

## A Contribution to the Moss Flora of Western Turkey: Moss Flora of the Kaz Mountain (Balıkesir, Turkey)

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**Abstract:** In the present study, 484 plant specimens were collected and identified from the region. 139 taxa, belonging to 23 families and 63 genera were found. *Brachythecium latifolium* Kindb. is recorded as the first time to Turkish flora among the others. In addition 12 taxa are new records for square B6 according to Henderson's (1961) grid system.

**Key Words:** Bryophyta, Mosses, Turkey.

### Batı Türkiye Karayosunu Florasına Bir Katkı: Kaz Dağı (Balıkesir, Türkiye) Karayosunu Florası

**Özet:** Bu çalışmada, bölgeden 484 bitki örneği toplandı ve tayin edildi. 23 familya, 63 cinse ait, 139 takson bulundu. Diğerleri arasından *Brachythecium latifolium* Kindb. Türkiye florası için ilk kez kaydedilmektedir. Ek olarak, 12 takson Henderson'un (1961) kareleme sistemine göre B6 karesi için yeni kayıttır.

**Anahtar Sözcükler:** Bryophyta, Karayosunları, Türkiye.

### Introduction

The studies on mosses of western Turkey can be divided into two period in terms of their conductors and realization times: The first is from 1961 to 1979 and the second is 1988 to date. The second period of Western studies were mostly performed by Turkish bryologists. This can be stated out as a diagnostic point for bryological history of Turkey. Number of publications on west of the country according to years are as follows:

One in 1961 and 1967 (1-2); two in 1969 (3-4); one in 1970 (5), 1973 (6), 1974 (7), 1975 (8) and 1979 (9); three in 1988 (10, 11, 12); one in 1990 (13), 1993 (14), 1994 (15) and 1996 (16).

In spite of increasing mandation of Turkish bryologists, mosses are still not sufficiently listed plants of Turkish flora because of limited number of Turkish bryologists and large area to be studied. Increasing attention on the plant group may help to create much more studies in near future. It is crucial to list total flora of Turkey, including all plant groups.

It is hoped that this study will contribute to the moss flora of western Anatolia as a guide for next studies.

### A Description of Study Area

Kaz mountain (Mt. Ida in Greek mythology) is situated perpendicularly to Aegean sea at the western Turkey, along the Edremit Bay (figure 1, 2). The area is surrounded by Kalkım in the northwest, Edremit in the southeast, Küçükkuyu in the southwest and Bayramiç in the northwest, by covering an area of approximately 700 km<sup>2</sup>. The highest part of the area reaches 1760 m. from sea level at Karataş hill.

There are three stations, measuring some climatic parameters around the mountain. According to data of 16 to 50 years from the stations, main rainfall averages between 631.1 mm/y (Balıkesir) and 733 mm/y (Edremit). Main annual temperature of the study area can be calculated as 15.7 °C. In Summer season, daily temperature may be higher as 43.7 °C (in Edremit) and dry period can be long as six months from May to October (17).

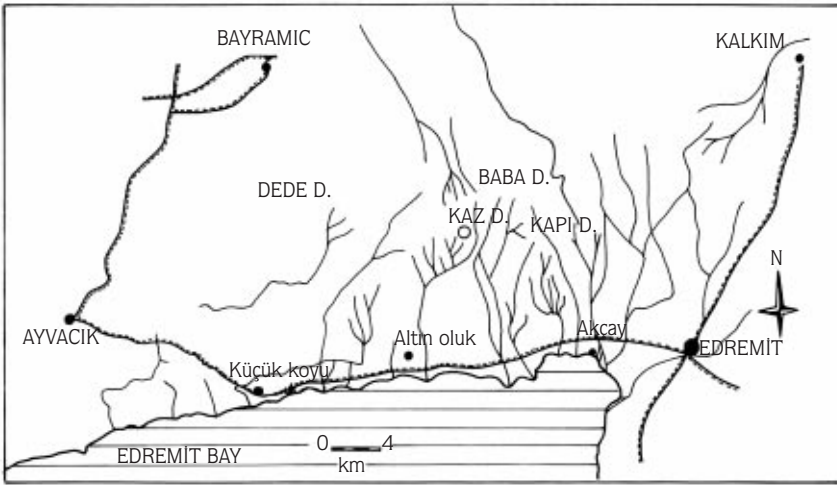


Figure 1. Map of the studied area.

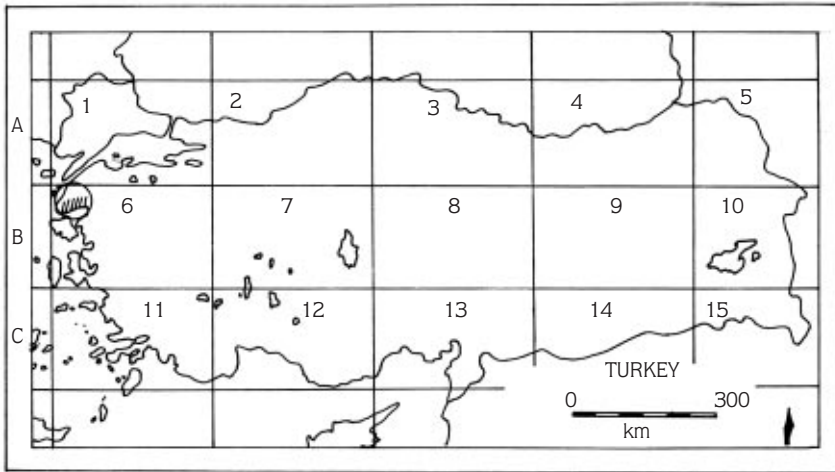


Figure 2. Turkey's grid system (Henderson, 1961).

### Flowering Plants of the Area

710 flowering plant taxa, belonging to 89 families and 380 genera have been found from the area (18). According to cited study, endemism rate is 9.4 per cent (67 taxa). Euro-Siberian elements are represented as 16.6 per cent. Mediterraneans (11.4 per cent) and East Mediterraneans (13.3 per cent) are other major components of the mountain's flowering plants.

In 1994, Kaz Dağ was accepted as national park due to its biological importance.

### Material and Methods

Moss specimens were collected from different parts of the area during the years between 1993 and 1995 by

senior author. Identifications of specimens were carried out using appropriate literatures by European (19–21) and north American bryologists (22–23). All specimen are deposited at Herbarium of Ege University (EGE).

The taxa which found from the area are listed according to Smith's (1996) system to genera level. Species and lower taxa are listed alphabetically within a genus.

An asterisk indicates "new for the square", two asterisks "recorded by Walther (1967) and three asterisks "new for Turkish flora", Parameters of collection sites are given in order of square no., province, district, locality, substrata, altitude, collection date and herbarium number (EGE).

**Findings****Bryophyta****Bryopsida****Polytrichaceae**

1. *Polytrichum juniperinum* Wild. ex Hedw.

B6 Balıkesir: Edremit, Tozlu plateau, on soil banks, 1450 m., 14.7.1994, EGE 19219.

2. *Pogonatum aloides* (Hedw.) P. Beauv.

B6, Balıkesir: Edremit, Gürgeç dağ, Koçaro place, on soil, 1400 m., 16.11.1993, EGE 19190.

(\*) 3. *Pogonatum urnigerum* (Hedw.) P. Beauv.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on soil, 1400 m., 14.7.1994, EGE 19236.

4. *Artichum undulatum* (Hedw.) P. Beauv.

B6 Balıkesir: Kalkım, Eybekdağ, Lower part of burnt area, on soil, 1000 m., 10.7.1994, EGE 19208.

**Ditrichaceae**

5. *Pleurozium subulatum* (Hedw.) Rabenh.

B6, Balıkesir: Edremit, Gürgeçdağ, between Koçaro place and Bostandere, on soil, 950 m., 6.5.1993, EGE 19194.

6. *Distichium capillaceum* (Hedw.) B.S.G.

B6, Balıkesir: Edremit, Kapıkule hill, on rocks, 1200 m., EGE 19194.

**Dicranaceae**

7. *Dicranella heteromalla* Podp.

B6, Balıkesir: Edremit, Gürgeçdağ, Koçaro place, on rocks, 1300 m., 5.5.1993, EGE 19176.

8. *Dicranoweisia cirrata* (Hedw.) Lindb. ex Milde.

B6, Balıkesir: Edremit, Damlatepe, trunks of *Pinus nigra*, 1260 m., 30.12.1993, EGE 19201.

9. *Dicranum scoparium* Hedw.

B6, Balıkesir: Edremit, Beypınarı, Ayıderesi, on rocks, 800 m., 6.5.1993, EGE 19218.

**Fissidentaceae**

10. *Fissidens adianthoides* Hedw.

B6, Balıkesir: Kalkım, 1 km west of Ayıgediği, stream bed, on rocks, 950 m., 15.9.1994, EGE 19172.

(\*\*) 11. *Fissidens cristatus* Wils. ex Mitt.

B6, Balıkesir: Sūdhang des Kaz Dağ, *Quercus cerris-Pinus brutia*-Wald, 1000 m., 6.6.1965, n.2131 (Walther, 1967).

12. *Fissidens taxifolius* Hedw.

B6, Balıkesir: Kalkım, lower parts of Ayıgediği, on soil bank, 750 m., 23.12.1993, EGE 19248.

(\*\*) 13. *Fissidens viridulus* (Sw.) Wahlenb.

B6, Balıkesir: Sūdhang des Kaz Dağ, *Platanus orientalis*-Schluchtwald, Felsritzen, 1300 m., 6.6.1995, n. 2153 (Walther, 1967) as *Fissidens bryoides* Hedw. ssp. *viridulus* (Sw.) Kindb.

**Encalyptaceae**

14. *Encalypta streptocarpa* Hedw.

B6, Balıkesir: Kalkım, Ayıgediği, stream bed, on soil, 950 m., 15.9.1994, EGE 19169.

15. *Encalypta vulgaris* Hedw. var. *vulgaris*

B6, Balıkesir: Edremit, Sarıkız hill, on rocks, 1700 m., 8.9.1994, Ege 19240.

(\*\*) 16. *Encalypta vulgaris* Hedw. var. *mutica* Brid.

B6, Balıkesir: Sūdhang des Kaz Dağ, *Quercus cerris*-Wald, Felsen 1000 m., 5.6.1965, n. 2138 a (Walther, 1967).

**Pottiaceae**

17. *Tortula intermedia* (Brid.) De Not

B6, Balıkesir: Edremit, Sakırız Hill, on rocks, 1700 m., 8.9.1994, EGE 19220.

18. *Tortula muralis* Hedw.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1000 m., 30.12.1993, EGE 19221.

19. *Tortula norvegica* (Web.) Lindb.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on rocks, 1000 m., EGE 19225.

20. *Tortula obtusifolia* (Schwaegr.) Mathieu.

B6, Balıkesir: Edremit, Üçpınarlar, on soil, 1150 m., 7.5.1993, EGE 19107.

21. *Tortula princeps* De Not

B6, Balıkesir: Edremit, Beypınarı, on rocks, 1350 m., EGE 19168.

22. *Tortula pulvinata* (Jur.) Limpr.

B6, Balıkesir: Edremit, Beypınarı, on rocks, 1300 m., EGE 19187.

23. *Tortula ruraliformis* (Besch.) Ingh.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1150 m., 30.12.1993, EGE 19224.

24. *Tortula ruralis* (Hedw.) Gaertn.

B6, Balıkesir: Edremit, Sarıkız Hill, on soil, 1650 m., 14.9.1994, EGE 19223.

25. *Tortula subulata* Hedw. var. *subulata*

B6, Balıkesir: Edremit, Beypınarı, Ayıderesi valley, on soil, 710 m., 20.4.1993, EGE 19222.

26. *Tortula subulata* Hedw. var. *angustata* (Schimp.) Kindb.

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on soil, 950 m., 16.9.1994, EGE 19209.

27. *Barbula convoluta* Hedw.

B6, Balıkesir: Edremit, Küçükkuyu, on soil and rocks, 100 m., 9.9.1994, EGE 19161.

28. *Barbula fallax* Hedw.

B6, Balıkesir: Edremit, Küçükkuyu, on soil and rocks, 100 m., 9.9.1994, EGE 19244.

(\*) 29. *Barbula hornchuchiana* Schultz

B6, Balıkesir: Edremit, Beypınarı, on soil, 1350 m., 29.4.1994, EGE 19098.

(\*\*) 30. *Barbula unguiculata* Hedw.

B6, Balıkesir: Sūdhang des Kaz Dağ, *Quercus cerris-Pinus brutia*-Wald, Fellsalten, 600 m., 5.6.1965, n. 2124 a (Walther, 1967).

31. *Gymnostomum aeruginosum* Sm.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1000 m., 10.6.1993, EGE 19162.

32. *Gymnostomum calcareum* Nees & Hornsch.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on rocks, 1400 m., 8.9.1994, EGE 19243.

33. *Eucladium verticillatum* (Brid.) B.S.G.

B6, Balıkesir: Edremit, Bostandere, on wet or submerged rocks, 650 m., 30.12.1993, EGE 19239.

34. *Weisia controversa* Hedw.

B6, Balıkesir: Edremit, Bostandere, on soil, 650 m., 30.12.1993, EGE 19247.

35. *Weisia tortilis* (Schwaegr.) C. Müll.

B6, Balıkesir: Sūdhang des Kaz Dağ, *Pinus brutia-Quercus cerris*-Wald, Fellsalten, 600 m., 5.6.1965, n. 2123 a (Walther, 1967).

(\*) 36. *Tortella fragilis* (Hook. & Wils.) Limpr.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 650 m., 30.12.1993, EGE 19166.

37. *Tortella tortuosa* (Hedw.) Limpr.

B6, Balıkesir: Edremit, Karanlıkdere Harita place, on rocks, 1400 m., 16.9.1994, EGE 19158.

38. *Pleurochaete squarrosa* (Brid.) Lindb.

B6, Balıkesir: Edremit, Şahindere, hills over Bent hotel, on soil, 150 m., 9.9.1994, EGE 19249.

39. *Timmiella anomala* (B.S.G.) Limpr.

B6, Balıkesir: Edremit, Şahindere, around Bent hotel, on soil and rocks, 100 m., 9.9.1994, EGE 19097.

40. *Bryoerythrophyllum recurvirostre* (Hedw.) Chen.

B6, Balıkesir: Edremit, Ayıderesi valley, on rocks, 600 m., 23.12.1993, EGE 19155.

41. *Cinclidotus riparius* (Web. & Mehr.) Arnott

B6, Balıkesir: Edremit, Şahindere valley, on submerged rocks, 30 m., 6.9.1994, EGE 19174.

#### Grimmiaceae

42. *Schistidium apocarpum* (Hedw.) B.S.G. var. *apocarpum*

B6, Balıkesir: Edremit, Beypınarı, on rocks, 1350 m., 29.4.1994, EGE 19177.

43. *Schistidium apocarpum* (Hedw.) B.S.G. var. *atrofusum* (Schimp.) C. Jens

B6, Balıkesir: Edremit, Sarıkız hill, on rock crevices, 1700 m., 8.9.1994, EGE 19250.

44. *Grimmia alpestris* (Web. & Mohr.) Schleich. ex Nees.

B6, Balıkesir: Edremit, Yumurtapınarı, on rocks, 1300 m., 8.9.1994, EGE 19113.

45. *Grimmia commutata* Hueb.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on rocks, 1400 m., 8.9.1994, EGE 19205.

46. *Grimmia decipiens* (Schultz.) Lindb.

B6, Balıkesir: Edremit, Karaçam fire control point, on soil and rocks, 1200 m., 28.12.1993, EGE 19226.

47. *Grimmia funalis* (Schwaegr.) B.S.G.

B6, Balıkesir: Kalkım, Eybekdağ, 2 km. west of Ayıgediği, on rocks, 850 m., 15.9.1994, EGE 19108.

48. *Grimmia hartmanii* Schimp.

B6, Balıkesir: Edremit, Kapıdağ, inner part of valley, on rocks, 700 m., 23.12.1993, EGE 19197.

49. *Grimmia laevigata* (Brid.) Brid.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1150 m., 30.12.1993, EGE 19196.

50. *Grimmia montana* B.S.G.

B6, Balıkesir: Edremit, Karanlıkdere, Harita place, on patched rocks, 1420 m., 14.9.1994, EGE 19188.

51. *Grimmia orbicularis* Bruch

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 900 m., 14.9.1994, EGE 19157.

52. *Grimmia ovalis* (Hedw.) Lindb.

B6, Balıkesir: Edremit, Kapı Dağı, *Abies nordmanniana* forest, on rocks, 1380 m., 11.9.1994.

53. *Grimmia pulvinata* (Hedw.) Sm.

B6, Balıkesir: Edremit, Bostandere, on rocks, 600 m., 30.12.1993, EGE 19193.

54. *Grimmia trichophylla* Grev.

B6, Balıkesir: Kalkım, around forest seedling and fishery foundation, on rocks, 300 m., 7.9.1994, EGE 19164.

(\*) 55. *Racomitrium aciculare* (Hedw.) Brid.

B6, Balıkesir: Edremit, 2 km. to Koçaro place, on soil and partially on rocks near stream, 850 m., 30.12.1993, EGE 19182.

56. *Racomitrium heterostichum* (Hedw.) Brid.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1260 m., 30.12.1993, EGE 19153.

#### Funariaceae

(\*\*) 57. *Funaria calcarea* Wahlenb. ssp. *mediterranea* (Lindb.) Kindb.

B6, Balıkesir: Südhang des Kaz Dağı, *Quercus cerris*-Wald, 1000 m., 6.6.1965 n. 2136 (Walther, 1967).

58. *Funaria hygrometrica* Hedw.

B6, Balıkesir: Edremit, Şahindere, around Bent hotel, on soil bank, 30 m., 13.4.1994, EGE 19191.

#### Bryaceae

59. *Pohlia cruda* (Hedw.) Linb.

B6, Balıkesir: Edremit, Gelinalan fountain, on wet rocks, 1000 m., 15.9.1994, EGE 19202.

60. *Pohlia nutans* (Hedw.) Lindb.

B6, Balıkesir: Edremit, Bostandere, on wet soil and rocks, 650 m., 27.12.1993, EGE 19170.

61. *Bryum affine* (Funck.) Brid.

B6, Balıkesir: Edremit, Karanlıkdere,

*Abies nordmanniana* forest, on rocks, 1400 m., 7.9.1994, EGE 19179.

62. *Bryum alpinum* Huds. ex With.

B6, Balıkesir: Edremit, Gelinalan fountain, on wet rocks, 1000 m., 19.7.1994, EGE 19178.

63. *Bryum capillare* L. ex Ledw. var. *capillare*

B6, Balıkesir: Kalkım, Eybek Dağı, lower part of burnt area, on soil, 880 m., 16.9.1994, EGE 19112.

64. *Bryum capillare* L. ex Hedw. var. *meridionale* Schimp.

B6, Balıkesir: Südhang des Kaz Dağı, *Pinus brutia-Quercus cerris*-Wald, Waldboden, 600 m., 6.6.1965, n. 2121.

65. *Bryum cernuum* Brid.

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 880 m., 16.9.1994, EGE 19163.

66. *Bryum pallescens* Schleich ex Schwaegr.

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 850 m., 16.9.1994, EGE 19165.

67. *Bryum pseudotriquetrum* (Hedw.) Schwaegr.

B6, Balıkesir: Edremit, Gelinalan fountain, on wet rocks, 1000 m., 19.7.1994, EGE 19151.

#### Mniaceae

68. *Mnium stellare* Reichard ex Hedw.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on rocks, 1400 m., 16.9.1994, EGE 19245.

(\*) 69. *Rhizomnium magnifolium* Horik

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on soil, 850 m., 15.9.1994, EGE 19167.

70. *Rhizomnium punctatum* (Hedw.) Kop.

B6, Balıkesir: Edremit, between Beypınarı and Ayıderesi, on soil, 900 m., 26.9.1994, EGE 19171.

(\*) 71. *Plagiomnium elatum* (Br. Eur.) Kop.

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 850 m., 16.9.1994, EGE 19111.

(\*) 72. *Plagiomnium medium* (Br. Eur.) Kop.

B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 950 m., 17.9.1994, EGE 19207.

73. *Plagiomnium rostratum* (Schrad.) Kop.

B6, Balıkesir: Kalkım, Eybek Dağ, Ayı gediği, on rocks, 900 m., 15.4.1994, EGE 19235.

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

B6, Balıkesir: Edremit, between Beypınarı and Ayıderesi, on rocks, 900 m., 9.6.1994, EGE 19234.

**Bartramiaceae**

75. *Bartramia ithyphylla* Brid.

B6, Balıkesir: Edremit, Ayıderesi, on soil bank, 700 m., 27.12.1993, EGE 19228.

76. *Philonotis fontana* (Hedw.) Brid.

B6, Balıkesir: Kalkım, Eybek Dağ, lower part of burnt area, on soil, 850 m., 15.9.1994, EGE 19251.

(\* 77. *Philonotis tomentella* Moll.

B6, Balıkesir: Edremit, Beypınarı, on soil bank, 1350 m., 29.4.1994, EGE 19227.

**Timmiaceae**

(\* 78. *Timmia megapolitana* Hedw.

B6, Balıkesir: Edremit, Karanlıkdere, *Abies nordmanniana* forest, on rocks, 1400 m., 16.9.1994, EGE 19210.

**Orthotrichaceae**

79. *Zygodon baumgartneri* Malta

B6, Balıkesir: Kalkım around forest seedling and fisherg foundation, on trunk of *Pinus nigra*, 300 m., 4.6.1994, EGE 19159.

80. *Orthotrichum anomalum* Hedw.

B6, Balıkesir: Edremit, Bostandere to Üçpınarlar, on rocks, 650 m., 30.12.1993, EGE 19105.

81. *Orthotrichum cupulatum* Hoffm. ex Brid.

B6, Balıkesir: Edremit, Sarıkız hill, on rocks, 1700 m., 8.9.1994, EGE 19211.

82. *Orthotrichum fastigiatum* Bruch. ex Brid.

B6, Balıkesir: Edremit, Beypınarı, on trunk of *Malus sylvestris*, 1350 m., 10.9.1994, EGE 19211.

83. *Orthotrichum lyellii* Hook. & Tayl.

B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on trunk of *Fagus sp.*, 1300 m., 5.5.1993, EGE 19200.

84. *Orthotrichum rupestre* Schleich. ex Schwaegr.

B6, Balıkesir: Edremit, Üçpınarlar to Karaçam fire control point, on rocks and soil, 1000 m., 30.12.1993, EGE 19204.

**Hedwigiaceae**

85. *Hedwigia ciliata* (Hedw.) Ehrh. ex P. Beauv.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1350 m., 30.12.1993, EGE 19212.

**Fontinalaceae**

86. *Fontinalis antipyretica* Hedw.

B6, Balıkesir: Kalkım, Eybek Dağ, lower part of burnt area, on wet rocks, 800 m., 19.7.1994, EGE 19246.

**Leucodontoceae**

87. *Pterogonium gracile* (Hedw.) Sm.

B6, Balıkesir: Edremit, Beypınarı to Ayıderesi, on rocks, 710 m., 28.6.1994, EGE 19173.

88. *Antitrichia californica* Sull.

B6, Balıkesir: Kalkım, Eybek Dağ, Ayı gediği, on rocks, 900 m., 16.9.1994, EGE 19184.

89. *Antitrichia curtispindula* (Hedw.) Brid.

B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on trunk of *Fagus sp.*, 1300 m., 28.12.1993, EGE 19106.

90. *Leucodon sciuroides* (Hedw.) Schwaegr.

B6, Balıkesir: Edremit, Üçpınarlar, on rocks, 1150 m., 10.6.1993, EGE 19252.

**Neckeraceae**

91. *Leptodon smithii* (Hedw.) Web. & Mahr.

B6, Balıkesir: Edremit, Ayıderesi valley, on rocks, 650 m., 28.12.1993, EGE 19213.

92. *Neckera complanata* (Hedw.) Hueb.

B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on rocks, 900 m., 19.7.1994, EGE 19185.

93. *Neckeradelphus menziesii* (Hook.) Steere

B &, Balıkesir: Kalkım, Eybek Dağ, around burnt area, on rocks, 910 m., 15.9.1994, EGE 19181.

94. *Homalia lusitanica* Schimp.

B6, Balıkesir: Edremit, Şahindere, on soil and partially tree roots, 100 m., 17.7.1995, Coll. Ö. çalışkan, EGE 19331.

**Thamniaceae**

95. *Thamnobryum alopecurum* (Hedw.) Nieuwl.

B6, Balıkesir: Kalkım, around forest seedling, on rocks in stream bed, 300 m., 7.9.1994, EGE 19253.

**Leskeaceae**

96. *Pterigynandrum filiforme* Hedw.

B6, Balıkesir: Edremit, Levent strait, on trunk of *Pinus nigra*, 1250 m., 7.9.1994, EGE 19183.

**Amblystegiaceae**

97. *Cratoneuron commutatum* (Hedw.) Roth. var. *commutatum*

B6, Balıkesir: Edremit, Tahindere, on wet rocks, 30 m., 13.4.1994, EGE 19192.

98. *Cratoneuron commutatum* (Hedw.) Roth. var. *falcatum* (Brid.) Moenk.

B6, Balıkesir: Edremit, Bostandere, on wet or submerged rocks, 650 m., 30.2.1993, EGE 19214.

99. *Cratoneuron filicinum* (Hedw.) Spruc.

B6, Balıkesir: Edremit, Ayı deresi, on rocks, 650 m., 21.12.1993, EGE 19215.

(\* 100. *Campylium chrysophyllum* (Brid.) J. Lange

B6, Balıkesir: Edremit, Beypınarı, on rocks, 1350 m., 29.4.1994, EGE 19254.

101. *Amblystegium serpens* (Hedw.) B.S.G. var. *juratzkanum* (Schimp.) Rau.

B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on rocks and soil, 1300 m., 5.5.1993, EGE 19255.

102. *Amblystegium tenax* (Hedw.) C. Jens.

B6, Balıkesir: Edremit, Şahindere, on wet rocks, 100 m., 9.9.1994, EGE 19152.

103. *Amblystegium varium* (Hedw.) Lindb.

B6, Balıkesir: Edremit, Küçükkuşu to hills, on wet rocks, 9.9.1994, EGE 19154.

104. *Leptodictyum riparium* (Hedw.) Warnst.

B6, Balıkesir: Kalkım, 1 km. to Ayı gediği, on wet rocks, 850 m., 15.4.1994, EGE 19109.

105. *Calliergonella cuspidata* (Hedw.) Loesk.

B6, Balıkesir: Edremit, Tozlu plateau, on wet soil, 1450 m., 19.7.1994.

**Brachytheciaceae**

106. *Isoetecium alopecuroides* (Dubois) Isov.

B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on trunk of *Fagus sp.*, 1350 m., 28.12.1993, EGE 19256.

107. *Isothecium myurum* Brid.  
B6, Balıkesir: Kalkım, Eybek Dağ, on trunk of *Castanea sativa*, 850 m., 8.9.1994, EGE 19180.
- (\*\*) 108. *Scorpiurium circinatum* (Brid.) Fleisch. & Loesk.  
B6, Balıkesir: Südhang des Kaz Dağ, *Pinus brutia-Quercus cerris*-wald, Felsen, 1000 m., 6.6.1965 n. 2129 (Walther, 1967).
109. *Homalothecium cf. lutescens* (Hedw.) Robins.  
B6, Balıkesir: Edremit, Beypinarı to Ayıderesi, on rock, 850 m., 28.12.1993, EGE 29156.
110. *Homalothecium sericeum* (Hedw.) B.S.G.  
B6, Balıkesir: Edremit, Lower part of Damlatepe, on rocks and soil, 700 m., 30.12.1993, EGE 19110.
111. *Brachythecium albicans* (Hedw.) B.S.G.  
B6, Balıkesir: Kalkım, Eybek Dağ, Lower part of burnt area, on soil and partially on rock, 850 m., 16.9.1994, EGE 19238.
- (\*) 112. *Brachythecium glareosum* (Spruc.) B.S.G.  
B6, Balıkesir: Kalkım, Eybek Dağ, Ayıgediği to burnt area, on rocks, 900 m., 16.9.1994, EGE 14199.
- (\*\*\*) 113. *Brachythecium latifolium* Kindb.  
B6, Balıkesir: Kalkım, Eybek Dağ, Lower parts of burnt area, on soil, 850 m., 16.9.1994, EGE 19237.
114. *Brachythecium cf. rutabulum* B.S.G.  
B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on stump and soil, 1350 m., 16.11.1993, EGE 19189.
115. *Brachythecium salebrosum* (Web. & Mohr.) B.S.G.  
B6, Balıkesir: Kalkım, Eybek Dağı, Ayıgediği, on rocks, 900 m., 29.6.1994, EGE 19160.
116. *Brachythecium starkei* (Brid.) B.S.G.  
B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on rocks, 1350 m., 21.12.1993, EGE 19203.
117. *Brachythecium velutinum* (Hedw.) B.S.G.  
B6 Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on rocks and soil, 1350 m., 22.12.1994, EGE 19195.
118. *Pseudoscleropodium purum* (Hedw.) Fleisch.  
B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on soil, 900 m., 14.9.1994, EGE 19175.
119. *Scleropodium touretii* (Brid.) L. Koch.  
B6, Balıkesir: Kalkım, Eybek Dağ, around burnt area, on soil, 900 m., 15.9.1994, EGE 19257.
120. *Cirriphyllum crassinervium* (Tayl.) Loesk. & Fleisch.  
B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on soil and rocks, 870 m., 15.9.1994, EGE 19242.
121. *Rhynchostegium confertum* (Dicks.) B.S.G.  
B6, Balıkesir: Edremit, Ayıderesi, on rocks, 700 m., 19.11.1993, EGE 19233.
122. *Rhynchostegium murale* (Hedw.) B.S.G.  
B6, Balıkesir: Kalkım, around forest seedling and fishery foundation, on rocks, 300 m., 7.9.1994, EGE 19232.
123. *Rhynchostegium riparioides* (Hedw.) Card.  
B6, Balıkesir: Edremit, Şahindere, kaya üzeri, 100 m., 16.9.1994, EGE 19231.
124. *Eurhynchium praelongum* (Hedw.) B.S.G.  
B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on wet soil, 800 m., 16.9.1994, EGE 19258.
125. *Eurhynchium pulchellum* (Hedw.) Jenn.  
B6, Balıkesir: Edremit, Kapı Dağ, Koçaro place to Bostandere, 900 m., 28.12.1983, EGE 19241.
126. *Eurhynchium schleicheri* (Hedw.) Mild.  
B6, Balıkesir: Kalkım, lower part of burned area, on soil and partially on rocks, 1000 m., 14.9.1994, EGE 19186.
127. *Eurhynchium sp.*  
B6, Balıkesir: Kalkım, lower part of burned area, on rocks, 880 m., 16.9.1994, EGE 19102.
128. *Eurhynchium speciosum* (Brid.) Jur.  
B6, Balıkesir: Edremit, Ayıderesi, on rocks, 760 m., 19.11.1993, EGE 19216.
- (\*) 130. *Eurhynchium stokesii* (Turn.) B.S.G.  
B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on rocks, 800 m., 19.7.1994, EGE 19101.
131. *Eurhynchium striatum* (Hedw.) Schimp.  
B6, Balıkesir: Kalkım, forest seedling and fishery foundation, on rocks near stream, 300 m., 19.7.1994, EGE 19259.
132. *Rhynchostegiella curviseta* (Brid.) Limpr.  
B6, Balıkesir: Kalkım, Eybek Dağ, 1 km. west of Ayıgediği, on patched rocks, 870 m., 16.9.1994, EGE 19229.
133. *Rhynchostegiella tenella* (Dicks.) Limpr.  
B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on rocks, 1300 m., 27.12.1993, EGE 19230.
- Plagiotheciaceae**
134. *Plagiothecium cf. denticulatum* (Hedw.) Br. Eur.  
B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on trunks of *Fagus sp.*, 1350 m., 27.12.1993, EGE 19260.
- Hypnaceae**
135. *Hypnum cupressiforme* L. ex Hedw. var. *cupressiforme*  
B6, Balıkesir: Edremit, very common plant in almost all localities at the area, on trunks, rocks or soil, EGE 19261.
136. *Hypnum cupressiforme* L. ex Hedw. var. *filiforme* Brid.  
B6, Balıkesir: Edremit, Gürgen Dağ, Koçaro place, on trunk of *Pinus nigra*, 1350 m., 7.9.1994, EGE 19262.
137. *Hypnum cupressiforme* L. ex Hedw. var. *lacunosum* Brid.  
B6, Balıkesir: Edremit, Kapıdağ, Beypinarı to Ayı deresi, on rocks, 710 m., 23.12.1993, EGE 19263.
138. *Hypnum hamulosum* Br. Eur.  
B6, Balıkesir: Kalkım, Eybek Dağ, lower part of burned area, on rocks, 880 m., 18.9.1994, EGE 19100.
138. *Hypnum imponens* Hedw.  
B6, Balıkesir: Kalkım, around forest seedling and fishery foundation on trunks, 330 m., 7.9.1994, EGE 19114.
139. *Ctenidium molluscum* (Hedw.) Mitt.  
B6, Balıkesir: Edremit, Levent strait, on soil, 1250 m., 19.7.1994, EGE 19264.

## Results and Discussion

In the present study, 139 taxa belonging to 23 families and 63 genera were identified from Kaz Mountain. 12 taxa are new to square B6 according to Henderson's (1961) grid system. *Brachythecium latifolium* Lindb. is recorded for the first time to Turkish moss flora.

Number of species of each families are given in Table 1.

As seen in Table 1, six families are represented monotypically in the area. *Brachytheciaceae* and *Pottiaceae* together constitute 37.4 per cent of the flora. *Brachytheciaceae* is the richest family in the species., *Pottiaceae*, *Grimmiaceae*, *Amblystegiaceae*, *Bryaceae*, *Mniaceae*, *Orthotrichaceae* and *Hypnaceae* are other major components of the flora. Rich genera in the species are also given in Table 2.

*Grimmia* Hedw. is the richest in the species. *Tortula* Hedw. is another species rich genera of the mountain. Both of them comprise 15.1 per cent of total number of species in the area. Thirty four genera are represented monotypically. Six genera in Table 2 are acrocarpous mosses and the remainings belong to pleurocarpous family, *Brachytheciaceae*. Higher number of genera is one of the reasons for species richness.

Families which consist xerophytic taxa of the area as follows: *Encalyptaceae*, *Pottiaceae*, *Grimmiaceae*, *Orthotrichaceae*, *Hedwigiaceae* *Leucodontaceae*. In spite of their xerophytic dominant appearance, some of this families known as comprise a few number of aquatic or semi-aquatic species, such as *Eucladium verticillatum*, *Cinclidotus riparius* (*Pottiaceae*), *Racomitrium aciculare* and some semiaquatic forms of *Schistidium apocarpum*. It is obvious that these species constitute a little part of their family and can be considered as exceptions. Although they consist some xerophytic taxa, almost all pleurocarpous families have mesophytic or hygrophytic groups. Especially in *Brachytheciaceae* (except *Homalothecium sericeum*), mosses of wet places are common (species of *Eurhynchium* Br. Eur., *Rhynchostegium* Br. Eur., etc.). Similarly, *Amblystegiaceae* and *Fontinalaceae* have mosses in water or near water substrates.

At the southern part of the mountain, mediterranean vegetation (macquie, phrygana and *Pinus brutia* forest) is dominant and mosses of this localities are generally belong to xerophytic groups from sea level to an altitude of 1000 m. They are as follows: *Tortula ruralis*, *T. muralis*, *T. pulvinata*, *T. princeps*, *T. intermedia*

Table 1. Families and Their Species Number.

Families	Number of Species	%
Brachytheciaceae	27	19.42
Pottiaceae	25	17.98
Grimmiaceae	15	10.78
Amblystegiaceae	9	6.47
Bryaceae	9	6.47
Mniaceae	7	5.04
Hypnaceae	6	4.32
Orthotrichaceae	6	4.32
Fissidentaceae	4	2.88
Leucodontaceae	4	2.88
Neckeraceae	4	2.88
Polytrichaceae	4	2.88
Bartramiaceae	3	2.16
Dicranaceae	3	2.16
Encalyptaceae	3	2.16
Ditrichaceae	2	1.44
Funariaceae	2	1.44
Fontinalaceae	1	0.72
Hedwigiaceae	1	0.72
Leskeaceae	1	0.72
Plagiotheciaceae	1	0.72
Timmiaceae	1	0.72
Thamniaceae	1	0.72
Total	23	139
		100

Table 2. The Genera which are represented by more than three Species in the area.

Genera	Number of Species
Grimmia	11
Tortula	10
Brachythecium	7
Bryum	7
Eurhynchium	7
Hypnum	5
Orthotrichum	5
Barbula	4
Fissidens	4
Plagiomnium	4

(Pottiaceae), *Grimmia pulvinata*, *Grimmia trichophylla* (Grimmiaceae), *Orthotrichum rupestre*, *O. anomalum* (orthotrichaceae), *Hedwigia ciliata* (Hedwigiaceae) *Antitrichia californica*, *Pterogonium gracile* (Leucodontaceae), *Hypnum cupressiforme* on open rocks; *Tortula subulata* (Pottiaceae), *Funaria hygrometrica* (Funariaceae), *Bryum capillare* (Bryaceae) on soil, *Zygodon baumgartneri* (Orthotrichaceae), *Leucodon sciuroides*, *Antitrichia californica* (Leucodontaceae) on tree trunks. *Leucodon sciuroides* is found preferably on rocks but it is possible see it on tree trunks of humid habitats.

In wet or moist places at the northern part of the area, *Fissidens adianthoides* (Fissidentaceae), *Encalypta streptocarpa* (Encalyptaceae), *Eucladium verticillatum*, *Cinclidotus riparius* (Pottiaceae), *Racomitrium aciculare* (Grimmiaceae), *Pohlia cruda*, *P. nutans*, *Bryum alpinum*, *B. pseudotriquetrum* (Bryaceae), species of *Plagiomnium* Kop. and *Rhizomnium* (Broth.) Kop. (Mniaceae), *Philonotis* Brid. (Bartramiaceae), *Fontinalis antipyretica* (Fontinalaceae), *Thamnobryum alopecurum* (Thamniaceae), species of *Cratoneuron* (Sull.) Spruce and *Amblystegium* Br. Eur., *Leptodictyum riparium*, *Calliergonella cuspidata* (Amblystegiaceae), species of *Brachythecium* Br. Eur., *Rhynchostegium* and *Eurhynchium* (Brachytheciaceae) can be observed on soil or rocks depend on species preferences between elevation of 500 and 1000 m. or more. *Cinclidotus riparius* form a community at Şahindere together with *Rhynchostegium riparioides*, *Eurhynchium speciosum*, *Amblystegium tenax* and *Cratoneuron filicinum* on west rocks. A similar wet place community can be observed in Bostandere. In this community, *Cratoneuron commutatum* var. *falcatum* and *Eucladium verticillatum* are plentiful on wet rocks and CaCO<sub>3</sub> accumulated on the plants. *Fontinalis antipyretica* form a community in Gelinalan fountain with *Philonotis fontana*, *Bryum alpinum* and *Encalypta streptocarpa*. This community occurs on wet rocks and partially on soil. As known well, *F. antipyretica* is a submerged plant of aquatic environments but at this area it can be seen observed on wet rocks without submersion. *Rhynchostegium riparioides* is another community of wet places in Kalkım, around forest seedling and fishery foundation. The community is placed onto wet or moist rocks near stream. *Plagiomnium rostratum*, *Thamnobryum alopecurum*, *Eurhynchium speciosum*, *E. stokesii* and *Racomitrium aciculare* are other members of the community.

In our efforts to determining moss communities of the area, *Antitrichia curtispindula* was observed an epiphytic community in Eybek Dağ at an altitude of 100

m. together with *Hypnum cupressiforme*, *Leucodon sciuroides*, *Plagiothecium* cf. *denticulatum* and *Zygodon baumgartneri* on trunks of *Pinus nigra*, *Abies nordmanniana* subsp. *equi-trojani* and *Quercus* sp. Among these species, *Antitrichia californica*, *Pterigynandrum filiforme*, *Isothecium myurum*, *Orthotrichum lyellii*, *O. rupestre* can be found.

*Leucodon sciuroides* and *Homalothecium sericeum* from community with *Grimmia pulvinata*, *G. trichophylla*, *Tortula ruralis*, *Hedwigia ciliata* and some of the other xerophytic members that mentioned previously. Similarly *Grimmia trichophylla*–*Homalothecium sericeum*, *Pterogonium gracile*–*Hypnum cupressiforme* communities are found in Southern part of the mountain in an altitude between 50 and 500 m. as epilithically.

*Homalothecium sericeum* and *Tortula subulata* community is found on soil in southern parts of the area. All these communities are in need of confirmation by specialists on the subject. Considering them as associations will be very artificial due to lacking of detailed information for their continuity and characteristics. It is also another obstacle our very limited knowledge on general features of Turkish Bryo–vegetation. These are results of a series sampling by réleves in places that considered as homogenous. In our opinion it would be better consider them as communities that need of confirmation by further studies. Dominancy was determinative factor when we were studying on the communities. It could be another subject for discussion.

Acrocarpous mosses constitute 60.45 per cent of total flora. This is proper rate for acrocarpous mosses in the area because of their advantages under extreme conditions such as less humidity, desiccation due to long summer period etc. especially in southern part of the mountain. rates of acrocarps and pleurocarps may be an useful tool to pre-determination of an area, climatically. However, we have to keep in mind that not all acrocarps are xerophytics and not all pleurocarps can be found only in moist or wet habitats. For this reason, mosses, showing tendency to xerophytism must be cleared whether it is acrocarps or pleurocarps. By doing this we can obtain a value of approximately 50 per cent for mosses, showing tendency to xerophytism but this value can vary depend on our knowledge on real preferences of mosses, distributed in an area. To obtain this value almost all of *Mniaceae*, at least two members of *Pottiaceae* and many of *Bryaceae*, *Polytrichaceae*, *Fissidentaceae*, a member of *Encalyptaceae* may be separated as non-xerophytes. Similar work for pleurocarps may diminish the rate around 5 to



6 per cent due to mosses showing tendency to be found in dry habitats.

Further studies on Turkish mosses in different parts of the country may provide more detailed data on rates of acrocarps and pleurocarps in dry or moist environments and then we can say more than the present study.

This study was performed as a Ph. D. thesis. Delaying publication, an increase collected specimens and some incorrect identification caused changes in species number via included new taxa and excluded some. For this reason, our present publication became more comprehensive than our original thesis. Meanwhile, we had to re-calculate

most of our previous findings, such as rates of taxa in total flora, acrocarps etc. Excluded taxa due to incorrect identification as follows:

*Fabronia pusilla* Raddi

*Fontinalis antipyretica* Hedw. var. *gigantea* (Sull.) Sull.

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

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