Lake, 1750m, 27.08.1995, Akçaabat, Kayabaşı High Plateau, 1700m, 08.10.1995, on rock, Öz 260.

A1, A2, A3, A5, A6, A7, A11, Cosmopolitan.

Climaciaceae

Climacium Web. & Mohr.

65. *C. dendroides* (Hedw.) Web.

A4, Trabzon, Düzköy, Maçka High Plateau, 1650m, 09.07.1994, Öz 261.

A2, C. Europe, Faroes, N., C. and E. Asia, N. America, Greenland, New Zealand.

Neckeraceae

Neckera Hedw.

1. Leaves not undulate **N. complanata**

1. Leaves transversally undulate **N. crispa**

66. *N. crispa* Hedw.

A4 Trabzon, Akçaabat, Kuruçam, 800m, on soil, 31.03.1996, Maden, 800m, 15.10.1995, Maçka, Altındere, 1250m, Hamsiköy, 1000m, 01.10.1993, on rock and on tree, Öz 262.

A2, A3, A6, A13, C. Europe, Caucasus, Madeira, Canaries, England.

67. *N. complanata* (Hedw.) Hüb.

A4 Trabzon, Akçaabat, Kuruçam, 800m, 31.03.1996, Uçarsu, 500m, 15.10.1995, Maçka, Altındere, 1100m, 10.10.1994, on tree, Öz 263.

A1, A2, A3, A6, A13, C. Europe, Caucasus, Iran, Kashmir, Algeria, Madeira, Canaries, C. Africa, N. America, England.

Thamniaceae

Thamnobryum Nieuwl.

68. *T. alopecurum* (Hedw.) Nieuwl.

A4 Trabzon, Akçaabat, Maçka High Plateau, on soil, 1500m, 09.07.1994, Öz 264.

A1, A2, A6, A12, C. Europe, Faroes, Asia, N. Africa, Macaronesia, N. America.

Hookeriaceae

Hookeria (Hedw.) Sm.

69. *H. lucens* (Hedw.) Sm.

A4 Trabzon, Akçaabat, Maden, 800m, Cevizlik, 900m, 15.10.1995, Maçka, Altındere, 900m, Meryemana, 1100m, 01.10.1993, Çaykara, Uzungöl, 1800m., 26.08.1995, under forest, on soil, Öz 265.

A3, C., W. Europe, Faroes, Poland, Croatia, Caucasus, Tunisia, Madeira, N. America.

Habroniaceae

Habrodon Schimp.

70. *H. perpusillus* (De Not.) Lindb.

A4 Trabzon, Akçaabat, Yıldızlı, on soil, 400m, 11.11.1995, Öz 266.

A6, A12, Europe, Algeria.

A new record for A4 square.

Thuidiaceae

1. Paraphyllia numerous, usually multiform

Thuidium

1. Stem with small, few or no paraphyllia

Anomodon

Thuidium B., S.&G.

1. Stems 2 or 3 pinnate

2. Apex of apical cells of ultimate branch leaves acute, not papillose

T. tamariscinum

2. Apex of apical cells of ultimate branch leaves obtuse, crowned with 2-3 papillose

T. delicatulum

1. Stems simply pinnate **T. abietinum**

Key to the subspecies of *T. abietinum*

1. Stem leaves 1.5-2 mm long, tapering to long acuminate apex

T. abietinum subsp. **hystricosum**

1. Stem leaves mostly 1.0-1.4mm, tapering to acuminate apex

T. abietinum subsp. **abietinum**

71. *T. abietinum* (Brid.) B.S.&G. subsp. **abietinum**

A4 Trabzon, Akçaabat, Yıldızlı, on rock,

250m, 19.10.1995, Öz 267.

A2, A3, A9, C. Europe, Iceland, Caucasus, N. and C. Asia, Kashmir, China, Japan, N. America, Greenland.

72. *T. abietinum* subsp. **hystricosum** (Mitt.) Kindb.

A4 Trabzon, Akçaabat, Doğanköy, on soil, 500m, 22.10.1995, Öz 268.

A2, A3, France, Spain, England, Czechoslovakia, Switzerland, Italy, China.

A new record for A4 square.

73. *T. tamariscinum* (Hedw.) B.S.&G.

A4 Trabzon, Cosmopolitan, Öz 269.

A2, A3, Europe, Caucasus, N. and C. Asia, Japan, Algeria, N. America, Greenland.

74. *T. delicatulum* (Hedw.) B.S.&G.

A4 Trabzon, Akçaabat, Karaman, 150m, on rock, 15.10.1995, Öz 270.

Distribution: A2, A13, Europe, Iceland, Faroes, Caucasus, N., C. Asia, China, Japan, N. America, Mexico, Jamaica, Haiti.

Anomodon Hook and Tayl.

1. Leaves 1.2 mm long, margin with a few teeth near apex **A. attenuatus**

1. Leaves 2-3.5 mm long, margin without teeth near apex **A. viticulosus**

75. *A. attenuatus* (Hedw.) Hueb.

A4 Trabzon, Akçaabat, Erikli, 550m, Akpınar, 750 m, 12.08.1995, Uçarsu, 600m, 15.10.1995, on soil, Öz 271.

A2, A3, Europe, Caucasus, Asia.

76. *A. viticulosus* (Hedw.) Hook.

A4 Trabzon, Akçaabat, Kuruçam, 800m, 31.10.1996, Maçka, Altındere, 1200m, Ocaklı, 750m, Yazılıtaş, 1000m, 25.11.1995, on soil, Öz 272.

A2, A3, A6, A13, C. Europe, Caucasus, Iran, Siberia, Kashmir, Nepal, China, Canaries, Algeria, N. America.

Amblystegiaceae**Amblystegium** B.S. &G.

1. Cells in mid-leaf linear-rhomboidal, mostly 7-14 times as long as wide, margin entire

A. riparium

1. Cells in mid-leaf rhomboidal to narrowly rhomboidal, mostly 2-7 times as long as wide margin entire or denticulate

2. Leaves distant, markedly narrowed at insertion, 1.2-2.2mm long **A. humile**

2. Leaves crowded, not markedly narrowed at insertion, mostly 0.3-1.0mm long

A. serpens**77. A. riparium** (Hedw.) B.S. &G.

A4 Trabzon, Akçaabat, Akpınar, 750m, 12.08.1995, Düzköy, Haçka High Plateau, 1650m, 09.07.1994, on tree, Öz 273.

A2, A5, A6, A7, C. Europe, Siberia, Tibet, Tonkin, Japan, Macaronesia, Kerguelen is., Algeria, S. Africa, N. America, Mexico, Guatemala, Cuba, Haiti, Australia.

A new record for A4 square

78. A. humile (P. Beauv.) Crundw.

A4 Trabzon, Vakfıkebir, Sekmentli, on rock and soil, 500m, 19.11.1995, Öz 274.

A5, Europe, Caucasus, Iran, Siberia, C. Asia, N. America, Mexico, England.

A new record for A4 square.

79. A. serpens (Hedw.) B.S.&G.

A4 Trabzon, Maçka, Altındere Valley, Merymana, 1400m, 08.10.1993, on rock and tree, Öz 275.

A2, A3, A6, A7, A8, A11, A12, C. Europe, Faroes, Caucasus, Siberia, Tibet, Chitral, Kashmir, Japan, Azores, Algeria, N. America, Greenland, Peru, New Zealand.

Drepanocladus Hedw.

1. Leaf margin denticulate **D. exannulatus**

1. Leaf margin entire or slightly sinuose

D. revolvens**80. D. revolvens** (Sw.) Wsrnst.

A4 Trabzon, Akçaabat, ışıklar, 900m, Düzköy, 950m, 12.08.1995, Hidirnebi High Plateau, 1450m, 08.05.1994, on wet soil, Öz 276.

A2, Europe, Faroes, Iceland, N. and C. Asia, Japan, New Guinea, Greenland, N. America, Colombia, Antarctica, New Zealand.

81. D. exannulatus B.S. &G.

A4 Trabzon, Maçka, Altındere Valley, on rock, on soil, 1400m, 28.09.1993, Öz 277.

A1, Europe, Iceland, Caucasus, Altai, Kashmir, Yunnan, Japan, N. America, Greenland, Falkland is., New Zealand.

A new record for A4 square.

Calliergon (Sull.) Kindb.**82. C. cuspidatum** (Hedw.) Kindb.

A4 Trabzon, Maçka, Altındere Valley on wet soil, Öz 278.

A2, A3, C. Europe, Faroes, Asia, Macaronesia, N. Africa, N. America, Jamaica, Argentina, Australia, New Zealand.

Brachytheciaceae

1. Basal and angular cells small and opaque, forming distinct group **Isothecium**

1. Basal and angular cells not as above

2. Leaves very concave

3. Shoots julaceous with imbricate leaves, apiculus short, reflexed

Pseudoscleropodium

3. Shoots julaceous and leaves with long piliferous acumen or shoots not julaceous and apiculus not reflexed

Cirriphyllum

2. Leaves not or only slightly concave

4. Stem and branch leaves differing in shape **Eurhynchium**

4. Stem and branch leaves hardly differing in shape though sometimes differing in size

5. Seta rough, lid conical-rostellate, leaf base decurrent

Brachythecium

5. Seta smooth, lid rostrate, leaf base not decurrent

Rhynchostegium**Isothecium** Brid.

1. Leaves longitudinally plicate

I. striatulum

1. Leaves not plicate

I. myosuroides**83. I. striatulum** (Spruce) Kindb.

A4 Trabzon, Köprübaşı, 500, Dağardı, 700m, 25.09.1994, Çaykara, Ataköy, 1000m, 24.09.1995, on rock, Öz 279.

Europe, Caucasus, Canaries, Algeria.

84. I. myosuroides Brid.

A4 Trabzon, Esiroğlu, 500m, Çatak, 750m, on tree, 28.09.1993, Öz 280.

A2, A3, C. Europe, Faroes, Algeria, Canaries, Madeira.

Homalothecium B.S.&G.

1. Stems procumbent, attached to substrate by rhizoids for most of their length

H. sericeum

1. Stems erect or ascending, not attached to substrate except at base **H. lutescens**

85. H. lutescens (Hedw.) Robins.

A4 Trabzon, Maçka, Altındere Valley on rocks and stones, Öz 281.

Cosmopolitan.

86. H. sericeum (Hedw.) Br. Eur.

A4 Trabzon, Maçka, Altındere Valley on rocks, Öz 282.

Cosmopolitan.

Brachythecium B.S.&G.

1. Leaves longitudinally plicate, margin entire

- or denticulate, seta smooth **B. albicans**
2. Leaves imbricate when dry giving shoots string-like appearance
3. Dioecious, stems creeping, stem leaves with long, twisted, filiform acumen **B. glaerosum**
3. Autoecious, stems ascending or creeping, stem leaves with shorter, flat acumen **B. mildeanum**
1. Leaves not or only slightly plicate, margin denticulate, seta papillose at least above
4. Nerve reaching acumen and sometimes almost to leaf apex **B. populeum**
4. Nerve not reaching acumen
5. Leaves secund when moist, seta papillose above scarcely decurrent **B. plumosum**
5. Leaves not secund, seta papillose throughout
6. Angular cells forming distinct auricles
7. Dioecious, plant robust, stem leaves broadly above to ovate-oblong, acute to obtuse and apiculate **B. rivulare**
7. Autoecious, plants slender, stem leaves cordate-triangular to broadly ovate with long acumen **B. starkei**
6. Angular cells not forming distinct auricle
8. Plants slender, stem leaves lanceolate-triangular, tapering from near base **B. velunitum**
8. Plants medium-sized to robust, stem leaves ovate-cordate or ovate-lanceolate **B. rutabulum**
87. **B. albicans** (Hedw.) B., S.&G. A4 Trabzon, Maçka, Coşandere, 800m, on soil, 28.08.1993, Vakfıkebir, Soğuksu, 500m, 18.11.1995, on soil, Öz 283.
- A2, A3, A11, C. Europe, Iceland, Faroes, Caucasus, Azores, Madeira, N. America, Greenland, Australia, New Zealand, England.
88. **B. glaerosum** (Spruce) B., S.&G. A4 Trabzon, Akçaabat, Ortaalan, 550m, Pazarcık, 600m, Koçlu, 650m, 15.10.1995, on rock and stone, Öz 284.
- A2, A6, C. Europe, Iceland, Caucasus, Siberia, Yunnan, Korea, Japan, N. America, England.
89. **B. mildeanum** (Schimp.) Milde. A4 Trabzon, Akçaabat, Demirtaş, 300m, 07.10.1995, Çaykara, Dernek, 500m, 24.09.1995, on soil, Öz 285.
- A2, A6, A13, C. Europe, Iceland, Faroes, N. Asia, Azores, Madeira, N. America.
90. **B. rutabulum** (Hedw.) B., S. &G. A4 Trabzon, Akçaabat, Gürgenagaç, 1000m, Erikli, 650m, 12.08.1995, Maçka, Coşandere, 1000m, 28.08.1993, on tree body, Öz 286.
- A1, A2, A3, A6, A8, A14, C. Europe, Iceland, Faroes, N. Asia, Azores, Madeira, N. America, England.
91. **B. starkei** (Brid.) B., S.&G. A4 Trabzon, Sürmene, Çamburnu, on rock, 50m, 26.06.1995, Öz 287.
- A1, Arctic and Alpine Europe, Caucasus, N. and C. Asia, Yunnan, Japan, N. America, England.
92. **B. rivulare** B., S.&G. A4 Trabzon, Maçka, Hamsiköy, 1000m, on rock, 28.08.1993, Vakfıkebir, Caferli, 50m, on rock in forest, 19.11.1995, Öz 288.
- Cosmopolitan.
93. **B. velunitum** (Hedw.) B., S.&G. A4 Trabzon, Akçaabat, Kuruçam, 1000m, on rocks and stones, 08.10.1995, Öz 289.
- Cosmopolitan.
- A new record for A4 square.
94. **B. plumosum** (Hedw.) B., S. &G. A4 Trabzon, Akçaabat, Kuruçam, 850m, on rock, 22.10.1995, Öz 290.
- A2, A3, A12, Cosmopolitan.
- A new record for A4 square.
95. **B. populeum** (Hedw.) B., S. &G. A4 Trabzon, Akçaabat, Kuruçam, 1000m, on soil, Öz 291.
- A2, A3, A6, Cosmopolitan.
- Pseudoscleropodium** (Limpr.) Fleisch.
96. **P. purum** (Hedw.) Fleisch. A4 Trabzon, Akçaabat, Kuruçam, 1000m, on soil and rocks, Öz 292.
- A2, A3, Cosmopolitan
- Cirriphyllum** Grout.
1. Leaves not very concave, apex acuminate **C. crassinervium**
1. Leaves very concave, apex obtuse or rounded with long piliferous acumen **C. piliferum**
97. **C. crassinervium** (Tayll.) Loeske and Fleisch. A4 Trabzon, Çarşıbaşı, Yorožburnu, 20m, 16.12.1995, Akçaabat, Haçka High Plateau, 1800m, 09.07.1994, on soil, on stone, Öz 293.
- A1, A2, A3, A6, A7, A11, A12, Europe, Caucasus, Japan, Algeria, Madeira, Canaries.
98. **C. piliferum** (Hedw.) Grout. A4 Trabzon, Çarşıbaşı, Yorožburnu, on soil, 20m, 16.12.1995, Öz 294.

A3, Europe, Iceland, Faroes, Caucasus, N. and C. Asia, Japan, Morocco, N. America, Greenland.

A new record for A4 square.

Rhynchostegium B.,S. & G.

99. *R. riparioides* (Hedw.) C. Jenn.

A4 Trabzon, Akçaabat, Haçka High Plateau, 1750m, on wet soil, 09.07.1994, Öz 294.

Cosmopolitan.

Eurhynchium B.,S. & G.

1. Leaves strongly pilicate, seta smooth

E. striatum

1. Leaves not or only slightly pilicate, seta papillose

2. Stem leaves cordate-triangular, longly decurrent, branch leaves very different in shape

E. praelongum

2. Stem and branch leaves ± similar

3. Seta smooth, at least some branch leaves concave

E. pulchellum

3. Seta papillose, branch leaves acute, not concave

4. Dioecious, plant usually yellowish or yellowish-green, mid-leaf cells 45-60 µm long

E. hians

4. Autoecious or synoecious, plants usually dark green, cells 40-90 µm long

E. speciosum

100. *E. striatum* (Hedw.) Schimp.

A4 Trabzon, Akçaabat, Söğütlü, 100m, 05.12.1995, Yıldızlı, 200m, 11.11.1995, on soil, on rock, Öz 296.

A1, A2, A5, A6, A8, A10, Cosmopolitan.

101. *E. pulchellum* (Hedw.) Jenn.

A4 Trabzon, Akçaabat, Söğütlü, 100m, 05.12.1995, Yıldızlı, 200m, 11.11.1995, on soil, on rock, Öz 297.

A1, A2, A5, A6, A8, A10, Cosmopolitan.

102. *E. praelongum* (Hedw.) B.,S. & G.

A4 Trabzon, Maçka, Altındere, 1250m, 20.08.1993, Akçaabat, Kayabaşı High Plateau, 1700m, 08.10.1995, on soil, Öz 298.

A1, A2, A3, A6, A8, Europe, Iceland, Faroes, Caucasus, N. Asia, Yunnan, Japan, Morocco, Tunisia, Macaronesia, N. America.

A new record for A4 square.

103. *E. speciosum* (Brid.) Jur.

A4 Trabzon, Akçaabat, Söğütlü, 100m., 05.12.1995, Yıldızlı, 100m, 11.11.1995, on soil, on wet rock, Öz 299.

A1, A2, A3, A6, A8, Europe, Italy, Iran, Canaries.

104. *E. hians* (Hedw.) Sande Lac.

A4 Trabzon, Akçaabat, Yıldızlı, 50m, 11.11.1995, on soil, Öz 300.

A1, A2, A6, A11, A12, Europe, Iceland, Caucasus, Lebanon, C. Asia, Japan, Algeria, Madeira, Azores, N. America.

Entodontaceae

Orthothecium B.,S.& G.

105. *O. intricatum* (C.Hatm.) B.,S. & G.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on rock, 1400m, 08.10.1995, Öz 301.

A1, England, Iceland, C. Europe, Faroes, Caucasus, N. Asia, Punjab, N. America, N. Africa, Greenland.

A new record for A4 square.

Plagiotheciaceae

Plagiothecium B.,S. & G.

1. Most leaves asymmetrical and obtuse

P. denticulatum

1. Most leaves symmetrical acute to acuminate

2. Leaves sharply denticulate near apex, apical cells slightly differentiated

P. plathyphyllum

2. Leaves entire or denticulate near apex apical cells not differentiated

P. succulentum

106. *P. denticulatum* (Hedw.) B.,S. & G.

A4 Trabzon, Akçaabat, Çiçeklidüz, 250m 09.07.1995, Maçka, Altındere, Meryemana, 1250m, 20.08.1993, on soil, Öz 302.

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

107. *P. plathyphyllum* Mönk.

A4 Trabzon, Akçaabat, ışıklar, on soil, 700, 12.08.1995, Öz 303.

A1, Europe.

A new record for A4 square.

108. *P. succulentum* (Wils.) Lindb.

A4 Trabzon, Akçaabat, Yıldızlı, 200m, 11.11.1995, Sürmene, Muratlı, 150m., 29.06.1994, on soil, Öz 304.

Europe, Faroes, Madeira.

Sematophyllaceae

Sematophyllum Mitt.

109. *S. demissum* (Wils.) Mitt.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on tree, 1600m, 08.10.1995, Öz 305.

England, Norway, W. and C. Europe, Japan, N. America.

Hypnaceae

1. Leaves straight or slightly curved, capsule straight

Platygyrium

1. Leaves ± curved sometimes falcate or circinate, capsule mostly ± curved

2. Leaf apex obtuse or rounded

Pleurozium

2. Leaf tapering to apex

3. Leaves not plicate nor leaf base cordate

Hypnum

3. Leaves plicate or if not then leaf base cordate

4. Shoots arcuate, stem reddish, stem and branch leaves ± similar in

shape **Rhytidiadelphus**
 4. Shoots not arcuate, stem greenish-yellowish, branch leaves much narrower than stem leaves

Ctenidium

Platygyrium B.,S. & G.

110. P. repens (Brid.) B.,S. & G.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, on tree Öz 306.

A2, A6, Europe, N. and C. Asia, Japan, Algeria, N. America.

A new record for A4 square

Hypnum Hedw.

1. Angular cells inflated, forming distinct auricles **H. lindbergi**

1. Angular cells not inflated but differentiated and sometimes forming auricles

2. Largest angular cells hardly more than 10µm wide **H. vaucheri**

2. Largest angular cells 12-30µm wide

H. cupressiforme

Key to the varieties of the *H. cupressiforme*:

1. Plants slender, leaves straight, lid with subulate beak

H. cupressiforme var. **resupinatum**

1. Plants slender to robust, leaves falcate, lid rostellate to rostrate

2. Plants slender or medium sized, greenish

H. cupressiforme var. **cupressiforme**

2. Plants robust, yellowish-green to golden-brown

H. cupressiforme var. **lacunosum**

111. H. cupressiforme Hedw. . var. **cupressiforme**

A4 Trabzon, Akçaabat, Yıldızlı, 200m, 11.11.1995, Sürmene, Muratlı, 150m, 29.06.1994, on soil, Öz 307.

Cosmopolitan.

112. H. cupressiforme Hedw. . var. **resupinatum** (Tayl.) Schimp.

A4 Trabzon, Akçaabat, Demirtaş, 200 m, 11.11.1995, Yomra, Özdil, 500m, 03.12.1995, on soil, Öz 308.

A1, Europe, Azores, Madeira, Newfoundland.

113. H. cupressiforme Hedw. var. **lacunosum** Brid.

A4 Trabzon, Akçaabat, Karaman, 100m, 11.11.1995, Köprübaşı, 500m, 25.09.1994, Çaykara, Ataköy, 1100m, 26.08.1995, on soil, Öz 309.

A1, A2, A3, A6, A11, A12, Europe, C. America.

114. H. lindbergi Mitt.

A4 Trabzon, Sürmene, Çamburnu, on rock, 150m, 01.06.1995, Öz 310.

Europe, Iceland, Asia, N. America, Greenland.

A new record for A4 square.

115. H. vaucheri Lesque.

A4 Trabzon, Vakfikebir, Caferli, on soil and rock, 150m, 19.11.1995, Öz 311.

A2, A8, A10, Europe, Asia, N. America.

Ctenidium (Schimp.) Mitt.

116. C. molluscum (Hedw.) Mitt.

A4 Trabzon, Akçaabat, ışıklar, 750 m, on tree

body and roots, Öz 312.

A1, A2, A12, A13, Europe, Iceland, Faroes, Caucasus, N. Asia, Kamchatka, Algeria, Canaries, Azores, N. America.

Rhytidiadelphus (Warnst.) Warnst.

1. Syem leaves plicate, not squarrose

R. triquetrus

1. Stem leaves not plicate, squarrose

R. squarrose

117. R. squarrosus (Hedw.) Warnst.

A4 Trabzon, Maçka, Meryemana, 1400m, 13.10.1993, Çaykara, Uzungöl, 1800m, 24.09.1993, on soil, on rock, Öz 313.

Europe, Iceland, Asia, Madeira, Azores, N. America.

A new record for A4 square.

118. R. triquetrus (Hedw.) Warnst.

A4 Trabzon, Maçka, Meryemana, under forest on soil, 1400m, 02.10.1993, Öz 314.

A2, A5, A6, Europe, Iceland, Caucasus, Asia, Yunnan, Japan, Madeira, N. America.

Pleurozium Mitt.

119. P. schreberi (Brid.) Mitt.

A4 Trabzon, Maçka, Meryemana, under forest on soil, 1400m, 02.10.1993, Öz 315.

Europe, Iceland, Faroes, Asia, America, Greenland

Hylocomium B.,S. &G.

120. H. splendens B.,S. &G.

A4 Trabzon, Akçaabat, Kayabaşı High Plateau, in forest, on soil, 1800m, 08.10.1995, Öz 316.

A2, A3, A5, Cosmopolitan.

Results and Discussion

In this study, 61 genera belonging to 27 families and 120 taxa were identified from the moss samples collected from Trabzon and environs between 1992 and 1995.

The families richest in species are shown in order below (Table 1).

The first 10 families make up 70% of the total taxa in the study area and the other 17 families constitute 30%.

Table 1. The Distributions of the Species According to the Families*

Familia	Species	Percentage of taxa according to the total number of taxa
Brachytheciaceae	22	18.03
Pottiaceae	13	10.65
Hypnaceae	11	9.00
Dicranaceae	9	7.38
Polytrichaceae	8	6.55
Grimmiaceae	8	6.55
Mniaceae	7	5.73
Thuidiaceae	6	4.90
Amblystegiaceae	6	4.90
Bryaceae	6	4.90
Bartramiaceae	4	3.27
Plagiotheciaceae	3	2.54
Fissidentaceae	2	1.63
Funariaceae	2	1.63
Orthotrichaceae	2	1.63
Neckeraceae	2	1.63
Sphagnaceae	1	0.81
Dittrichaceae	1	0.81
Leucobryaceae	1	0.81
Encalyptaceae	1	0.81
Hedwigiaceae	1	0.81
Climaciaceae	1	0.81
Thamniaceae	1	0.81
Hookeriaceae	1	0.81
Habroniaceae	1	0.81
Entodontaceae	1	0.81
Sematophyllaceae	1	0.81

*The Moss Flora of Trabzon and Environs (T. ÖZDEMİR, B. ÇETİN)

Table 2. The Comparison of the Taxa Distribution According to the Families*

Familie	Trabzon and Environs		Sinop and Environs		Antalya and Environs		Gerede-Aktaş Environs		Yedigöller Environs	
	Number of species		Number of species		Number of species		Number of species		Number of species	
Brachytheciaceae	22.00	18.0	23.00	20.5	14.00	15.5	19.00	15.0	15.00	17.4
Polytrichaceae	8.00	6.55	3.00	2.6	-	-	4.00	3.00	5.00	5.68
Hypnaceae	11.00	9.00	10.0	8.9	3.00	3.3	11.00	8.00	8.00	9.09
Pottiaceae	13.00	10.6	12.0	10.7	32.00	35.5	16.00	12.00	12.00	13.6
Mniaceae	7.00	5.73	6.00	5.4	-	-	9.00	6.07	8.00	9.09
Bryaceae	6.00	4.90	6.00	5.4	4.00	4.4	17.00	12.06	2.00	2.20

*The Moss Flora of Trabzon and Environs (T. ÖZDEMİR, B. ÇETİN)

In table 2, a comparison between the studies carried out in the Black Sea and the Mediterranean shows that the number of species of *Pottiaceae* family members, which display acrocarpous development in the Mediterranean, is higher than in the Black Sea Region and since acrocarpous species have quill-edged leaves and grow in the form of close pads, they can endure long periods of heat and dryness better than pleurocarpous species in the Black Sea (9-12).

The number of species of the members belonging to such families as *Brachytheciaceae* and *Amblystegiaceae* with Pleurocarpous grows quite high. As forests are widespread in this region, species that grow into branches and expand like a carpet under humid conditions are naturally more common in the areas below the layer of trees.

According to Henderson's grid system, the number of new records in the study area in the A4 square is 26 (*Polytrichum longisetum*, *Campylopus brevipilus*, *C. fragilis*, *Fissidens taxifolius*, *Tortula intermedia*, *Barbula convoluta*, *B. recurvirostra*, *B. tophacea*, *Schistidium trichodon*, *Bryum pallescens*, *B. creberrinum*, *Orthotrichum affine*, *Habrodon perpusillus*, *Thuidium abietinum* var. *hystricosum*, *Amblystegium riparium*, *A. humile*, *Drepanocladus exannulatus*, *Brachythecium velunitum*, *B. plumosum*, *Cirriphyllum piliferum*, *Eurhynchium praelongum*, *Orthothecium intricatum*, *Plagiothecium plathyphyllum*, *Platygrium repens*, *Hypnum lindbergi*, *Rhytidiadelphus squarrosus*).

As a result of our efforts to determine the ecological habitat of mosses, the following moss species were found to be abundant in the sublayers of *Quercus petraea* (Mattuschkal) Lieb., *Carpinus betulus* L., *Fagus orientalis* Lipsky, and *Castanea sativa* Miller, which appear as a bush

layer at an elevation of 200-500m: *Atrichum undulatum*, *Campylopus atrovirens*, *Fissidens taxifolius*, *Bryum capillare*, *B. pallescens*, *Mnium hornum*, *M. marginatum*, *Rhizomnium punctatum*, *Plagiomnium medium*, *P. undulatum*, *Neckera complanata*, *Amblystegium serpens*, *Eurhynchium striatum*, *Plagiothecium denticulatum*, *P. succulentum*, *Pleurozium schreberi*, *Habrodon perpusillus*, *Hypnum cupressiforme*.

The following species are abundant below the layer of *Pinus sylvestris* L., *Abies nordmanniana* (Stev.) Mattf and *Picea orientalis* (L.) Link. which grow in acidic soil at an elevation of 500-1200m: *Polytrichum commune*, *P. formosum*, *P. longisetum*, *Pogonatum urnigerum*, *Dicranum fuscescens*, *D. polysetum*, *D. scoparium*, *Leucobryum glaucum*, *Hookeria lucens*, *Neckera crispa*, *Anemodon viticulosus*, *isothecium myosuroides*, *Brachythecium rutabulum*, *B. plumosum*, *Eurhynchium praelongum*, *Rhyntidiadelphus triquetrus*, *R. squarrosus*, *Tortella tortuosa*, *Plagiothecium plathyphyllum*, *Hypnum cupressiforme* var. *lacunosum*, *Plagiomnium elatum*.

The following moss species areas are seen especially on rock and stone in places where the aforementioned community grows: *Tortula intermedia*, *Barbula convoluta*, *B. unguiculata*, *Trichostomum crispulum*, *Tortella tortuosa*, *Tortula muralis*, *Grimmia trichophylla*, *Racomitrium lanuginosum*, *Bryum capillare*, *Orthotrichum anomalum*, *O. affine*, *Homalothecium lutescens*, *H. sericeum*, *Brachythecium albicans*, *B.*

glerosum, *B. starkei*, *B. velunitum*, *B. populeum*, *Hypnum vaucheri*.

The species found in wetland and near water bank are: *Sphagnum palustre*, *Pohlia cruda*, *Bryum pallescens*, *Plagiomnium undulatum*, *P. elatum*, *P. medium*, *Calliergon cuspidatum*, *Rhynchostegium riparium*, *Ditrichum heteromallum*, *Dicranella heteromalla*, *Philonotis fontana*, *Barbula tophacea*.

The sub-species of different plant groups showing a carpetlike distribution and dominance over other moss species are as follows: *Homalothecium lutescens*, *Hypnum cupressiforme*, *Bryum capillare*, *Rhodobryum roseum*, *Plagiomnium undulatum*, *Thuidium tamariscinum*, *Pleurozium schreberi*, *Dicranum scoparium*, *Hylocomium splendens*.

The species found on the soil and rocks below this formation are *Amblystegium humile*, *Drepanocladus exannulatus*, *Eurhynchium striatum*, *E. speciosum*, *E. hians*, *Brachythecium rutabulum*, *B. albicans*, *Cirriphyllum crassinervium*, *Platygrium repens*, *Hypnum cupressiforme*, *H. vaucheri*, *Rhytidiadelphus squarrosus*.

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References

1. Henderson, D.M., Prentice, H.T., Contributions to the Bryophyte Flora of Turkey VIII., Notes Roy. Bot. Gard. Edinb., 29, 235-262 (1969).
2. Henderson, D.M., Contributions to the Bryophyte Flora of Turkey VI., Notes Roy., Bot., Gard. Edinb., 25, 279-291 (1961).
3. Smith, A.J.E., The Moss Flora of Britain and Ireland, Cambridge University Press, London (1980).
4. Vitt, D.H., Marsh, J.E., Bovey, R.G., Mosses, Lichens and Ferns of Northwest North America, University of Washington Press, (1988).
5. Watson, E.V., British Mosses and Liverworts, Cambridge University Press, London, (1981).
6. Özdemir, T., Sürmene (Trabzon) Yöresi Karayosunu (Musci) Florası, Doğa Tr. J. of Botany, 18, 331-335 (1994).
7. Baydar, S. and Özdemir, T., Altındere Vadisi Milli Parkı Karayosunları (Musci), Tr. J. of Botany, 20, 53-57 (1996).
8. Çetin, B., Checklist of mosses of Turkey. Lindbergia 14 : 15-23, Copenhagen (1988).
9. Çetin, B. and Yurdakulol, E., Yedigöller Milli Parkının Karayosunu Florası, Doğa TU Botanik D., 12,2: 128-146 (1988).
10. Çetin, B. and Yurdakulol, E., Gerede-Aktaş (Bolu) Ormanlarının Karayosunları (Musci) Florası, Doğa Bilim Dergisi A2, 9, 29-39, (1985).
11. Çetin, B., Antalya Çevresi (Köprülü Kanyon ve Güllük Dağı (Termosses) Milli Parkları ve Kurşunlu şelalesi) Karayosunları (Musci), Doğa TU. Botanik D., 13,3: 456-469 (1989).
12. Çetin, B., Uyar, G., The Moss Flora of Sinop and its Environs (Ayancık, Boyabat and Gerze) Tr. J. of Botany, 21, 231-244 (1997).