

Two new records of *Fissidens* (Fissidentaceae Bryopsida) in Southern Turkey

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Abstract – *Fissidens fontanus* and *F. osmundoides* (Fissidentaceae, Bryopsida) are recorded for the first time in Turkey. The former was collected from Dörttyol (Hatay Province) in the Amanos Mountains and the latter from Adana – Gülek Gate (Gülek Boğazi). The nearest locality to Turkey for *F. fontanus* is Israel, while *F. osmundoides* is known nearby in Italy, Romania, Bulgaria, the Caucasus region, and Iran. There are now 22 species of *Fissidens* present in Turkey.

Bryophyta / Musci / New records / *Fissidens fontanus* / *Fissidens osmundoides* / Southern Turkey / Amanos Mountains / Taurus Mountains / Cilician Gate

INTRODUCTION

Fissidens Hedw. is a large and diverse moss genus with approximately 450 species (Crosby *et al.*, 2000). Although the genus is found throughout the world, the vast majority of its species occur in the tropical and subtropical regions (Pursell, 2007) Kürschner and Erdağ (2005) list 20 species of *Fissidens* from Turkey. As a result of recent field work conducted by the senior author, two species of *Fissidens* new to Turkey (Fig. 1) have been discovered: *F. fontanus* (Bach. Pyl.) Steud. and *F. osmundoides* Hedw.

NEW FISSIDENS SPECIES IN TURKEY

Fissidens fontanus (Bach. Pyl.) Steud.

Figs 2-6

Turkey: Hatay, Amanos Mountains, northeast of Dörttyol, northeast of Kizlar Ufacik Yaylasi, Delicay stream, submerged in stream, 1500 m, 36°56' N 36°25' E, 12 June 2002; Özlem Tonguç Yayintaş T 1215, (herbarium of Çanakkale Onsekiz Mart University, MO).

Fissidens fontanus belongs to subgenus *Octodiceras*, a subgenus sometimes recognized at the generic level. It is an aquatic species that is distributed in Europe from southern Sweden to western England, south to the Iberian Peninsula

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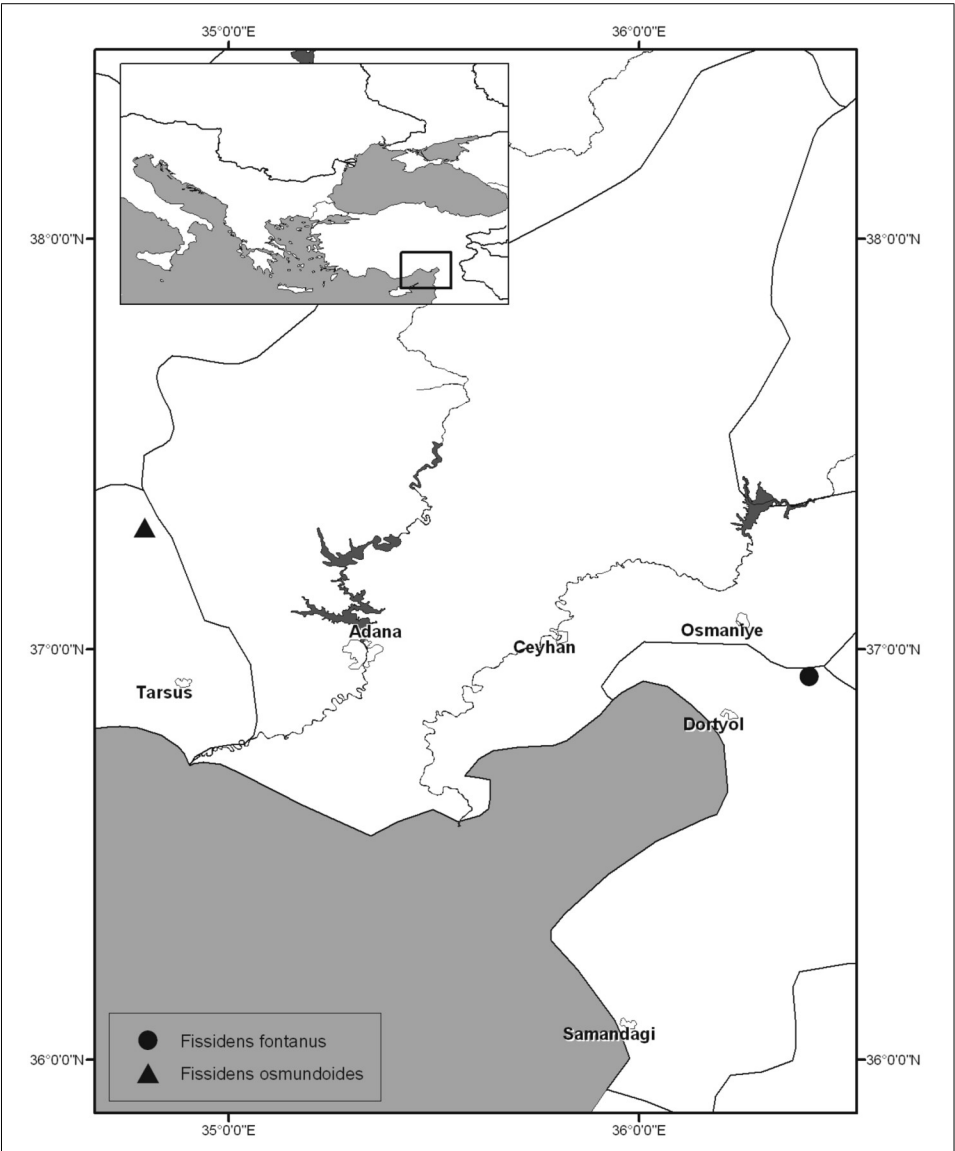
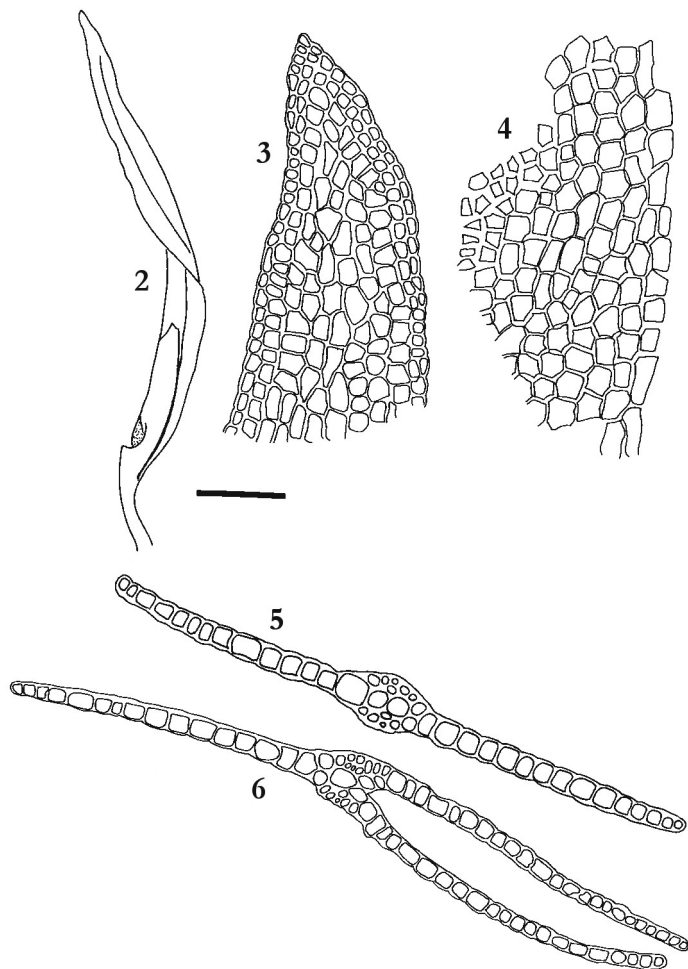


Fig. 1. The localities of *Fissidens fontanus* (●) and *Fissidens osmundoides* (▲) in Turkey.

and east to Ukraine; North Africa (Pursell, 1987), Chad (O'Shea, 2006); North America from Ontario south to Florida, west to Minnesota and Texas, and on the Pacific coast from British Colombia to California; Mexico; Central America; and the West Indies (Pursell, 1987). The nearest localities to Turkey for *F. fontanus* are Israel (Heyn & Herrnstadt, 2004) and Iran (Akhani & Kürschner, 2004).

The area in which *F. fontanus* was collected is in the Province of Hatay within grid square C13 (Fig. 1) of the system outlined by Henderson (1961). This area lies on the eastern slopes of the Amanos Mountains which form a southern



Figs. 2-6. *Fissidens fontanus* (Bach. Pyl.) Steud. **2.** Leaf. **3.** Leaf apex. **4.** Basal cells of dorsal lamina. **5.** Cross section through upper part of leaf. **6.** Cross section through lower part of leaf. Scale in mm: bar = 0.05 (**5**); bar = 0.06 (**3, 4, 6**); bar = 0.85 (**2**). (All from *Yayintaş T 1215*, MO).

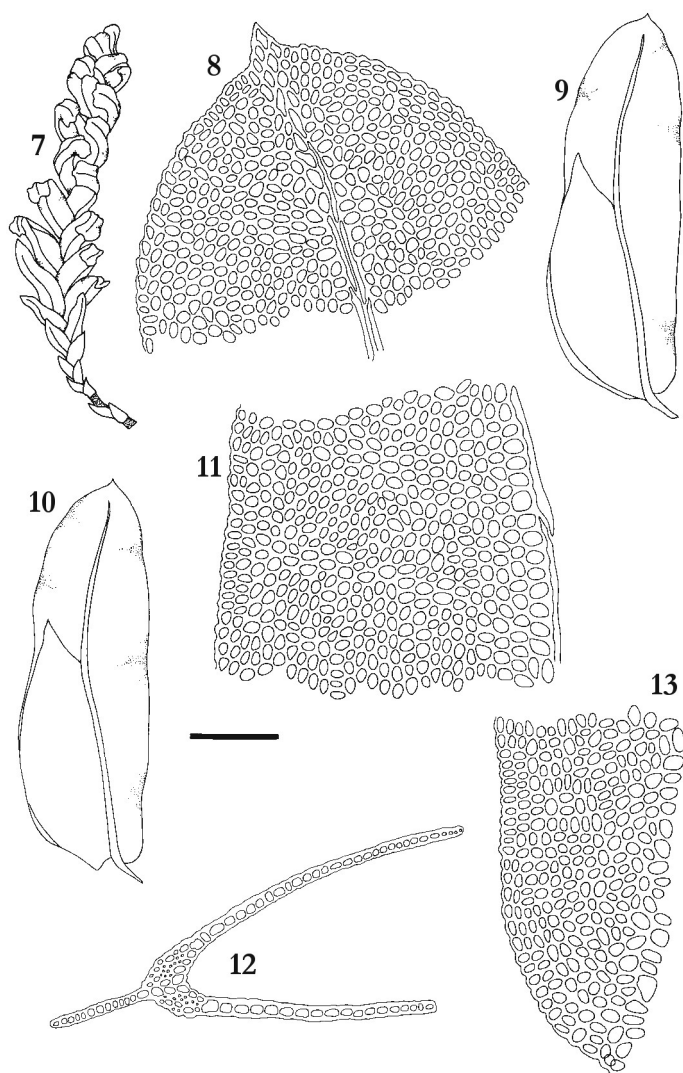
projecting spur from the eastern part of the Taurus Mountains near the northwestern corner of Syria. Common trees in this area include: *Fagus orientalis* Lipsky, *Pinus brutia* Ten, *Quercus cerris* L., *Pinus nigra* Arn. subsp. *pallasiana* (Lamb.) Holmboe., *Carpinus orientalis* Miller, *Cedrus libani* A. Richard and *Abies cilicica* (Ant. et Kotschy) Carr. The area has a typical Mediterranean climate with hot, dry summers and cool, rainy winters. Annual precipitation varies throughout the year from 1019-1500 mm (Akman, 1999). The Deliçay stream is a boulder filled, mountain stream about 48 km long. It has very different water flows depending upon the season the year. During the spring, because of snow melt in the mountains, the stream water level is high and the current very fast. While in the dry summer the water level is low and the current is sluggish. At the time *Fissidens fontanus* was collected (June) the stream was about 1 meter deep with a generally slow moving current.

Fissidens osmundoides Hedw.

Figs 7-13

Turkey: Adana, Between Adana and Nigde, Cilician Gates, Belemelik Valley, pass through the Taurus Mountain, Çakıt creek, wet area, in rock crevices, 1050 m, 15 June 2000, Özlem Tonguç Yayintaş T 857, (herbarium of Çanakkale Onsekiz Mart University, MO).

Fissidens osmundoides Hedw. is found throughout the Northern Hemisphere. It is known nearby Turkey in Italy (Cortini Pedrotti, 2001), Romania



Figs. 7-13. *Fissidens osmundoides* Hedw. 7. Habit. 8. Leaf apex. 9-10. Leaves. 11. Dorsal laminal cells at mid-leaf. 12. Cross section through lower part of leaf. 13. Dorsal laminal cells at insertion. Scale in mm: bar = 0.06 (7, 10, 12); bar = 0.08 (11); bar = 0.34 (8, 9); bar = 1.3 (6). (All from Yayintaş T 857, MO).

(Dihoru 1994), Bulgaria (Natcheva & Ganeva, 2005), the Caucasus region (Ignatov & Afonina, 1992), and Iran (Frey & Kürschner 1991, Akhani & Kürschner, 2004).

The area in which *F. osmundoides* was collected belongs to grid square C13 (Fig. 1) of Henderson (1961). The Cilician Gates form the main pass through the Taurus Mountains of southern Turkey connecting the low plains of Cilicia and the Mediterranean coast with the high central plateau of Anatolia. The Beledik Valley forest vegetation begins at about 800 m where it is characterized by low and spreading trees, especially *Quercus*. The upper part of the forest area is dominated by evergreen trees such as *Cedrus*. *Fissidens osmundoides* was collected in the southern part of the Cilician Gates along the Çakıt creek. Çakıt creek is about 165 km long. It is a slow moving creek that can be forded in the dry summer season, but during the wet winter season the water level is often too high for safe crossing. Water quality in the Çakıt creek is low due to pollution from nearby towns and agricultural run off. *Fissidens osmundoides* was collected in rock crevices along Çakıt creek. The plants grew high enough above the creek that they were not submerged even during the wet season. This area has not been extensively explored by Turkish bryologists, and is in great need of further collecting (Yayintas & Glime, 2005).

Fissidens osmundoides is similar to and can be confused with *F. taxifolius* Hedw., *F. adianthoides* Hedw., and *F. dubius* P. Beauv. It differs, however, from all three species in having costae that end 4-9 cells below the apex. In *F. adianthoides* and *F. dubius* the costae end 2-3 cells below the apex, while the costae in *F. taxifolius* are percurrent or excurrent. *Fissidens adianthoides* and *F. dubius* further differ from *F. osmundoides* in having sharply serrate leaf margins that are often bordered by several rows of pale cells.

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