

## The Cladoceran and Copepod (Crustacea) Fauna of İkizgöl (Bornova-İzmir)

M. Ruşen USTAOĞLU, Süleyman BALIK, Cem AYGEN, Didem ÖZDEMİR MİS  
Ege Üniversitesi, Su Ürünleri Fakültesi, Su Ürünleri Temel Bilimler Bölümü, İçsular Biyolojisi Anabilim Dalı,  
35100 Bornova, İzmir-TURKEY

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**Abstract:** With the aim of identifying cladoceran and copepod fauna of İkizgöl, which is situated 565 m above sea level on the southern slope of Yamanlar Mountain, plankton samples were collected monthly by plankton net horizontally and vertically, with a mesh size of 55µm between December 1994 and May 1996. Collected specimens were preserved in 4% formaldehyde. As a result, a total of 16 (12 cladoceran and 4 copepods) species were identified from İkizgöl.

**Key Words:** Crustacea, Cladocera, Copepoda, Fauna, İkizgöl

### İkizgöl'ün (Bornova-İzmir) Cladocera ve Copepoda (Crustacea) Faunası

**Özet:** Yamanlar dağının güney yamacında 565 m. yükseklikte yer alan İkizgöl'ün kladoser ve kopepod faunasını belirlemek amacıyla, Aralık 1994-Mayıs 1996 tarihleri arasında aylık periyotlarla, 55µm. göz açıklığındaki plankton keçesi kullanılarak horizontal ve vertikal çekimlerle gölden toplanan plankton örnekleri %4'lük formolde tespit edilmiştir. Örneklerin kalitatif değerlendirilmesi sonucunda, İkizgöl'de kladoserlerden 12 tür, kopepodlardan ise 4 tür olmak üzere toplam 16 tür saptanmıştır.

**Anahtar Sözcükler:** Crustacea, Cladocera, Copepoda, Fauna, İkizgöl

### Introduction

The cladocerans and copepods are two groups of zooplankton, which form the second trophic level of the food chain in aquatic environments.

In Turkey, which has very rich inland water sources, many studies have been carried out with the purpose of identifying cladoceran and copepod species in many lakes and regions.

The first study on İkizgöl was by Mann (1). Seçmen and Leblebici (2) have studied its macrophytes and Gezerler-Şipal et al. (3) have studied the micro and macro algae flora of the lake. The aim of this study is to contribute to the bio-diversity of İkizgöl and Turkey by investigating the cladoceran and copepod fauna.

### Materials and Methods

To determine the Cladocera and Copepoda fauna of İkizgöl, plankton samples were collected monthly with a plankton net (mesh size 55 µm) both horizontally and

vertically between December 1994 and May 1996. The plankton samples were immediately fixed in 4% formaldehyde.

Identification of the species were done by utilizing various publications (1, 4-15). Water temperatures were measured by a thermometer with 0.1°C sensitivity. pH and conductivity measurements were performed by Hanna 8014 pHmeter and Hanna 8033 conductivimeter. Dissolved oxygen concentration (Winkler method) and alkalinity measurements were made by volumetric methods.

### Properties of the Study Area

İkizgöl, a tectonic lake located on the southern slope of Yamanlar Mountain, lies 565 m above sea level. Its maximum depth is 420 cm and it is fed by surrounding springs and rainfall. The excess water of İkizgöl drains into Bornova Stream through a canal located in the southern part of the lake.

In an earlier study on the zooplankton of İkizgöl, *Diaphanosoma brachyurum*, *Daphnia longispina* and

*Metacyclops gracilis* species were reported (1). Within the lake and on the shore, the macrophyte species *Phragmites australis*, *Thypha latifolia*, *Polygonum lapatifolium*, *Epibolium hirsutum*, *Cyperus longus*, *Lycopus europaeus*, *Alisma plantagoaquatica*, and *Ceratophyllum submersum* were reported by Seçmen and Leblebici (2). Gezerler-Şipal et al. (3) reported a total of 110 micro and macro algae taxa (17 belonging to Cyanophyta, 8 to Euglenophyta, 34 to Chlorophyta, 1 to Xantophyta, 2 to Dinophyta, 46 to Bacillariophyta and 2 to Chrysophyta).

The water temperature of the lake ranges from 2.0°C (January 1995) to 25.1°C (June 1995). The minimum and maximum depth and transparency are 270-420 cm and 35-170 cm respectively. Measurements of water samples taken from the site gave pH, dissolved oxygen concentration, conductivity and alkalinity values of 6.90-8.55, 2.8-11.52 mg/l, 201-407 µS, and 1.6-3.0 meq/l respectively (Table 1).

## Results

The samples collected during the research period indicate the presence of 12 species of Cladocera: *Daphnia cucullata* Sars, 1862, *Daphnia hyalina* Leydig, 1860, *Daphnia longispina* O.F.Müller, 1785, *Simocephalus exspinosus* (Koch, 1841), *Simocephalus vetulus* (O.F.Müller, 1776), *Ceriodaphnia laticaudata* P.E.Müller, 1867, *Ceriodaphnia quadrangula* (O.F.Müller, 1785), *Ceriodaphnia reticulata* (Jurine, 1820), *Scapholeberis kingi* Sars, 1903 belonging to the family Daphniidae, and *Chydorus sphaericus* (O.F.Müller, 1776), *Alona guttata* Sars, 1862, *Alona rectangula* Sars, 1862 belonging to the family Chydoridae, and 4 species of Copepoda: *Macrocyclops albidus* (Jurine, 1820), *Eucyclops serrulatus* (Fischer, 1851), *Metacyclops gracilis* (Lilljeborg, 1853) belonging to the family Cyclopidae and *Canthocamptus staphylinus* (Jurine, 1820) belonging to the family Canthocamptidae. Table 2 shows the monthly distribution of the species identified in İkizgöl.

Table 1. Monthly values of the physico-chemical composition of İkizgöl. (\*: no water samples were taken)

Months	Depth (cm)	Transparency (cm)	Temp. (°C)	pH	D.O. (mg/l)	Conductivity (µS <sub>20°C</sub> )	Alkalinity (meq/l)
December 94	400	80	3.0	8.55	10.80	374	1.6
January 95	360	40	2.0	7.10	10.60	312	1.6
February	360	40	10.0	7.08	10.40	326	1.6
March	420	60	8.0	8.32	10.00	387	1.6
April	400	150	18.0	7.21	8.80	213	1.6
May	390	140	22.1	6.90	4.00	201	1.6
June	360	90	25.1	7.43	6.80	217	2.4
July	290	120	21.9	7.32	4.80	247	2.6
August	290	70	23.9	7.51	2.80	278	2.8
September	270	100	19.2	7.86	6.00	314	3.0
October	270	100	12.2	8.08	7.68	407	2.9
November	390	35	5.4	7.49	7.52	285	1.6
December	400	90	9.1	7.11	4.08	314	2.0
January 96	*	*	*	*	*	*	*
February	400	40	7.4	7.53	11.52	301	2.0
March	400	80	6.4	7.42	8.32	310	1.8
April	400	170	18.3	7.26	8.88	212	1.4
May	*	*	*	*	*	*	*

Table 2. Monthly distribution of the species identified in İközgöl.

Species/Months	1994						1995						1996				
	D	J	F	M	A	M	J	J	A	S	O	N	D	F	M	A	M
<b>COPEPODS</b>																	
<i>Macrocyclus albidus</i>	+	+	+	+	+	-	-	+	+	+	-	-	+	+	-	-	-
<i>Eucyclops serrulatus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Metacyclops gracilis</i>	-	-	-	+	+	+	+	+	+	+	-	-	-	-	+	-	
<i>Canthocamptus staphylinus</i>	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	
<b>CLADOCERANS</b>																	
<i>Daphnia cucullata</i>	-	-	+	-	-	-	-	-	-	-	+	-	+	+	+	+	+
<i>Daphnia hyalina</i>	-	-	+	-	+	+	+	-	-	-	-	-	-	-	-	-	
<i>Daphnia longispina</i>	-	-	-	+	+	+	+	+	-	-	-	-	+	+	+	+	
<i>Simocephalus exspinosus</i>	+	+	+	+	+	-	-	-	-	+	-	+	+	+	+	-	+
<i>Simocephalus vetulus</i>	+	+	+	+	+	+	-	-	-	+	+	+	-	+	+	-	+
<i>Ceriodaphnia laticaudata</i>	-	-	-	-	-	-	+	+	-	-	+	-	-	-	-	-	
<i>Ceriodaphnia quadrangula</i>	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	
<i>Ceriodaphnia reticulata</i>	+	-	+	+	-	-	+	-	-	-	-	-	-	-	-	-	+
<i>Scapholeberis kingi</i>	-	-	-	+	+	-	+	-	-	-	-	-	-	-	-	-	
<i>Chydorus sphaericus</i>	+	+	+	+	+	+	-	-	-	-	-	+	-	+	+	+	+
<i>Alona guttata</i>	-	+	+	+	+	-	-	+	-	+	-	-	-	-	-	+	+
<i>Alona rectangula</i>	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+

## Discussion and Conclusions

Because of the strong land structure, İközgöl is difficult to reach. Consequently, the lake has not been exposed to anthropogenic pollution so far.

As shown in Table 2, *E. serrulatus* was the most abundant copepod species observed during the 17 months of the study period. The presence of egg sac carrying (E.S.C.) individuals of *E. serrulatus* from December to September (a 10-month period) shows that this species has a continuous population in İközgöl. The presence of E.S.C. individuals of *M. albidus* between December and April shows that this species has a regenerated population when the water becomes cold (<20°C). Furthermore, the presence of E.S.C. individuals of *M. gracilis* from April to September means that this species has a regenerated population when the water becomes warm (>18°C). Because of its biological behaviour, *C. staphylinus* is a species which lives near the bottom, and so catching it with a plankton net is difficult.

Table 2 shows that *S. vetulus* was the most abundant cladoceran species during the study period, observed mostly in the cold months when the water temperature

was below 20°C. *S. exspinosus* and *C. sphaericus* were the second most abundant cladoceran species, observed in 11 months of the research period. *A. guttata* and *C. quadrangula* were the species, observed in only two months, in spring and early summer.

Mann (1) reported the occurrence of *Diaphanosoma brachyrum*, *M. gracilis* and *D. longispina*, but we only found two of these (*M. gracilis* and *D. longispina*) during the 17-month study period. Fourteen species (*M. albidus*, *E. serrulatus*, *C. staphylinus*, *D. cucullata*, *D. hyalina*, *S. exspinosus*, *S. vetulus*, *C. laticaudata*, *C. quadrangula*, *C. reticulata*, *S. kingi*, *C. sphaericus*, *A. guttata* and *A. rectangula*) out of 16 are new records for İközgöl.

We believe this study will contribute to a better understanding of the bio-diversity of Turkey, and be a resource for future studies on İközgöl.

## Dedication

This study is dedicated to the memory of Dr. Ufuk Gezerler-Şipal, who died in July 10th of 1999. She was an excellent person and an outstanding scientist.

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