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# Notes on *Dicranella crispa* and *Schistidium confusum* in Turkey

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**Abstract**

In this study, both *Dicranella crispa* (Hedw.) Schimp (Dicranaceae) and *Schistidium confusum* H.H.Blom (Grimmiaceae) were recorded a second time from Mersin after Ardahan and Sakarya provinces and, also a first time from The Mediterranean region in Turkey. The specimens collected from the Taşeli Plateau. Description of the species is given along with their ecology and phytogeographical distribution.

**Keywords:** Bryophyte, *Dicranella crispa*, *Schistidium confusum*, Taşeli Plateau, Turkey.

# Türkiye'deki *Dicranella crispa* ve *Schistidium confusum* Üzerine Notlar

**Öz**

*Dicranella crispa* (Hedw.) Schimp (Dicranaceae**)** ve *Schistidium confusum* H.H.Blom (Grimmiaceae) bu çalışma ile Türkiye'de Ardahan ve Sakarya illerinden sonra ikinci kez Mersin'den ve ilk kez Akdeniz bölgesinden kaydedilmiştir. Örnekler Taşeli Platosu'ndan toplanmıştır. Türlerin tanımı ekolojileri ve fitocoğrafik dağılımları ile birlikte verilmiştir.

**Anahtar kelimeler:** Briyofit, *Dicranella crispa*, *Schistidium confusum*, Taşeli Platosu, Türkiye.

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## 1. Introduction

The Taşeli Plateau, located between the provinces of Antalya-Karaman and Mersin, is a karst plateau with an area of 113460 ha located between the longitude of 32.73 ° E and the latitude of 36.38 ° N. The plateau is in Key Biodiversity Area (KBA) status due to its biodiversity (Eken et al., 2006).

The study area is located in the Mediterranean Phytogeographical Region, common vegetation of steppe exists at high altitude. Since the Taşeli Plateau is heavily covered with rocks, rock vegetation covers a large area. Moreover, the area also covered with Conifer forest in the southern and northern areas (Sümbül and Erik, 1988a, 1988b, 1990a, 1990b). According to the data of Anamur District Meteorology Station (URL-1), this locality has a rainy, warm Mediterranean climate (Akman, 2011). The mean annual temperature is 19.4°C. The highest mean temperature is 33.0°C in August, and the lowest is 8.2°C in January. The mean annual precipitation of the region is 928.3 mm. According to the data of Gülnar District Meteorology Station (URL-1), this locality has also rainy, warm Mediterranean climate (Akman, 2011). The mean annual temperature is 13.4°C. The highest mean temperature is 30.2°C in August, and the lowest is 0.4°C in January. The mean annual precipitation of the region is 762.8 mm.

The genus *Dicranella* (Dicranaceae) represented with 7 taxa and the genus *Schistidium* (Grimmiaceae) represented with 22 taxa in Turkey (Karakaş and Ezer, 2016; Erdağ and Kürschner, 2017; Batan et al., 2018; Uyar et al., 2018). *Dicranella crispa* and *Schistidium confusum* are reported second time from Turkey, former taxon first time reported Ardahan and later taxon first time reported Sakarya province where are located from Euro-Siberian Phytogeographical Region with this study. Moreover, these species are recorded the first time from the Mediterranean Region (Figure 1,2).

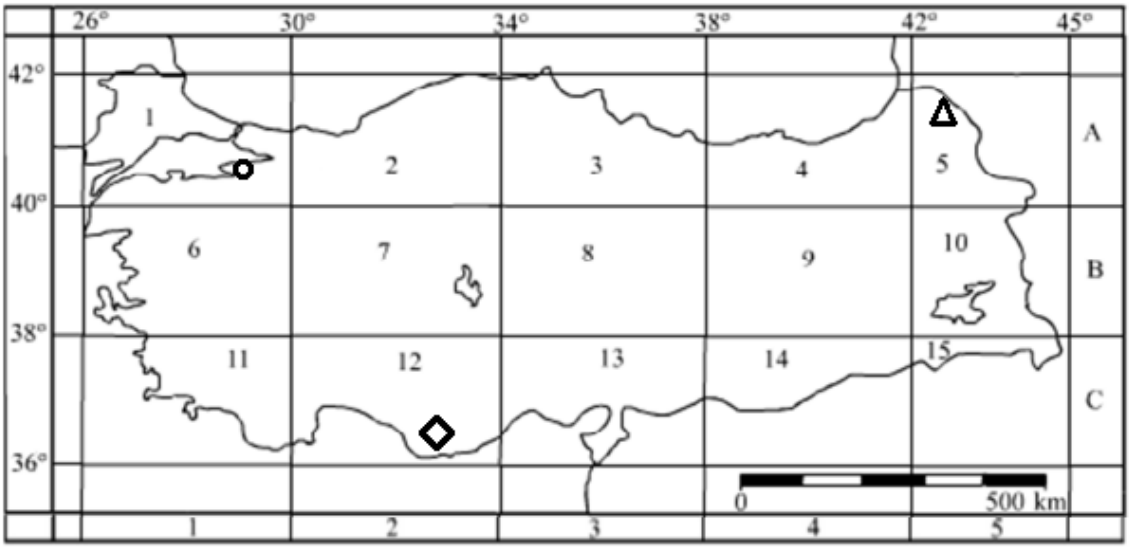


Figure 1. *D. crispa* and *S. confusum* distribution in Turkey (Henderson, 1965). **Δ** *Dicranella crispa*, **O** *Schistidium confusum*, ◊ Location of the research area


Figure 2. *D. crispa* and *S. confusum* location in Taşeli Plateau (changed from Google Earth)
*Dicranella crispa* *Schistidium confusum*

## 2. Materials and Methods

*Dicranella* and *Schistidium* specimens were collected during the bryological investigations in Taşeli Plateau. The collected specimens were prepared according to standard herbarium techniques and identified using various flora and revisional studies; Nyholm, 1986, 1998; Blom, 1996; Noguchi and Iwatsuki, 1987; Smith, 2004; Frey et al., 2006. Voucher specimens were stored in standard bryophyte envelope in Herbarium of Scientific and Technological Application and Research Center, Aksaray University (AKSU).

## 3. Results and Discussion

***Dicranella crispa*** (Hedw.) Schimp.

**Specimen examined**: Turkey, Mersin province, Bozyazı district, Dereköy village, Dereköy freshwater trout facility surroundings (36º 20' 23.9388" N-33º 4'31.8504" E), on rock, 1100 m, 22.08.2019, A. UYGUR 1496.

Taxa belong to *D. crispa* are diagnosed with lightly crisped leaves when dry, squarrose leaves when moist, plane leaf margin at base, denticulate leaf margin towards the apex. The plant is 5-10 mm long and seen green tufts. Leaves are 2-4 mm long and reflexed backward. Basal leaf cell is linear to rectangular (Fig. 3). Mid-leaf cell is narrower, linear, 4-6 µm wide. Sporophytes were not seen in our population. *D. crispa* is similar to *D. gravilleana* (Brid.) Schimp. but it is differentiated upper rectangular narrow leaf cell (rectangular cell) and rhizoidal gemmae is absent (has reddish brown rhizoidal gemmae) (Ireland, 1982; Nyholm, 1986; Smith, 2004; Frey et al., 2006).

*D. crispa* is circumpolar, acidophytic, mesophytic, sciophytic specimen. Its habitat is open on bare clayey, loamy, sandy and gravelly banks and alluvial sands, by streams, river and roadsides, on ditches, in sands or clay pits (Dierβen, 2001; Smith, 2004). Dereköy village has a freshwater spring. Specimens were collected on a rock from under poplar tree around freshwater spring.

*D. crispa* which is including in the IUCN Red List of Threatened Species in the LC category in Europe (Cogoni et al. 2019) spreads in Europe (including Svalbard in the north, Italy, Denmark, Finland, Norway, Faeroe Islands, Sweden, France, Great Britain, Ireland, Austria, Czech Republic, Germany, Netherlands, Poland, Slovakia, Switzerland, Hungary, Romania, Slovenia, Iceland), Siberia, N. Asia, N. America, Greenland and China (Nyholm, 1986; Noguchi and Iwatsuki, 1987; Smith, 2004; Frey et al., 2006; Ros et al., 2013; Hodgetts, 2015; Gulnigar et al., 2018).


Figure 3. *D. crispa*. a) Habitus (lightly crisped leaves), b-c) Leaves, d) Apex of the leaf, e) Basal cell, f) Cross-section of leaf

***Schistidium confusum*** H.H.Blom
**Specimen examined:** Turkey, Mersin province, Anamur district, Kaş plateau (36°17'28.6584"N-32°36'47.7864"E), on rock, alt.1950 m, 28.06.2019, A. UYGUR 1011.

*S. confusum* has recurved leaf margins, narrow and rigid hair points, strongly sinuose leaf cells. Upper leaf lamina bistratose, costa strong, peristome teeth squarrose and capsule oblong. Perichaetial leaves are longer than capsule (Nyholm, 1998; Blom, 1996, Uyar et all., 2018, Fig. 4).

*S. confusum* is basiphytic, xerophytic, thermophytic plant. They grow on calcareous rocks, seashore cliffs and rood cutting. Their habitat is under deciduous forest or sun-exposed areas (Dierβen, 2001; Hallingback et al., 2006). In the first locality of *S. confusum* in Turkey, the species was collected under *Quercus* forest at deciduous forest edge, on calcareous rock at 150 m (Uyar et al., 2018); the second locality of *S. confusum* in the present study was collected from calcareous rock in the sun-exposed area at 1950 m and together with *Grimmia pulvinata* (Hedw.) Sm. The presence of *S. confusum* which has xerophytic character at the high altitude of the study area may be due to the climate characteristics of the study area and presence of arid rocky habitats in the study area. Also, *S. confusum* is included in the IUCN Red List of Threatened Species in the LC category in Europe (Schröck, 2019).

*S. confusum* is known from Turkey, Austria, Czech Republic, Estonia, Finland, Hungary, Latvia, Norway, North-Western European Russia, and Sweden (Nyholm, 1998; Ignatov et al., 2006, Ros et al., 2013, Uyar et al., 2018).

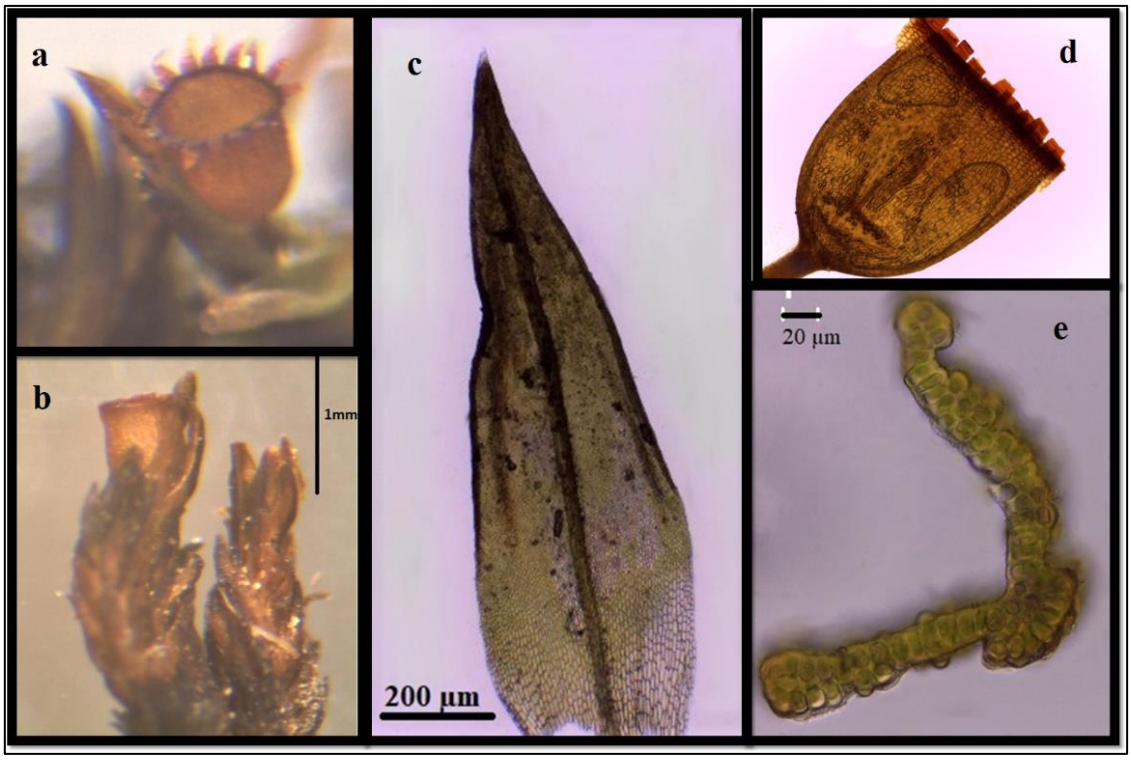


Figure 4. *S. confusum*. a) Capsule b) Habit c) Leaf d) Capsule (10x) e) Cross-section of leaf

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