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Soil Bdelloid Rotifers in Aksaray (Central Anatolia, Türkiye)

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Abstract: Twelve bdelloid rotifer taxa were recorded as a result of the examination of 20 soil samples collected from different regions of Aksaray. Of these, *Ceratotrocha cornigera* (Bryce, 1893) and *C. veleta* Donner, 1949 are secondly recorded from Turkey. While the highest species richness was found in Eşmekaya and Ortaköy localities, no species was found in the samples collected from the localities; Şerefli Koçhisar, Topakkaya, Toki, State Hospital and Aksaray University Campus.

Key words*:* bdelloid, soil rotifer, species diversity, Turkish Fauna

Aksaray'ın Toprakta Yaşayan Bdelloid Rotiferleri (Orta Anadolu, Türkiye)

Özet: Aksaray ilinin farklı bölgelerinden toplanan yirmi toprak örneğinin incelenmesi sonucunda on iki bdelloid rotifer taksonu kaydedildi. Bunlardan *Ceratotrocha cornigera* (Bryce, 1893) ve *C. veleta* Donner, 1949 Türkiye'den ikinci kez rapor edildi. En yüksek tür zenginliği Eşmekaya ve Ortaköy lokalitelerinde bulunurken, Şerefli Koçhisar, Topakkaya, Toki, Devlet Hastanesi ve Aksaray Üniversitesi Kampüsü lokalitelerinden toplanan örneklerde hiç bir tür bulunamadı.

Anahtar Kelimeler: bdelloid, toprak rotiferleri, Türkiye Faunası

1. Introduction

About 461 bdelloid rotifer species are known worldwide [1]. Forty three of these have been recorded from Türkiye up to now [2, 3, 4].

Bdelloids are pseudoceolamate animals with 300-700 microns body size. They live in terrestrial (mosses, lichens, barks, and soils) and aquatic habitats (running waters, lakes and reservoirs). Diversity pattern of microscopic organisms (smaller than 2 mm) is not clear because of limited studies carried out on these organisms. Some recent papers on bdelloid rotifers [5,6,7] reported that more faunistic studies are needed to learn about diversity pattern of bdelloids. Only few studies on soil bdelloid rotifers have been conducted [8,9].

Here, in our study, we carried out a faunistic survey of bdelloids to understand diversity pattern of microscopic organisms in 20 different soil habitats located in Central Anatolia.

2. Materials and Methods

Twenty soil samples for bdelloid rotifers were collected from different parts of Aksaray (Central Anatolia, Türkiye) (Table 1). For each sample about 500 g. soil was taken. About 5 g. soil for each sample was put into a petri dish and then added distilled water to break dormancy form. Moving animals were identified using by stereo and binocular microscopes under the magnification of 10x, 40x and 100x. A classic guide book [8] for bdelloid identification was followed. Systematical names of the species were done according to Segers [1].

The coordinates of sampling sites were taken using by a GPS. Altitude of the sampling area is about 900 m.

Table 1. Sampling localities and their coordinates of soil bdelloid rotifers in Aksaray

Samples Codes	Sampling sites	Coordinates
AKS1	Aksaray University Campus 1	38° 19' 44" K / 33° 59' 89" E
AKS2	Aksaray University Campus 2	38° 19' 35" K / 33° 59' 62" E
AKS3	KYK Girls' Dormitory	38° 21' 70" K / 33° 58' 83" E
cvAKS4	Park site	38° 22' 39" K / 34° 0' 54" E
AKS5	Fatih District	38° 21' 41" K / 34° 2' 8" E
AKS6	Aratol District	38° 21' 47" K / 33° 59' 37" E
AKS7	Helvadere 1	38° 11' 4" K / 34° 12' 34" E
AKS8	Helvadere 2	38° 11' 80" K / 34° 12' 12" E
AKS9	Helvadere 3	38° 11' 38" K / 34° 12' 30" D
AKS10	Helvadere 4	38° 11' 46" K / 34° 12' 40" D
AKS11	Aksaray State Hospital	38° 23' 58" K / 34° 1' 13" E
AKS12	Toki	38° 24' 15" K / 34° 0' 6" E
AKS13	Eşmekaya 1	38° 16' 99" K / 33° 26' 56" D
AKS14	Eşmekaya 2	38° 14' 27" K / 33° 26' 33" D
AKS15	Gölyazı	38° 33' 54" K / 33° 12' 63" D
AKS16	Ortaköy	38° 30' 23" K / 33° 57' 63" D
AKS17	Şerefli Koçhisar	38° 50' 08" K / 33° 35' 70" D
AKS18	Topakkaya	38° 28' 25" K / 33° 52' 14" D
AKS19	Selime 1	38° 18' 51" K / 34° 15' 01" D
AKS20	Selime 2	38° 18' 42" K / 34° 15' 99" D

3. Results

As a result of the examination of 20 soil samples from different habitats, 12 bdelloid taxa were recorded (Table 2). Of these species, *Ceratotrocha cornigera* and *C. velata* are recorded from Türkiye for the second time. One taxon of *Mniobia* and 2 taxa of *Habrotrocha* could not be identified in species level. They may be new species to science. Worldwide and Türkiye distributions of these recorded taxa were given according to Segers [1] and Kaya et. al [4].

Some recorded species; *Adineta vaga, Ceratotrocha cornigera, Habrotrocha bidens*, *Macratrochela plicata* and *Philodina proterva* are worldwide distributed and cosmopolite species [1].

Ceratotrocha cornigera (Bryce, 1893): Common species all over the world [1] but it is secondly recorded from Türkiye.

Ceratotrocha velata Donner, 1949: It is a Palerctic species [1] and the second record for Türkiye.

Macrotrachela latior Donner, 1951: Palerctic species [1]. It was found in Kayseri (Central Anatolia) [4]. Here, in our study, we found it in Aksaray where is close to Kayseri.

Philodina acuticornis Murray, 1902: First record of this species was given from Bolu (Marmara Region of Türkiye) [4] and now we found it in Aksaray. It is recorded from Africa, Asia and Australia [1].

Rotaria sordida (Western, 1893): Cosmopolite species [1]. It was found in muddy tree roots in the present study.

During the study, no bdelloid was recorded in some samples (AKS1, AKS2, AKS11, AKS12, AKS13, AKS15, AKS17 and AKS18). Only one species was seen in 8 samples (AKS3, AKS5, AKS6, AKS7, AKS8, AKS10, AKS19 and AKS20). Two species were found in two samples (AKS4 and AKS9) and 3 species in one sample (AKS4), 4 species in one sample (AKS16).

4. Discussion

Species richness for each sample is ranged from 0 to 4. Excluding the samples without species, species richness for each sample (α-diversity) was found as 1.58. This number is very low comparing to the studies carried out on lichens and mosses [10, 7]. Here in this study, we observed that α-diversity is rather low in soil samples than mosses and lichens.

There are many factors which affect the species composition and diversity of bdelloid rotifers. The most important ones are soil moisture, salinity, pH, food and oxygen [11, 12, 13]. Soil is highly saline in Aksaray. In addition to, soil is poorer than moss and lichen in terms of food. These conditions might be responsible for low alpha diversity.

There is no diversity pattern for microscopic organisms (smaller than 2 mm) [14]. Bdelloid rotifers are also microscopic organisms smaller than 2 mm. Some studies [15, 16] showed that bdelloid rotifers are much common everywhere and these studies support the hypothesis “everything is everywhere”. On the other hand, some studies show that bdelloids have high habitat selectivity [5] and another study supports that weak habitat specialization of bdelloids [7]. Consensus of all these studies is lack of faunistic studies on microscopic organisms as well as bdelloid rotifers.

In the present study, a faunistic survey on bdelloids in soil samples was conducted. Records of species from different regions and habitats help to learn about global distribution of these small animals.

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Table 2. Recorded species from each soil localities in Aksaray

	AKS 3	AKS 4	AKS 5	AKS 6	AKS 7	AKS 8	AKS 9	AKS 10	AKS 14	AKS 16	AKS 19	AKS 20
Adineta vaga (Davis, 1873)									X	X		
**Ceratotrocha cornigera* (Bryce, 1893)											X	
**Ceratotrocha velata* Donner, 1949										X		
Habrotrocha bidens (Gosse, 1851)			X			X			X	X		X
Habrotrocha sp.1							X					
Habrotrocha sp.2							X					
Macrotrachela latior Donner, 1951									X			
Macrotrachela plicata (Bryce, 1892)					X							
Mniobia sp.								X				
Philodina acuticornis Murray, 1902										X		
Philodina proterva Milne, 1916		X		X								
Rotaria sordida (Western, 1893)	X	X										

* The second record for Turkish fauna