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Research Note

A contribution to the bryophyte flora of southwestern Turkey: Bryophyte flora of Yilanli Mountain (Mugla-Turkey)

Ozlem Tonguc Yayintas*

Canakkale 18 Mart University, Biga Vocational College, 17200 Biga, Canakkale, Turkey

*Corresponding Author: ozlemyayintas@hotmail.com

Abstract
In this study, 286 plant specimens were collected and identified from the Yilanli Mountain region. In additionally 107 taxa, belonging to 18 families and 52 genera, were found. Among these, 12 liverworts species were defined. In addition 29 taxa are new records for square C11 according to the Henderson 1961 grid system.

Keywords: Bryophyte, flora, Mugla, Turkey.

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INTRODUCTION

For this study, the Yilanli Mountain, near the city of Mugla, in southwest Turkey was selected as the research area. The study area is located in the C11 grid square according to the system adopted by Henderson 1961 (Fig. 1). This study will contribute to our understanding of the moss flora of Turkey.

Whole study areas participate in the Mediterranean phytogeographical regions. This study area includes 3 vegetation types;

1. Forest vegetation consisting of *Pinus brutia* Ten., *P. nigra* Arn. subsp. *pallasiana* (Laub.) Holmboe, *Cedrus libani* A. Rich., *Cupressus sempervirens* L., *Alnus orientalis* Decne var. *orientalis*, and *Salix babylonica* L.

2. Step vegetation consisting of *Bromus tomentellus* Boiss, *Minuartia anatolica* (Boiss) Woron var. *arachnoidea* Mc Neill, *M. mesoginata* (Boiss) subsp. *mesoginata*, *Cerastium fragillinum* Boiss., *Astragalus condensatus* Ledeb., *Ebenus barbigera* Boiss, *Phlomis linearis* Boiss. & Bal., *Marrubium globosum* Montbret & Aucher ex Benth. subsp. *globosum*, *Thymus argaeus* Boiss. & Bal., *Acantholimon puberulum* Boiss. & Bal. var. *puberulum*, *Galium asparagifolium* Boiss. & Heldr.

3. Schrub vegetation consisting of *Juniperus oxycedrus* L. subsp. *oxycedrus*, *Quercus coccifera* L., *Alnus orientalis* Decne. var. *orientalis*.

In some parts of this area, the flora has become scarce because of erosion and anthropogenic effects. Generally, forests are made up of *Pinus brutia* and *P. nigra*. *Quercus coccifera* are very dominant among the olive trees in the destroyed bushes. In addition species such as *Juniperus excelsa*, *J. foetidissima, Quercus ilex, Arbutus andrachne, Phylleria media, Pistacia therebinthus,* and *P. lentiscus* are also widespread. *Liquidambar orientalis* in southwestern Anatolia was important both for ecology and economics. It is also possible to see *Platanus orientalis, Crataegus monogyna, Spartium junceum, Nerium oleander,* and *Alnus orientalis* along the streams. Generally, the plants along the roads belong to the Asteraceae family. The number of endemic flowering plants is 64 (18.65%) (Varol et al. 2004). The distribution rates of taxa into phytogeographical regions are as follows: Mediterranean elements 132 (38.49%), Irano-Turanian elements 36 (10.5%) and Euro-Siberian elements 8 (2.33%).

All the collecting sites for mosses belong

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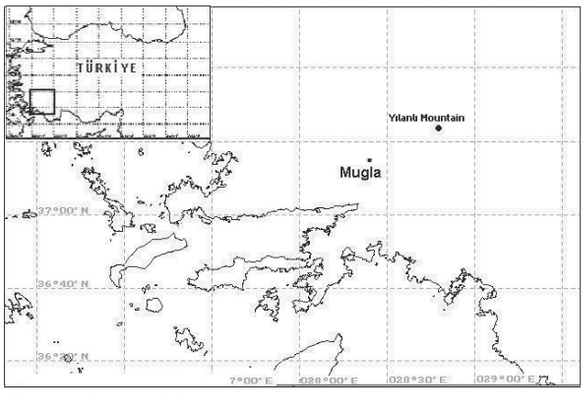

Fig. 1. Map of Turkey and study area.

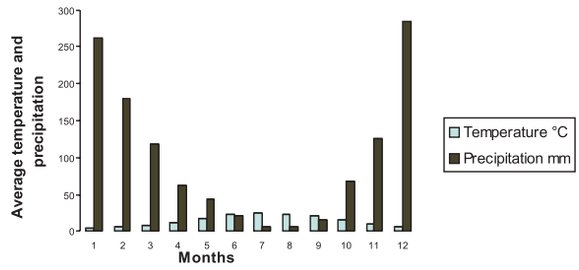

Fig. 2. Climatic diagram of Mugla.

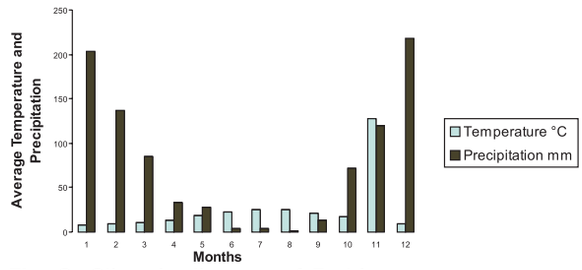

Fig. 3. Climatic diagram of Fethiye

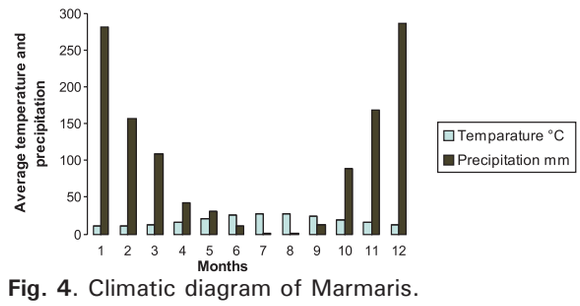

Fig. 4. Climatic diagram of Marmaris.

to the Mediterranean area. In general, the Mediterranean climate is extremely variable. In the research area, the climate is typical Mediterranean, which is characterized by warm and rainy winters and hot and dry summers. Also in the research area, them one winter and autumn seasons, defined like the summer season, this is minimum precipitation level (Akman 1990). The annual mean temperature is 14.9°C and the annual mean precipitation is 1196.4 mm in the research area. The maximum mean temperature is in July at 26°C and the minimum is 5.4°C in January (Figs. 2-4). The Yilanli Mountain and its environment are located in the Aegean region. The research area is surrounded by the Yemisendere-Goktepe village to the northeast, Kizildag-Kizilderebasi village to the south, the Boyalidere-Akyer village to the southeast, and the Mugla Forest Management area to the west.

MATERIAL AND METHODS

The materials for the study include 286 moss specimens collected during the periodic field trips to the research area in the different seasons between 1996 and 1997. Identifications of specimens were carried out using appropriate literature by European and North American bryologists (Smith 1980, 2004, Crum and Anderson 1981, Nyholm 1981, Ireland 1982, Frey et al. 1995, Greven 1995). Checklists and nomenclature were updated by Uyar and Cetin (2004) and Kürschner and Erdag (2005). The plant list enumerates the nomenclature for the bryophytes as, Hill et al. 2006. Information about new taxa for the C11 grid square was obtained from literature (Henderson 1961 a, b, Walther 1967-1970, Yayintas and Iwatsuki 1988, Cetin 1994, Erdag and Yayintas 1999, Tonguc Yayintas 2000, 2001, Varol et al. 2004). All specimens were deposited at the Herbarium of Canakkale 18 Mart University, Canakkale, Turkey. Collection numbers for the Tonguc Yayintas are preceded by a T.

The taxa are listed according to Smith's 1980 system for genus level. An asterisk indicates "New for the square C11."

Floristic List

Ditrichaceae

1. **Distichium capillaceum* (Hedw.) Bruch & Schimp.

C11, Mugla: Ozluce village, on calcareous rocks, 1200 m, 12.4.1996, T. 317; between Boyalýdere and Akyer, on rocks, 1200 m, 15.5.1996, T. 424, 451, 481; between Yemisendere and Dipsiz, epiphytic on Alnus orientalis, 1000 m, 13.03.1997, T. 538; Cakmakbasalan, on rocks, 800 m, 15.05

1996, T. 396.

2. *Ditrichum flexicaule* (Schwägr.) Hampe

C11, Mugla: Between Yemisendere and Dipsiz, near river side's on rocks, 1000 m, 13.03.1997, T. 438, 451; Gucukdere, epiphytic on *Platanus orientalis*, 1000 m, 13.03.1997, T. 588.

Dicranaceae

3. *Dicranella varia* (Hedw.) Schimp.

C11, Mugla: Gucukdere, on rocks, 1000 m, 13.03.1997, T. 562.

4. *D. heteromalla* (Hedw.) Schimp.

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on calcareous rocks, 1000 m, 15.05.1996, T. 425.

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

C11, Mugla: Ozluce village, trunks of *Pinus nigra*, 1000 m, 12.04.1996, T. 379; Cakmakbasalan and surroundings, on tree trunks, 800 m, 15.05.1996, T. 394, 396, 398; between Boyalidere and Akyer, road of Karaoluk, on calcareous rocks, 1000 m, 15.05.1996, T. 425; between Yemisendere and Dipsiz, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 516, 517, 518, 519.

Fissidentaceae

6. **Fissidens cristatus* Wills. ex Mit. var. *mucronatus* (Limpr.) Waldh.

C11, Mugla: Gucukdere and around, on rocks, 13.03. 1997, T. 589.

7. *F. dubius* P. Beauv.

C11, Mugla: Between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 444; between Yemisendere and Dipsiz, on tree trunks, 1000 m, 13.03.1997, T. 529, 538, 544, 545.

8. **F. pusillus* (Wilson.) Milde

C11, Mugla: Between Yemisendere and Dipsiz, along stream, on rocks, 1000 m, 13.03.1997, T. 467.

9. **F. serrulatus* Brid.

C11, Mugla: Between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 444.

10. *F. taxifolius* Hedw.

C11, Mugla: Cakmakbasalan and surroundings, on soil banks, 800 m, 15.05.1996, T. 395.

Encalyptaceae

11. **Encalypta streptocarpa* Hedw.

C11, Mugla: Between Boyalidere and Akyer, along streams, on soil, 1000 m, 13.03.1997, T. 540.

12. *E. vulgaris* Hedw.

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on rocks, 850 m, 13.03.1997, T. 449, 465; Yemisendere village and surroundings, on rocks, 1000 m, 13.03.1997, T. 515.

Pottiaceae

13. *Syntrichia intermedia* (Brid.) De Not.

C11, Mugla: Ozluce village, on rocks, 1200 m, 12.04.1996, T. 308, 329, 345; between Yemisendere and Dipsiz, near river sides, on rocks, 1000 m, 13.03.1997, T. 475; between Boyalidere and Akyer, on calcareous rocks, 1000 m, 13.03.1997, T. 498, 510; Gucukdere and surroundings, on rocks, 1000 m, 13.03.1997, T. 551, 552.

14. *S. ruralis* (Hedw.) P.Gäertn., E. Mey. & Scherb.

C11, Mugla: Ozluce village, Yilanli forest management, on soil, 1200 m., 12.04.1996, T. 320, 344; Cakmakbasalan waterfall surroundings, on soil, 800 m., 15.05.1996, T. 404, 405; Gucukdere and surroundings, on tree, 1000 m, 13.03.1997, T. 567.

15. *S. ruraliformis* (Besch.) Ingham.

C11, Mugla: Gucukdere and surroundings, on rocks, 1000 m, 13.03.1997, T. 564.

16. **S. papillosissima* (Hedw.) P. Gäertn., E. Mey. & Scherb.

C11, Mugla: Ozluce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 347, 369; between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T 443, 452

17. *S. princeps* De Not.

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 15.05.1996, T. 393.

18. *S. subulata* Hedw.

C11, Mugla: Ozluce village, Yilanli forest management, on soil, 1200 m, 12.04.1996, T. 336, 337, 374, 384.

19. *S. subulata* Hedw. var. *angustata* (Schimp.) Limpr.

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on soil, 1000 m., 15.05.1996, T. 446, 450.

20. **S. subulata* Hedw. var. *subinermis* (Bruch & Schimp.) Wilson.

C11, Mugla: Ozluce village, Yilanli forest management, on soil, 1200 m, 12.04.1996, T. 373.

21. **S. caninervis* (Mitt.) Broth. subsp.

caninervis

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on rocks, 1200 m, 12.04.1996, T. 338; between Yemisendere and Dipsiz, on rocks, 1000 m, 113.03.1997, T. 483; between Boyalidere and Akyer, on rocks, 1000 m, T. 422.

22. **S. virescens* (De Not.) De Not.

C11, Mugla: Gucukdere and surroundings, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 549.

23. *S. mucronifolia* Schwägr.

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on soil, 1200 m, 12.04.1996, T. 322.

24. *Tortula muralis* L. ex Hedw.

C11, Mugla: Ozluce village, on rocks, 1200 m, 12.04.1996, T. 308, 355, 359, 372, 373, 375; between Yemisendere and Dipsiz, along streams, on rocks, 13.03.1997, T. 473, 476, between Boyalidere and Akyer, *Alnus orientalis* forest and *Platanus orientalis* forest, on rocks, 1100 m, 13.03.1997, T. 525; Gucukdere and surroundings, on rocks, 1000 m, 13.03.1997, T. 575.

25. *T. laevipila* (Brid.) Schwägr.

C11, Mugla: Ozluce village, Yilanli forest management, on tree trunks, 1200 m, 12.04.1996, T. 362.

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

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on soil, 1200 m, 12.04.1996, T. 322, 323; between Boyalidere and Akyer, on calcareous rocks, 1000 m, 15.05.1996, T. 439, 446; between Yemisendere and Dipsiz, *Alnus orientalis*, 1000 m, 13.03.1997, T. 502, 514; Gucukdere and surroundings, on soil, 1000 m, 13.03.1997, T. 565, 568.

27. *Didymodon fallax* Hedw.

C11, Mugla: Ozluce village, on boulders, 1200 m, 12.04.1996, T. 358, between Boyalidere and Akyer, on calcareous rocks, soil banks, 1000 m, 15.05.1996, T. 452, 456; Gucukdere and surroundings, 1000 m, 15.05.1996, T. 577.

28. *D. acutus* (Brid.) Brid.

C11, Mugla: Gucukdere and surroundings, on rocks, 1000 m, 13.03.1997, T. 574.

29. *D. vinealis* Brid.

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on soil, 1200 m, 12.04.1996, T. 361, 363; between Boyalidere and Akyer, on tree trunks, 1000 m, 13.03.1997, T. 497.

30. *D. vinealis* Brid. var. *flaccidus* (Tayl.) Schimp.

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on boulder, 1200 m, 12.04.1996, T. 365; between Yemisendere and Dipsiz, on tree trunks, 1000 m, 13.03.1997, T. 524, 526.

31. **D. spadiceus* (Mitt.) Braithw.

C11, Mugla: Between Yemisendere and Dipsiz, on tree trunks, 1000 m, 13.03.1997, T. 490.

32. *D. ferrugineus* (Brid.) Brid.

C11, Mugla: Between Boyalidere and Akyer, on soil, 1000 m, 13.03.1997, T. 494, 546.

33. *Barbula convoluta* Hedw.

C11, Mugla: Between Yemisendere and Dipsiz, on roadsides, 1000 m, 13.03.1997, T. 482, 484.

34. *Gymnostomum aeruginosum* Sm.

C11, Mugla: Yemisendere village, on calcareous cinders (tufa), 1000 m, 13.03.1997, T. 586, 587.

35. *Weisia controversa* Hedw.

C11, Mugla: Ozluce village, Yilanli forest management and surroundings, on road sides, 1200 m, 12.04.1996, T. 349, 350; between Boyalýdere and Akyer, on rocks, 1000 m, 15.05.1996, T. 428, 429, 431; between Yemisendere and Dipsiz, near river sides, on rocks, 1000 m, 13.03.1997, T. 461.

36. *Bryoerythrophyllum recurvirostrum* (Hedw.) P. Chen

C11, Mugla: Ozluce village, near Yilanli forest management, on calcareous cinder (tufa), 1200 m, 12.04.1996, T. 386.

37. **Cinclidotus riparius* (Brid.) Arn.

C11, Mugla: Between Boyalidere and Akyer, along streams, 1000 m, 13.03.1997, T. 469, 470.

38. *Pseudocrossidium revolutum* (Brid.) R. H. Zander

C11, Mugla: Between Boyalidere and Akyer, on calcareous rocks, 1000 m, 15.05.1996, T. 465.

Grimmiaceae

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

C11, Mugla: Özlüce village, Yilanli forest management, on soil, 1200 m, 12.04.1996, T. 385.

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

C11, Mugla: Ozluce village, Yilanli forest

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management and surroundings, on rocks, 1200 m, 12.04.1996, T.303, 306, 308, 331, 340, 346, 362, 364, 366, 376, 378, 381; Cakmakbasalan and surroundings, along streams and waterfall, 800 m, 15.05.1996, T. 389, 407; between Yemisendere and Dipsiz, on soil,1000 m, 13.03.1997, T. 462, 477, 492; Boyalidere and Akyer, epiphytic on Alnus orientalis, 1000 m, T. 526, 528; Gucukdere and surroundings, on soil, 1000 m, 13.03.1997, T.571.

41. *G. trichophylla* Grev.

C11, Mugla: Between Boyalidere and Akyer, on road sides, 800 m, 15.05.1996, T. 448; Gücükdere and surroundings, near river sides, on rocks, 13.03.1997, T. 566.

42. *G. pulvinata* (Hedw.) Sm. var. *africana* (Hedw.) Hook. & Wilson

C11, Mugla: Gücükdere and surroundings, on soil, 1000 m, 13.03.1997, T. 571; Özlüce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 318.

43. *G. elatior* Bruch ex Bals.-Criv. & De Not.

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on calcareous rocks, 1000 m, 15.05.1996, T. 477.

44. *Schistidium apocarpum* (Hedw.) Bruch & Schimp.

C11, Mugla: Ozlüce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 382.

Funariaceae

45. *Funaria hygrometrica* Hedw.

C11, Mugla: Between Yemisendere and Dipsiz, near river sides, on soil bank, 1000 m, 13.03.1997, T. 489.

Bryaceae

46. *Bryum capillare* Hedw.

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on soil, 800 m, 15.05.1996, T. 406; between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 452,453.

47. *B. pseudotriquetrum* (Hedw.) Gaertn.

C11, Mugla: Gucukdere and surroundings, along streams, on wet rocks, 1000 m, 13.03.1997, T. 573.

48. *B. uliginosum* (Hedw.) Bruch & Schimp.

C11, Mugla: Ozluce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 355.

49. *B. intermedium* (Brid.) Blandow

C11, Mugla: Gucukdere and surroundings, near river sides, on calcareous rocks, 1000 m, 13.03.1997, T. 587.

50. *B. pallescens* Schleich. ex Schwägr.

C11, Mugla: Between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 426.

51. *Pohlia wahlenbergii* (F. Weber & D. Mohr) A. L. Andrews

C11, Mugla: Between Boyalidere and Akyer, on soil exposed and disturbed habitat, 1000 m, 15.05.1996, T. 432.

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

C11, Mugla: Between Boyalidere and Akyer, on soil, 1000 m, 15.05.1996, T. 444.

Mniaceae

53. *Plagiomnium medium* (Bruch & Schimp.) T. Kop.

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 15.05.1996, T. 410; Gucukdere and surroundings, near river side's, on rocks, 1000 m, 13.03.1997, T. 579, 580, 581.

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

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 15.05.1996, T. 411,412,413; between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 417.

55. **P. elipticum* (Brid.) T. Kop.

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 15.05.1996, T. 414, 415, 416; between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 418, 444.

Bartramiaceae

56. **Plagiopus oederiana* (Sw.) H.A. Crum & L. E. Anderson

C11, Mugla: Between Yemisendere and Dipsiz, on calcareous rocks, 1000 m, 13.03.1997, T. 533.

57. **Bartramia halleriana* Hedw.

C11, Mugla: Between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 433.

58. *Bartramia pomiformis* Hedw.

C11, Mugla: Between Boyalidere and Akyer, in rock crevices, 1000 m, 15.05.1996, T. 434; between Yemisendere and Dipsiz, near river side's, on rocks, 1000 m, 13.03.1997, T. 495, 496, 500, 507.

59. *Bartramia stricta* Brid.

C11, Mugla: Between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T.

440.

Orthotrichaceae

60. *Orthotrichum lyellii* Hook. & Tayl.

C11, Mugla: Ozluce village, Yilanli forest management, on tree trunks, 1200 m, 12.04.1996, T. 326,332,351; Gucukdere and surroundings, on tree trunks, 1000 m, 13.03.1997, T. 570.

61. *O. pallens* Bruch ex Brid.

C11, Mugla: Ozluce village, Yilanli forest management, on broad-leaved trees, 1200 m, 12.04.1996, T. 306.

62. *O. cupulatum* Hoffm. ex Brid.

C11, Mugla: Ozluce village, Yilanli forest management, on trees, 1200 m, 12.04.1996, T. 328, 330, 333, 334, 335, 341, 342, 352, 353, 367, 375, 376, 377; Cakmakbasalan and surroundings, near waterfalls, on rocks, 1000 m, 15.05.1996, T. 400; between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 429; between Yemisendere and Dipsiz, near riversides, on calcareous rocks, 1000 m, 13.03.1997, T. 474, 501; on tree trunks, 1000 m, 13.03.1997, T. 536, 542; Gucukdere and surroundings, on rocks, 1000 m, 13.03.1997, T. 586.

63. *O. anomalum* Hedw.

C11, Mugla: Ozluce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 342, 343, 348, 354, 377; between Yemisendere and Dipsiz, on calcareous rocks, 1000 m, 13.03.1997, T. 462, 464, 474, 478; between Boyalidere and Akyer, on tree trunk, 1000 m, 13.03.1997, T. 522.

64. **O. rupestre* Schleich. ex Schwägr.

C11, Mugla: Between Yemisendere and Dipsiz, along streams, on soil, 1000 m, 13.03.1997, T. 466, 473, 476, 488; between Boyalidere and Akyer, on rocks, 1000 m, 13.03.1997, T. 527; Gücükdere and surroundings, on soil, 1000 m, 13.03.1997, T. 578, 582, 584, 585.

65. **O. striatum* Hedw.

C11, Mugla. Cakmakbasalan and surroundings, near waterfalls, on trunks of broad leaved trees, 1000 m, 15.05.1996, T. 401.

66. **O. affine* Schrad. ex Brid. subsp. *fastigiatum* (Brid.) Hartm.

C11, Mugla: Yemisendere and Dipsiz, on trunk of broad leaved trees, 1000 m, 13.03.1997, T. 539.

67. *O. speciosum* Nees

C11, Mugla: Cakmakbasalan and surroundings, near river side's, on broad-leaved trees, 1000 m, 15.05.1996, T. 403; between Yemisendere and Dipsiz, on *Platanus orientalis*, 1000 m, 13.03.1997, T. 530.

68. *O. tenellum* Bruch. ex Brid.

C11, Mugla: Gucukdere and surroundings, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 582, 583.

69. *O. affine* Schrad ex Brid.

C11, Mugla: Between Yemisendere and Dipsiz, epiphytic on *Platanus orientalis*, 1000 m, 13.03.1997, T. 536.

70. *Zygodon rupestris* (Dicks) Brid.

C11, Mugla: Gucukdere and surroundings, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 556.

Hedwigiaceae

71. *Hedwigia stellata* Hedenäs

C11, Mugla: Between Boyalidere and Akyer, on calcareous rocks, 1000 m, 15.05.1996, T. 434, 437, 438.

72. *H. ciliata* (Hedw.) Ehrh. ex P. Beauv.

C11, Mugla: Between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 441, 442.

Leucodontaceae

73. *Leucodon sciuroides* (Hedw.) Schwägr. var. *morensis* (Schwägr.) De Not.

C11, Mugla: Ozluce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 307, 309, 310, 311, 313, 314, 315, 316, 319, 360; Cakmakbasalan and surroundings, near waterfalls, on soil, 1000 m, 15.05.1996, T. 387, 389, 393, 394; between Boyalidere and Akyer, on tree trunks, 1000 m, 13.03.1997, T. 520; Gucukdere and surroundings, along streams, on soil, 1000 m, 13.03.1997, T. 564, 569.

74. *L. sciuroides* (Hedw.) Schwägr.

C11, Mugla: Ozluce village, Yilanli forest management, on rocks, 1200 m, 12.04.1996, T. 321; between Yemisendere and Dipsiz, on rocks, 1000 m, 13.03.1997, T. 503; on tree trunks, 1000 m, 13.03.1997, T. 534, 541; Gucukdere and surroundings, on rock, 1000 m, 13.03.1997, T. 548, 559.

75. *Antitrichia curtipendula* (Hedw.) Brid.

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on rocks, 1000 m, 15.05.1996, T. 441, 443.

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

C11, Mugla: Cakmakbasalan and surroundings, on tree trunks, 800 m,

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15.05.1996, T. 409; between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 441; between Yemisendere and Dipsiz, on tree trunks, 1000 m, 13.03.1997, T. 491, 532; Gucukdere and surroundings, on tree trunks, 1000 m, 13.03.1997, T. 557, 567.

Neckeraceae

77. *Metaneckera menziesii* (Drumm.) Steere

C11, Mugla: Cakmakbasalan and surroundings, near waterfalls, on rocks, 1000 m, 15.05.1996, T. 408; between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 446, 447; between Yemisendere and Dipsiz, on rocks, 1000 m, 13.03.1997, T. 499, 505, 508, 513; Gucukdere and surroundings, near streams, on rocks, 1000 m, 13.03.1997, T. 550, 573, 576.

78. *Leptodon smithii* (Hedw.) F. Weber & D. Mohr

C11, Mugla: Between Yemisendere and Dipsiz, on rocks, 1000 m, 13.03.1997, T. 509, 532.

Leskeaceae

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

C11, Mugla: Between Yemisendere and Dipsiz, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 511.

80. **Leskea polycarpa* Ehrh. ex Hedw.

C11, Mugla: Between Boyalidere and Akyer, on *Alnus orientalis*, 1000 m, 13.03.1997, T. 504.

81. **Pseudoleskeella catenulata* (Schrad.) Kindb.

C11, Mugla: Between Yemisendere and Dipsiz, on tree trunks, 1000 m, 13.03.1997, T. 520.

Amblystegiaceae

82. *Amblystegium serpens* (Hedw.) Schimp.

C11, Mugla: Between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 444, 458.

83. *A. serpens* (Hedw.) Schimp. var. *juratzkanum* (Schimp.) Rau & Herv.

C11, Mugla: Between Yemisendere and Dipsiz, near river side's, on decaying wood, 1000 m, 13.03.1997, T. 471; epiphytic on tree trunks, 1000 m., 13.03.1997, T. 542.

84. *Calliergonella cuspidata* (Hedw.) Loeske

C11, Mugla: Gücükdere and surroundings, near streams, on rocks, 1000 m, 13.03.1997, T. 577.

85. *Cratoneuron commutatum* (Hedw.) Ochyra var. *falcatum* (Brid.) Ochyra

C11, Mugla: Yemisendere village, on rocks, beside streams, 1000 m, 13.03.1997, T. 486.

86. *C. filicinum* (Hedw.) Spruce

C11, Mugla: Between Yemisendere and Dipsiz, near river side, on rocks, 1000 m, 13.03.1997, T 487.

Brachytheciaceae

87. *Brachythecium velutinum* (Hedw.) Schimp.

C11, Mugla; Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 14.05.1996, T. 388; between Boyalidere and Akyer, on soil, 1000 m, 15.05.1996, T. 460; between Yemisendere and Dipsiz, near river side, on rocks, 1000 m, 13.03.1997, T. 463.

88. *B. rutabulum* (Hedw.) Schimp.

C11, Mugla: Between Boyalidere and Akyer, on rocks, 1000 m, 15.05.1996, T. 419; Between Yemisendere and Dipsiz, near river sides, on rocks, 1000 m, 13.03.1997, T. 481.

89. *B. populeum* (Hedw.) Schimp.

C11, Mugla: Between Yemisendere and Dipsiz, near river sides, on tree trunks, 1000 m, 13.03.1997, T. 485.

90. *Homalothecium sericeum* (Hedw.) Schimp.

C11, Mugla: Ozluce village, near Yilanli forest management, on tree trunks, 1200 m, 12.04.1996, T. 304, 305, 310, 312, 337, 339, 356, 357, 359, 360, 370, 371, 380; Cakmakbasalan and surroundings, near waterfalls, on rocks, 800 m, 15.05.1996, T. 390, 391; between Boyalidere and Akyer, on roadsides, on soil, 1500 m, 15.05.1996, T. 440, 442, 454; between Yemisendere and Dipsiz, near riversides and on rocks, 1000 m, 13.03.1997, T. 463, 493, 500, 506; epiphytic on *Alnus-Platanus orientali*s, 1000 m, 13.03.1997, T. 535, 537; Gucukdere and surroundings, along streams, on tree trunks, 1000 m, 13.03.1997, T. 551, 553, 560, 561, 563.

91. *H. philippeanum* (Spruce) Schimp.

C11, Mugla: Between Boyalidere and Akyer, on calcareous rocks, 1000 m, 15.05.1996, T. 420, 457.

92. *H. lutescens* (Hedw.) H. Robins

C11, Mugla: Between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996,

T. 437.

93. **Tomentypnum nitens* (Hedw.) Loeske

C11, Mugla: Between Yemisendere and Dipsiz, epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997, T. 531, 535.

94. *Isothecium alopecuroides* (Dubois) Isov.

C11, Mugla: Between Boyalidere and Akyer, on tree trunks, 1000 m, 15.05.1996, T. 445.

95. *Eurynchium crassinervium* (Wilson.) Schimp.

C11, Mugla: Between Boyalidere and Akyer, on calcareous rocks, 1000 m, 15.05.1996, T. 435.

96. *Rhynchostegiella curviseta* (Brid) Limpr.

C11. Mugla: Between Boyalidere and Akyer, on limestone rocks, 1000 m, 15.05.1996, T. 427, 429, 430, 460; between Yemisendere and Dipsiz, near river side, on rocks, 1000 m, 13.03.1997, T. 463.

97. *Rhynchostegium confertum* (Dicks.) Schimp.

C11, Mugla: Cakmakbasalan and surroundings, on rocks, 800 m, 15.05.1996, T. 397; between Yemisendere and Dipsiz, on tree, 1000 m, 13.03.1997, T. 519.

98. *R. megapolitanum* (F. Weber & Mohr) Schimp.

C11, Mugla: Between Yemisendere and Dipsiz, on calcareous soil in woods, 1000 m, 13.03.1997, T. 479; between Boyalidere and Akyer, on rocks, 1000 m, 13.03.1997, T. 529.

99. **Rhynchostegium murale* (Hedw.) Schimp.

C11, Mugla: Between Yemisendere and Dipsiz, on rocks, 1000 m, 13.03.1997, T, 523; Gucukdere and surroundings, a long streams, on wet rocks, 1000 m, 13.03.1999, T.553, 554, 558,572

100. *Platyhypnidium riparioides* (Hedw.) Dixon.

C11, Mugla: Cakmakbasalan and surroundings, beside streams and rocks, 800 m, 15.05.1996, T. 395, 400, 403.

101. *Scleropodium touretii* (Brid.) L. F. Koch

C11, Mugla: Between Boyalidere and Akyer, on bare soil 1000 m, 13.03.1997, T.512; Gucukdere and surroundings, on rocks, 1000 m, 13.02.1997, T. 547.

102. **Scorpiurium sendtneri* (Schimp.) M. Fleisch.

C11, Mugla; Between Yemisendere and Dipsiz, near river sides, on rocks, 1000 m, 13.03.1997, T. 468.

Hypnaceae

103. *Hypnum cupressiforme* Hedw.

C11, Mugla: Between Yemisendere and Dipsiz epiphytic on *Alnus orientalis*, 1000 m, 13.03.1997 T.543; Gucukdere and surroundings, on tree trunk, 1000 m, 13.03.1997, T.555.

104. *H. cupressiforme* Hedw. var. *cupressiforme* Brid.

C11, Mugla: Cakmakbasalan and surroundings, on trunks of *Pinus* sp., 800 m, 15.05.1996, T. 402; Between Boyalidere and Akyer, epiphytic on *Platanus orientalis*, 1000 m, 15.05.1996, T. 421; Gucukdere and surroundings, near streams, on tree trunks, 1000 m, 13.03.1997, T.549.

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

C11, Mugla: Gucukdere and surroundings, near river sides, on rocks, 1000 m, 13.03.1997, T.571, 585.

106. **Taxiphylum wissgrillii* (Garov.) Wijk & Margad.

C11, Mugla: Cakmakbasalan and surroundings, on rocks, 800 m, 15.05.1996, T. 394.

107. *Platygyrium repens* (Brid.) Schimp.

C11, Mugla: Between Yemisendere and Dipsiz, epiphytic on Platanus orientalis, 1000 m, 13.03.1997, T. 521.

Hepaticopsida

1. **Cephaloziella hampeana* (Nees) Schiffn.

C11, Mugla: Yemisendere and surroundings, on rock, 1000m, 13.03.1997, T. 539.

2. *Concephalum conicum* (L.) Dumort.

C11, Mugla: Between Boyalidere and Akyer, growing on conglomerate rocks, 1200 m, 15.05.1996, 481.

3. *Frullania dilatata* (L.) Dumort.

C11, Mugla: Between Boyalidere and Akyer, *Alnus-Platanus* forest, 1000m, 13.03.1997, T.527.

4. *Frullania tamarisci* (L.) Dumort.

C11, Mugla: Between Boyalidere and Akyer, growing on granite rocks on shady banks, 1200 m., 15.05.1996, T.425.

5. **Lophozia longiflora* (Nees) Schiffn.

C11, Mugla: Yemisendere and

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surroundings, near river sides, 1000 m, 13.03.1997, T.509.

6. *Metzgeria furcata* (L.) Dumort.

C11, Mugla: Akyer and surroundings, near Karaoluk, on conglomerate rocks, 1200 m, 15.05.1996, T.433.

7. **Oxymitria incrassata* (Brotreo) Sergio & Sim-Sim

C11, Mugla: Between Boyalidere and Akyer, road of Karaoluk, on calcareous rocks, 1200m., 15.05.1996, T.429.

8. *Pellia endiviifolia* (Dicks.) Dumort.

C11, Mugla: Between Boyalidere and Akyer, on conglomerate rocks, 1200 m, 15.05.1996, T.520.

9. *Porella cordaeana* (Hüb.) Moore

C11, Mugla: Between Boyalidere and Akyer, on limestone rocks at roadsides, 1000 m, 15.05.1996, T.458.

10. *Reboulia hemisphaerica* (L.) Raddi

C11, Mugla: Between Boyalidere and Akyer, on rock ledges and faces, 1000 m, 15.05.1996, T.420.

11. *Southbya tophacea* (Spruce) Spruce

C11, Mugla: Yemisendere village, on calcareous cinders (tufa), 1000 m, 15.05.1996, T.521.

12. *Tarigonia hypophyla* L.

C11, Mugla: Between Boyalidere and Akyer, on shady calcareous rocks, 1000 m, 15.05.1996, T. 448.

RESULTS and DISCUSSION

In this study, 107 taxa belonging to 18 families and 48 genera were identified. In addition 12 liverworts species were also defined. In addition, 29 taxa of mosses and 3 taxa of Marchantiophyta which are new to square C11 according to the Henderson 1961 grid system. The number of species of each family is given in Table 1. As seen in Table 1, Pottiaceae and Brachytheciaceae together constitute 40.7% of the flora. Pottiaceae is the richest family in the number of species; Brachytheciaceae, Orthotrichaceae, Bryaceae, Grimmiaceae, Amblystegiaceae, Fissidentaceae, and Hypnaceae are the other major components of the flora. The following moss and liverwort species were abundant epiphytes of the *Alnus orientalis* and *Platanus orientalis, Pinus nigra* trees: *Distichium capillaceum, Ditrichum flexicaule, Dicranoweisia cirrata, Tortula muralis, Syntrichia virescens, Tortella tortuosa, Grimmia pulvinata, Orthotrichum speciosum, O. tenellum, O. affine, Zygodon rupestris, Habrodon perpusillus, Leskea polycarpa, Homalothecium sericeum, Tomentypnum nitens, Hypnum cupressiforme, H. cupressiforme* var. *cupressiforme, Platygyrum repens,* and *Frullania dilatata*. The following species are abundant on tree trunks: *Fissidens dubius, F. serrulatus, Syntrichia ruralis, Tortula laevipila, Didymodon vinealis* var. *flaccidus, Didymodon spadiceus, Bryum capillare, Orthotrichum lyellii, O. pallens, O. cupulatum, O. anomalum, O. affine* var. *fastigiatum, O. speciosum, Leucodon sciuroides* var. *morensis, L. sciuroides, Pterogonium gracile, Pseudoleskeella catenulate, Amblystegium serpens, A. serpens* var. *juratzkanum, Brachythecium populeum, Homalothecium sericeum, H. lutescens, Isothecium alopecuroides,* and *Rhynchostegium confertum*.

The following moss species were found, especially on the calcareous rocks: *Dicranella varia, D. heteromalla, Fissidens cristatus* var. *mucronatus, Encalypta vulgaris, Syntrichia intermedia, S. papillosissima, S. caninervis* subsp. *caninervis, Tortula muralis, Didymodon fallax, D. acutus, Weisia controversa, Pseudocrossidium revolutum, Grimmia pulvinata, G. trichophylla, G. pulvinata* var. *africana, G. elatior, Schistidium apocarpum, Bryum uliginosum, B. intermedium, B. pallescens, Plagiopus oederiana, Bartramia halleriana, B. pomiformis, Orthotrichum cupulatum, O. anomalum, O. rupestre, Hedwigia ciliata, H. stellata, Leucodon sciuroides* var. *morensis, L. sciuroides, Antitrichia curtipendula, Leptodon smithii, Calliergonella cuspidata, Eurhynchium crassinervium, Rhyncostegium megapolitanum*, and *Taxiphyllum wissgrillii*. *Gymnostomum aeruginosum* and *Bryoerythrophyllum recurvirostrum* were found on calcareous cinder.

The following moss species were found on the soil: *Fissidens taxifolius, Syntrichia ruralis, S. subulata, S. subulata* var. *subinermis, S. mucronifolia, Didymodon vinealis, D. ferrugineus, Racomitrium heterostichum, Grimmia pulvinata* var. *africana, Funaria hygrometrica, Pohlia wahlenbergii, P. cruda, Orthotrichum ruipestre,* and *Encalpyta streptocarpa.*

The following species were found in the wetlands and near waterfalls: *Cinclidotus riparius, Bryum capillare, B. pseudotriquerum, Plagiomnium medium, P. undulatum, P. ellipticum, Orthotrichum striatum, Metraneckera menziesii, Cratoneuron commutatum* var. f*alcatum, C. filicinum, Brachythecium velutinum, B. populeum, Rhynchostegiella curviseta, Platyhypnidium riparioides,* and *Rhynchostegium murale*.

As seen in Table 2, *Tortula* is the richest in the number of species with *Orthotrichum* as another species rich genus of the Yilanli Mountain. Families which contain xerophytic taxa of the area are as follows: Pottiaceae, Grimmiaceae, Orthotrichaceae, Encalyptaceae, Hedwigiacae, and Leucodontaceae. Almost all pleurocarpous families have mesophytic or hygrophytic groups, especially Brachytheciaceae, Amblystegiaceae and Neckeraceae.

The Turkish bryoflora, in whole, comprise 726 plants including 164 genera of Bryopsida in 59 genera and 166 species of Hepaticopsida and Anthoceratopsida (Uyar and Cetin 2004, Kürschner and Erdag 2005). When we compare between the study area bryophytes and totally Turkish bryophytes approximately 14.7%. As might be expected from the climatic conditions xerophytic and mesophytic mosses are dominant in the area. The Pottiaceae is the most species rich the family in Yilanli Mountain, with 27 species in the 11 genera. This number is about the overall total number of species in 1/4. This situation is not at all surprising because these species have quill-edged leaves, grow in cushion form and they can tolerate longer periods of heat. Acrocarpous mosses found the investigated area almost 50% because of the research area in the entire area is Mediterranean phytogeography.

Table 1. Families and their species number.

Families	Number of species	%
Pottiaceae	27	25.23
Brachytheciaceae	16	14.95
Orthotrichaceae	11	10.28
Bryaceae	7	6.54
Grimmiaceae	5	4.67
Amblystegiaceae	5	4.67
Fissidentaceae	5	4.67
Hypnaceae	5	4.67
Bartramiaceae	4	3.73
Leucodontaceae	4	3.73
Dicranaceae	3	2.80
Mniaceae	3	2.80
Leskeaceae	3	2.80
Encalyptaceae	2	1.86
Ditrichaceae	2	1.86
Hedwigiaceae	2	1.86
Neckeraceae	2	1.86
Funariaceae	1	0.93
Total: 18	107	100

Table 2. The genera which are represented by more than two species in the area.

Genera	Number of species
Tortula	13
Orthotrichum	10
Barbula	7
Fissidens	5
Bryum	5
Grimmia	4
Rhynchostegium	4
Homalothecium	4
Plagiomnium	3
Bartramia	3
Brachythecium	3
Hypnum	3

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Bati Türkiye Karayosun Florasina Bir Katki: Yilanli Dagi (Mugla, Türkiye) Karayosunu Florasi

Özet

Bu çalismada, bölgeden 286 bitki örnegi toplandi ve tayin edildi. 18 familya, 52 cinse ait, 107 takson bulundu. Bunlara ek olarak 12 cigerotu türü de tespit edildi. Bunlara ek olarak, 29 takson Henderson'un (1961) kareleme sistemine göre C11 karesi için yeni kayittir.

Anahtar Sözcükler: Bryofit, flora, Mugla, Türkiye.