

Ostracod (Crustacea) Fauna of Lake Eğirdir (Isparta)

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Abstract: In this study, the materials collected from 30 stations at different locations at Lake Eğirdir were evaluated. According to the results, a total of 12 species belonging to 11 genera of the superfamilies *Darwinulidacea* and *Cypridacea* were determined. Of these, *Potamocypris variegata* (Brady & Norman, 1889) is a new record from Anatolia. At the same time, the parthenogenetic populations of *Plesiocypridopsis newtoni* (Brady & Robertson, 1870) are reported from Anatolia in this study for the first time.

Key Words: The Eğirdir Lake, Crustacea, Ostracod

Eğirdir Gölü (Isparta) Ostrakot (Crustacea) Faunası

Özet: Bu çalışmada Eğirdir Gölü'nün çeşitli bölgelerine ait 30 istasyondan toplanan materyal değerlendirilmiştir. Sonuçlara göre, *Darwinulidacea* ve *Cypridacea* üstfamilyalarının toplam 11 cinsine ait 12 tür tanımlanmıştır. Bunlardan *Potamocypris variegata* (Brady & Norman, 1889), Anadolu'dan ilk kez kayıt edilmektedir, aynı zamanda *Plesiocypridopsis newtoni* (Brady & Robertson, 1870)'nin partenogenetik popülasyonu Anadolu'dan ilk kez bildirilmektedir.

Anahtar Sözcükler: Eğirdir Gölü, Crustacea, Ostrakot

Introduction

Ostracods, a subclassis of the classis Crustacea, have a worldwide distribution. They have species adapted to every kind of water viz. brackish water, fresh water or salt water. Their shells covering the soft body are rich in calcium carbonate, helping them to be fossilized. Ostracods have been living since the Cambrian period. The first studies related to ostracods in Turkey were performed by Schaffer (1). Subsequent studies based on taxonomy have been carried out by Hartmann (2) and Gülen (3-6). Studies related to freshwater ostracods have been performed by Altınışçılı (7,8), Asırlıgil (Özuluğ) and Gülen (9,10), and Külköylüoğlu on their regional and seasonal distribution (11-13).

In this study, Lake Eğirdir was chosen because there were no previous detailed studies on its ostracod fauna. By taking into account the geological history of Lake Eğirdir, it is important in terms of ostracod fauna since it is a remaining part of a large inland freshwater lake that existed in the middle Miocene-Pliocene periods.

Study area

Lake Eğirdir, a large tectonic and oligotrophic lake, is located within the borders of Isparta province (38°00'N,

30° 54'E). The deepest part of this lake is 13 m. It is at an altitude of 918 m and has a 47,250 hectare surface area. The middle part of the lake is narrower, like a channel. The shallower part in the north is called Hoyran (14).

Materials and Methods

Sampling was carried out at 30 stations, the locations of which are shown in the Figure, in summer and autumn, 1997. A special hand dip net, made of Muller cloth, was employed in sampling at the edge of the lake while sampling in the deeper areas was carried out by a bager. Formaldehyde of 4% was used for fixation. The collected materials were washed under pressurized water in sieves with different mesh sizes under laboratory conditions, and then they were put into alcohol of 70%. The samples were sorted under a binocular microscope. Temporary preparations were made with Lactophenol + Orange-G. Species identification was based on the morphological characteristics of their shells and body appendages. The materials have been conserved in the Zoology Museum of the Department of Biology of Istanbul University.

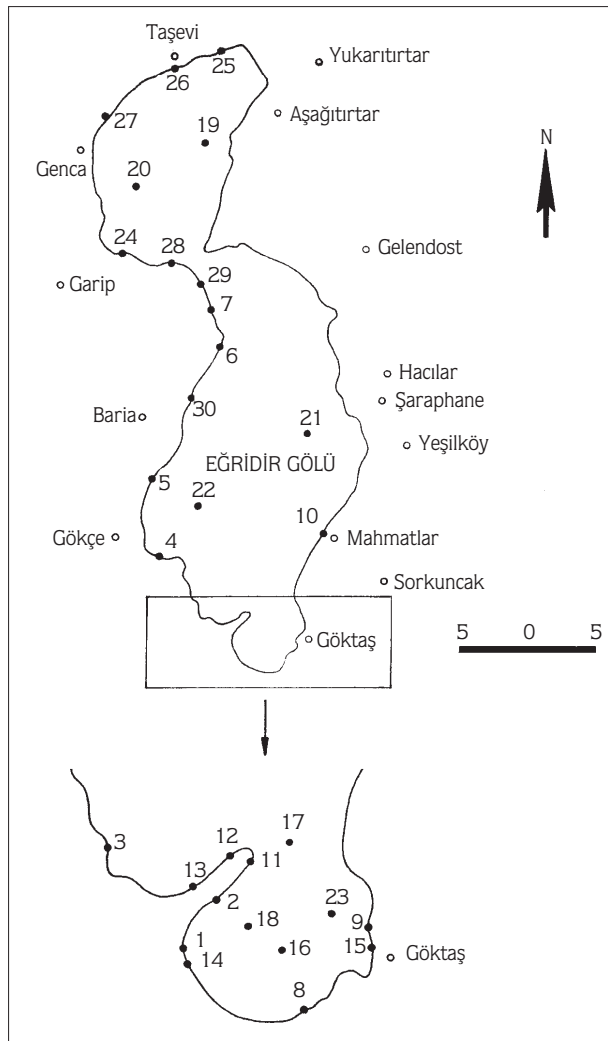


Figure : Sampling stations at Lake Eğirdir.

Findings and Taxonomy

This study was carried out in order to determine the living species of ostracod fauna of Lake Eğirdir. As a result of this study, 12 species, which belong to 11 genera, were determined at 30 stations. The classification made by Hartmann and Puri (15) was employed.

Darwinula stevensoni (Brady & Robertson, 1870)

Material: St. no: 26 (on 28.10.1997), 1 left valve; St. no: 14 (on 27.10.1997), 1♀; St. no: 5 (on 21.7.1997), 1 valve; St. no: 27 (on 28.10.1997), 1 valve.

This species is known from Russia (18), Europe, North Africa (19) and Iran (20). The previous records from Turkey are Bolu, Afyon (16), Kabaklı Spring-Diyarbakır (10) and Lake Terkos-Istanbul (17).

Ilyocypris gibba (Ramdohr, 1808)

Material: St. no: 2 (on 21.7.1997), 1 valve; St. no: 16 (on 27.10.1997), 1 valve; St. no: 17 (on 27.10.1997), 1 valve; St. no: 18 (on 27.10.1997), 1 valve; St. no: 19 (on 03.11.1997), 1 valve; St. no: 20 (on 06.11.1997), 1 valve; St. no: 21 (on 06.11.1997), numerous valves; St. no: 22 (on 06.11.1997), 1 valve; St. no: 23 (on 06.11.1997), 1♀ & numerous valves; St. no: 24 (on 28.10.1997), 1 valve; St. no: 26 (on 28.10.1997), 1 valve; St. no: 27 (on 28.10.1997), 1 valve; St. no: 28 (on 28.10.1997), 1 valve; St. no: 30 (on 28.10.1997), 1 valve.

Ilyocypris gibba is known from England (21), Europe, North Africa, North America (19), Iran (20), Aegean Sea (22), Israel (23) and Sudan (24). The previous records from Turkey are Kütahya, Balıkesir, Nevşehir, Lake Gavur-Adana, Ağrı (16), Lake Büyükçekmece (12), Lake Terkos (17) and Lake Sapanca (8).

Ilyocypris bradyi Sars, 1890

Material: St. no: 10 (on 24.7.1997), 1♀; St. no: 13 (on 26.10.1997), 1♀; St. no: 14 (on 28.10.1997), 1 valve; St. no: 24 (on 28.10.1997), 2♀; St. no: 27 (on 28.10.1997), 1♀; St. no: 28 (on 28.10.1997), 1♀; St. no: 30 (on 28.10.1997), 1 valve.

The species is known from Sweden, Great Britain, Germany, Switzerland, Hungary, Turkistan (25), Europe, North Africa, Middle Asia, North America (19) and Iran (2, 20). The previous records from Turkey are Lake Küçükçekmece (11,16), Lake Büyükçekmece (12), Lakes Sapanca and Iznik (8), Kabaklı Spring-Diyarbakır (10), Istanbul Bends (9), Bilecik, Balıkesir, Bergama, Amasya, Sivas, Antalya, Trabzon, Van, Kars, Nevşehir and Ankara (16).

Candona neglecta G. O. Sars, 1887

Material: St. no: 1 (on 21.7.1997), 1♀; St. no: 4 (on 21.7.1997), 1 valve; St. no: 5 (on 21.7.1997), 1 valve; St. no: 16 (on 27.10.1997), 1 valve; St. no: 17 (on 27.10.1997), 1 valve; St. no: 19 (on 03.11.1997), numerous valves; St. no: 20 (on 03.11.1997), numerous valves; St. no: 21 (on 06.11.1997), numerous valves; St. no: 22 (on 06.11.1997), numerous valves; St. no: 27 (on 28.10.1997), 1 valve; St. no: 29 (on 28.10.1997), 3♂ and 10♀; St. no: 30 (on 28.10.1997), 2♀.

Candona neglecta is known from Europe, Middle Asia, North Africa (19), Germany (26), Italy, Algeria (25) and Iran (2). The previous records from Turkey are Lakes Sapanca and Iznik (8), Kabaklı Spring-Diyarbakır (10), Lake Terkos (17), Bergama, Bilecik, Lake Birgi-Izmir, Lake Eftali-Bolu, Zonguldak, Lake Karamık-Afyon, Lake Gavur-Adana, Izmir, Rize and Trabzon (16).

Physocypria kraepelini G. W. Müller, 1903

Material: St. no: 18 (on 27.10.1997), 10; St. no: 28 (on 28.10.1997), 1♂ and 4♀.

It is known from Yugoslavia (27), Germany (28, 29), Luxembourg (30) and France (31). The previous records from Turkey are Lake Manyas-Balıkesir, Kırköz Reservoir-Antalya, Marmaris Canal Water, Tahta Köprü Reservoir-Inegöl, Lake Eftali-Bolu, Lake Sökülü Devrek-Zonguldak, Sakarya River Spring Çifteler-Eskişehir (16), Lake Terkos (17) and Lake Büyükçekmece (12).

Eucypris inflata (Sars, 1903)

Material: St. no: 2 (on 21.7.1997), 1♀; St. no: 25 (on 28.10.1997), 2♀; St. no: 28 (on 28.10.1997), 5♀; St. no: 7 (on 23.7.1997), 2♀.

Eucypris inflata is known from Western Siberia and Middle Asia (18) and Iran (20). The previous records from Turkey are Mersin, Bergama, Kayseri (16) and Lake Terkos (17).

Prionocypris zenkeri (Chyzer-That, 1858)

Material: St. no: 2 (on 21.7.1997), 1♀; St. no: 4 (on 21.7.1997), 1 valve; St. no: 5 (on 21.7.1997), 1 valve; St. no: 6 (on 23.7.1997), 1 valve; St. no: 9 (on 24.7.1997), 2♀; St. no: 10 (on 24.7.1997), 1 valve; St. no: 11 (on 24.7.1997), 3♀; St. no: 16 (on 27.10.1997), 1 valve; St. no: 18 (on 27.10.1997), 1 valve; St. no: 22 (on 06.11.1997), 1 valve; St. no: 26 (on 28.10.1997), 7♀; St. no: 28 (on 28.10.1997), 1 valve; St. no: 29 (on 28.10.1997), 1 valve; St. no: 30 (on 28.10.1997), 1♀.

It is known from North and Middle Europe (26), England, France, Switzerland, Hungary, Yugoslavia (19), Germany (28) and France (31,32). The previous records from Turkey are Lake Büyükçekmece (12), Lake Iznik (8), Kabaklı Spring-Diyarbakır (10), Afyon, Eskişehir, Eğirdir-Isparta, Lake Eftali-Bolu, Eskişehir and Tokat (16).

Cyprinotus inaequalis Bronstein, 1928

Material: St. no: 1 (on 20.7.1997), 1♀; St. no: 2 (on 21.7.1997), 3♀; St. no: 7 (on 23.7.1997), 1♀; St. no: 11

(on 24.7.1997), 4♀; St. no: 24 (on 28.10.1997), 4♀; St. no: 26 (on 28.10.1997), 4♀.

Cyprinotus inaequalis is known from North Caucasus (18), England, Holland, Romania, Bulgaria (33), Iran and Pakistan (2). The previous records from Turkey are Lake Sapanca (8), Kütahya, Eskişehir, Bilecik, Bursa, Aydın, Antalya, Bolu, Zonguldak, Bergama, Balıkesir, Antakya, Çankırı, Amasya, Malatya, Sivas, Kayseri, Nevşehir and Denizli (16).

Psychrodromus olivaceus (Brady & Normann, 1889)

Material: St. no: 13 (on 26.10.1997), 1♀.

This species is known from Europe (18,26), Caucasus (18) and Wales (21). The previous records from Turkey are Lakes Sapanca and Iznik (8), Lake Küçükçekmece (11), Bergama, Izmir, Bursa, Kütahya, Lake Küçükçekmece-İstanbul, Malatya and Afyon (16).

Cypridopsis vidua (Müller, 1776)

Material: St. no: 1 (on 20.7.1997), 9♀; St. no: 2 (on 21.7.1997), numerous ♀; St. no: 3 (on 21.7.1997), 7♀; St. no: 6 (on 23.7.1997), 3♀; St. no: 7 (on 23.7.1997), 3♀; St. no: 8 (on 24.7.1997), 13♀; St. no: 9 (on 24.7.1997), 1♀; St. no: 11 (on 24.7.1997), 12♀; St. no: 12 (on 26.10.1997), 2♀; St. no: 15 (on 27.10.1997), 1♀; St. no: 25 (on 28.10.1997), 1♀.

It is known from North and Middle Europe, North and South America, the Azores (26), North and East Asia (19), Russia, Caucasus, Siberia and North America (18). The previous records from Turkey are Lake Büyükçekmece (12), Lakes Sapanca and Iznik (8), Kabaklı Spring-Diyarbakır (10), Istanbul Bends (9), Lake Terkos (17), Van, Erzurum, Çanakkale, Bolu, Zonguldak, Balıkesir, Rize and Trabzon (16).

Plesiocypridopsis newtoni (Brady & Robertson, 1870)

Material: St. no: 1 (on 20.7.1997), 16♀; St. no: 2 (on 21.7.1997), 3♀; St. no: 3 (on 21.7.1997), 17♀; St. no: 4 (on 21.7.1997), 17♀; St. no: 6 (on 23.7.1997), numerous ♀; St. no: 7 (on 23.7.1997), 1♀; St. no: 8 (on 24.7.1997), 10♀; St. no: 9 (on 24.7.1997), 1 valve; St. no: 11 (on 24.7.1997), 1♀; St. no: 12 (on 26.10.1997), 3♀; St. no: 13 (on 26.10.1997), 1 valve; St. no: 14 (on 27.10.1997), 4♀; St. no: 18 (on 27.10.1997), 1 valve.

Plesiocypridopsis newtoni is known from Iran (2). The previous records from Turkey are Lake Terkos (17), Lake Birgi-Izmir, Balıkesir and Bergama (16).

Potamocypris variegata (Brady & Norman, 1889)

Material: St. no: 13 (on 26.10.1997), 3♀; St. no: 25 (on 28.10.1997), 5♀; St. no: 28 (on 28.10.1997), 2♀.

This species is known from Wales (21), Russia and North Europe (18), Germany (28), Luxembourg (32,34) and France (31). The previous records from Turkey are Lake Büyükçekmece (12).

Discussion and Conclusion

The inland lake in Middle Miocene-Pliocene Anatolia has led Asian originated ostracod species to spread towards Western Anatolia, thus explaining the record of *E. inflata* from the west.

The rivers Gediz and Menderes have acted as a bridge in the transportation of the European elements, while the rivers Yeşilirmak and Kızılırmak have functioned in the transportation of the elements of Sarmatik Inland Sea. The Anatolian Diagonal formed towards the end of Pliocene period, causing the inland lake to become two separate lakes, which were entirely isolated from each other. This geological formation reveals the existence of the European originated species, recorded only from the western part of Anatolia (35).

According to Demirsoy (35), Eastern and Western Anatolia acquired distinct diversity of fauna after the formation of the Anatolia Diagonal. The results of this study related to the ostracod (Crustacea) fauna of Lake Eğirdir reveal the presence of the following 12 species in the lake in question: *Darwinula stevensoni*, *Ilyocypris gibba*, *Ilyocypris bradyi*, *Candona neglecta*, *Physocypris kraepelini*, *Eucypris inflata*, *Prionocypris zenkeri*, *Cyprinotus inaequalis*, *Physchrodromus olivaceus*, *Cypridopsis vidua*, *Plesiocypridopsis newtoni* and *Potamocypris variegata*.

All of the species (except *P. newtoni* and *P. variegata*) were found in their known distribution areas, in concordance with the current literature.

Two species belonging to the genus *Ilyocypris*, *I. gibba* and *I. bradyi*, were reported in studies by Gülen (3-6) and Altınsoğlu (7,8). This result shows that these species have a wide distribution in Anatolia.

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C. neglecta is known to have a distribution in Europe, Middle Asia and North Africa. Hence, it is not surprising that Anatolia is included in its distribution area.

P. kraepelini, of which the general distribution area is limited to Europe, was recorded only from Thrace and Western Anatolia in Turkey (16). The fact that, before the formation of the Sea and Straits of Marmara, the streams used to flow to the large inland lake, passing through Thrace, may have resulted in the presence of this species in Western Anatolia as well as in Lake Eğirdir.

Bisexual populations of *P. zenkeri*, which is of European origin, were reported from Lake Karamık-Afyon (16), Lake Iznik (8) and Kabaklı Spring-Diyarbakır (10). In Lake Eğirdir, only a parthenogenetic population of *Prionocypris* was encountered.

The general distribution area of *Plesiocypridopsis newtoni* is Europe, Middle Asia and Africa (19). All the populations reported from Izmir, Balıkesir, Bergama (16) and Lake Terkos (17) in Thrace are bisexual. The parthenogenetic populations of *P. newtoni* are known in Europe. Its parthenogenetic populations are reported from Anatolia for the first time in this study. The presence of it in Lake Eğirdir implies that its distribution area has expanded towards the South.

The general distribution area of *P. variegata* lies through Europe to Iran (19). The first record of *Potamocypris variegata* in Turkey was from Lake Büyükçekmece (12). Except this study, there are no studies reporting this species from Anatolia. Thus, it can be concluded that the known distribution area of *P. variegata* in Turkey has been expanded towards the southern parts of Turkey, as well.

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