

Water Mite (Acari, Hydrachnellae) Fauna of Lake Çapalı, Afyon, Turkey

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Abstract: Through 10 monthly sampling, a total of 7434 water mites belonging to 24 species and 9 families from Lake Çapalı were caught and identified. Of these, *Piona variabilis* and *Arrenurus batillifer* are new records for the Turkish fauna. Besides the index of species diversity, frequency analysis and the ecological characters of the study area, constant, associated, euconstant, influent and accidental species were determined.

Key Words: Hydrachnellae, Acari, new record, ecology, Turkey.

Çapalı Gölü Su Kenesi (Acari, Hydrachnellae) Faunası, Afyon, Türkiye

Özet: Çapalı Gölünden on aylık örnekleme müddetinde dokuz familya ve yirmi dört türe ait toplam 7434 su kenesi örneği toplandı ve teşhisleri yapıldı. Bu türlerden *Piona variabilis* ve *Arrenurus batillifer* Türkiye faunası için yeni kayıtlar olarak teşhis edildi. Ayrıca, tür çeşitlilik indeksi, frekansı, rastlanma sıklığı ve çalışma alanının bazı ekolojik karakterleri ile baskın, sabit, katılımcı, etkin ve tesadüf türleri tespit edildi.

Anahtar Sözcükler: Hydrachnellae, Acari, yeni kayıt, ekoloji, Türkiye.

Introduction

Anatolia, a land bridge between Asia and Europe, has an important position zoogeographically, ecologically and geologically.

Anatolia has faced many geological changes, and the fauna of the region has considerable variation. During these changes, many animal species that originated in other zoogeographical regions migrated to Anatolia, particularly during the last glacial period, when conditions were appropriate for these species in Anatolia (Demirsoy, 1996).

Many paleontological and zoological findings in Anatolia have confirmed the theory that the climate was suitable for many life forms during the last Ice Age. Nevertheless, taxonomic studies on the fauna of Anatolia are limited to a few groups of invertebrates.

The first ecological studies on a lake and stream water mite were carried out in Dumlu and Akdağ streams

(Boyacı, 1990) and in the Sultan Rushes, Turkey (Özkan et al., 1993).

The aim of this research was to determine the relation among species and to contribute to the Anatolia fauna and to be a basic text for reflections on the biogeography of this group in Anatolia and adjacent areas.

Research Area

Lake Çapalı is located in the southern part of the Dinar overland route, in the southwest of Turkey. The Afyon-Isparta railway passes through the middle of the lake. The lake basin is connected with the large Menderes basin in the west, a desert plain and Uluborlu plain in the east and Burdur basin in the south (Figure 1).

The lake area is 1220 ha and the altitude is 950 m. The lake, of tectonic origin, is fed by surface and ground waters. The maximum depth is about 2-2.5 m and the water level in the dry seasons falls considerably and the

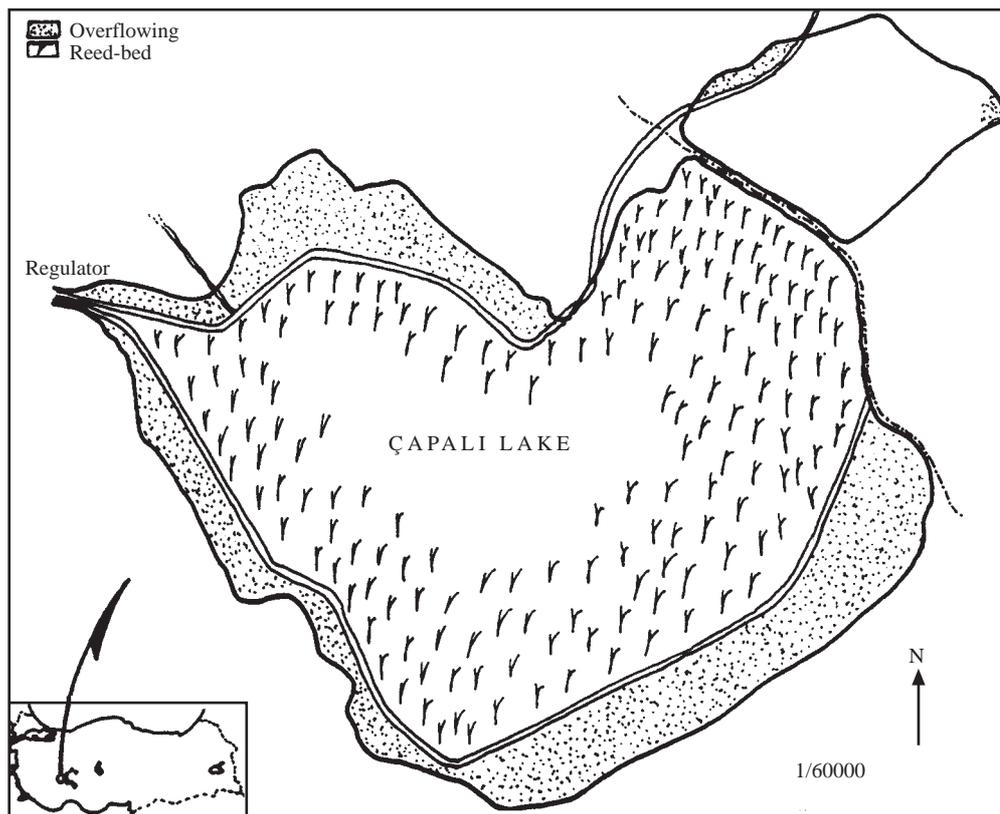


Figure 1. Lake Çapalı.

area of the lake is reduced to 1100 ha. The lake is completely covered with rushes, water lilies and reeds (D.S.İ. G. Müd., 1979).

The average annual precipitation is 476 kg/m². The highest and lowest water temperature is determined in August and January, respectively. Some of the minimum and maximum chemical values are as follows: pH 7.4-8.4, electrical conductivity 208-500 µmhos/cm, Na⁺ 3.91-35.65 mg/l, K⁺ 1.17-7.02 mg/l, Ca⁺⁺, Mg⁺⁺ 44-96 mg/l, CO₃ 0-21.6 mg/l, HCO₃ 93.94-256.2 mg/l, Cl 3.5-22.4 mg/l, and SO₄ 6.72-72.48 mg/l.

Material and Methods

Mosses and mud collected from the lake were washed under pressured tap water. Then the water mite specimens were collected in a container and fixed in Koenike liquid (10 parts glacial acetic acid, 45 parts water, 45 parts glycerin). Dissection of body parts and the orientation of specimens on a slide were performed before the specimens could be classified (Cook, 1974).

After the identification of the specimens, frequency analysis ($F = a/n \times 100$), the dominance values ($D = Na/Nn \times 100$) and the index of species diversity ($d = S-1/n$) were determined (Na = the individual numbers of species; Nn, n = a total of individual numbers; S = a total of species numbers; a = frequency of any species).

Results and Discussion

The wetland fauna, faced with problems such as agricultural pesticides, irrigation and drainage channels, has suffered due to excessive pollution and some species have been subject to extinction. The water mites are the invertebrate animal group most affected by this situation. A number of species present in the world water mites catalogs, caught in certain places and at certain times, have not been found again. (Viets, 1956; Viets, 1987) Thus, this situation reveals systematic problems in the definitions of species. We think that reevaluations of endemic species with more prospective research would be useful.

The species numbers of each family are as follows: Arrenuridae 7, Pionidae 5, Hydrachnidae 3, Eylaidae 2, Limnesidae 2, Unionicolidae 2, Hydryphantidae 1, Hydrodromidae 1 and Hygrobatidae 1. Among the 9 families determined, Arrenuridae (61.42%), Pionidae (12.4%) and Unionicolidae (12.3%) are dominant families. The species with the highest dominance evaluations ($C = 100\%$) are *A. globator*, *A. fimbriatus*, *A. affinis*, *A. claviger*, *H. despiciens*, *P. variabilis*, *U. minor* and *U. crassipes*, while the species with the lowest dominance evaluations ($C = 22.2\%$) are *H. crassipalpis*, *A. batillifer* and *H. krameri*.

In Tables 1-3, monthly distribution, dominance values, sampling numbers and frequency of the identified species and the index of species variation are shown.

Twenty-four species belonging to 9 families have been determined; 22 of these have been previously recorded from Turkey, and 2 species are new to the Turkish fauna. In the present study, 10 dominant species (76-100%), 5 constant species (51-75%), 6 associated species (26-50%) and 3 accidental species (0-25%) were determined. The indices of species variety in March, May and April (4.941, 3.747, 3.441, respectively) have been

Table 1. Annual data of all the species determined in Lake Çapalı.

Species	Individuals number	Frequency	Dominance	values
<i>Hydrachna conjecta</i>	28	0.3766	66.6	II
<i>Hydrachna leegei</i>	33	0.4439	66.6	II
<i>Hydrachna orientalis</i>	9	0.1210	33.3	III
<i>Eylais infundibulifera</i>	82	1.1030	44.4	III
<i>Eylais megalostoma</i>	48	0.6456	44.4	III
<i>Hydryphantes crassipalpis</i>	14	0.1883	22.2	IV
<i>Arrenurus suecius</i>	82	1.1080	66.6	II
<i>Arrenurus affinis</i>	651	8.7570	100	I
<i>Arrenurus claviger</i>	644	8.6620	100	I
<i>Arrenurus fimbriatus</i>	1271	17.097	100	I
<i>Arrenurus globator</i>	1849	24.872	100	I
<i>Arrenurus truncatellus</i>	67	0.9012	55.5	II
<i>Arrenurus batillifer</i>	2	0.0269	22.2	IV
<i>Limnesia undulata</i>	202	2.7172	88.8	I
<i>Limnesia maculata</i>	92	1.2375	66.6	II
<i>Hydrodroma despiciens</i>	544	7.3177	100	I
<i>Piona variabilis</i>	463	6.2280	100	I
<i>Piona alpicola</i>	50	0.6725	33.3	III
<i>Piona carnea</i>	176	2.3675	77.7	I
<i>Unionicola minor</i>	550	7.3984	100	I
<i>Unionicola crassipes</i>	455	6.1805	100	I
<i>Hydrochorautes krameri</i>	18	0.2421	22.2	IV
<i>Tiphys ornatus</i>	72	0.9865	44.4	III
<i>Hygrobates quanaticola</i>	32	0.4304	44.4	III

Total: 24 species, 7434 individuals

I: Frequency 76-100% euconstant species (10)

II: Frequency 51-75% constant species (5)

III: Frequency 26-50% associated species (6)

IV: Frequency 0-25 % accidental species (3)

Table 2. Monthly distributions of the water mites and diversity.

Individual	March	April	May	June	July	August	September	October	November
Number	344	494	507	789	1795	1592	829	779	575
Species number	18	18	20	20	19	16	15	12	12
Diversity	4.941	3.441	3.747	2.408	1.002	0.0942	1.688	1.412	1.913

Table 3. The species frequency groups and the numbers of individuals.

Euconstant		Constant		Associated		Accidental	
Arrenuridae	59%	Hydrachnidae	0.8%	Hydrachnidae	0.1%	Hydryphantidae	0.19%
<i>Arrenurus affinis</i>	651	<i>Hydrachna leegei</i>	33	<i>Hydrachna orientalis</i>	9	<i>Hydryphantes crassipalpis</i>	14
<i>Arrenurus claviger</i>	644	<i>Hydrachna conjecta</i>	28				
<i>Arrenurus fimbriatus</i>	1271			Eylaidae	1.7%	Arrenuridae	0.02%
<i>Arrenurus globator</i>	1849	Arrenuridae	2%	<i>Eylais infundibulifera</i>	82	<i>Arrenurus batillifer</i>	2
		<i>Arrenurus suecius</i>	82	<i>Eylais megalostoma</i>	48		
Limnesidae	2.7%	<i>Arrenurus truncatellus</i>	67			Pionidae	0.2%
<i>Limnesia undulata</i>	202			Pionidae	1.6%	<i>Hydrochorautes krameri</i>	18
		Limnesidae	1.2%	<i>Piona alpicola</i>	50		
Hydrodromidae	7.3%	<i>Limnesia maculata</i>	92	<i>Tiphys ornatus</i>	72		
<i>Hydrodroma despiciens</i>	544						
				Hygrobatidae	0.43%		
Pionidae	2.4%			<i>Hygrobates quanaticola</i>	32		
<i>Piona carnea</i>	176						
<i>Piona variabilis</i>	463						
Unionicolidae	13.5%						
<i>Unionicola minor</i>	550						
<i>Unionicola crassipes</i>	455						

determined to be higher than those in other months. Due to suitable environmental conditions, the numbers of individuals in the summer decreased the index of species diversity.

Faunal diversity tends to be low, although some of the taxa are quite abundant. Nevertheless, within a restricted area, total fauna diversity is high, due to low repetition.

The index of diversity values of species caught from the lake, where the depth is approximately 1-3 m, were similar (2.380) to the values obtained from countries in Europe (Meyer and Schwoerbel, 1981).

One source of variability is also the different life patterns. Species living in temporary ponds show 2

different strategies, overwintering in the dry pool basin mainly as eggs or larvae, but in some species as nymphal and adult resistant states, and spring migrants to temporary ponds from permanent ones (Camacho and Valdecasas, 1988). Species of the family Hydryphantidae (genera *Hydryphantes* and *Thyas*), Pionidae (*Piona* and *Tiphys*) and Arrenuridae (*Arrenurus*) and Hydrachnidae (*Hydrachna*) exhibit the second strategy (Wiggins et al., 1980).

The numbers of euconstant and constant species confirm that Lake Çapalı is an appropriate environment for water mites.

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