

Malacostraca (Crustacea) Fauna of Yuvarlak Stream (Köyceğiz- Muğla)

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Abstract: This study aimed to contribute to the knowledge of Turkish Malacostraca fauna by determining the Malacostraca (Crustacea) fauna of Yuvarlak Stream. Monthly sampling was performed at 10 stations along the stream between May 2001 and April 2002.

Eleven taxa were determined; of these, 5 (*Gammarus balcanicus*, *Gammarus longipedis*, *Echinogammarus antalyae*, *Corophium orientale* and *Orchestia platensis*) belong to Amphipoda, 3 (*Palaemonetes antennarius*, *Atyaephyra desmarestii orientalis* and *Potamon potamios*) to Decapoda, 2 (*Lekanesphaera hookeri* and *Cyathura carinata*) to Isopoda and 1 (*Diamysis mesohalobia mesohalobia*) to Mysidacea.

Key Words: Malacostraca, Fauna, Yuvarlak Stream, Köyceğiz, Turkey

Yuvarlakçay (Köyceğiz- Muğla)'ın Malacostraca (Crustacea) Faunası

Özet: Bu çalışmada, Yuvarlakçay'ın Malacostraca (Crustacea) faunasının tespiti ve bu sayede Türkiye'nin Malacostraca faunası hakkındaki bilgilere katkıda bulunulması amaçlanmıştır; bu bakımdan, Mayıs 2001- Nisan 2002 tarihleri arasında, 10 istasyondan aylık örnekleme yapılmıştır.

Çalışma sonucunda, toplam 11 takson tespit edilmiş olup, bunlardan 5'i (*Gammarus balcanicus*, *Gammarus longipedis*, *Echinogammarus antalyae*, *Corophium orientale*, *Orchestia platensis*) Amphipoda, 3'ü (*Palaemonetes antennarius*, *Atyaephyra desmarestii orientalis*, *Potamon potamios*) Decapoda, 2'si (*Lekanesphaera hookeri*, *Cyathura carinata*) Isopoda ve 1'i (*Diamysis mesohalobia mesohalobia*) de Mysidacea'ye dahildir.

Anahtar Sözcükler: Malacostraca, Fauna, Yuvarlakçay, Köyceğiz, Türkiye

Introduction

The Malacostraca comprise about 28,000 species with a broad disparity in morphology, anatomy, embryology, behaviour and ecology (Richter and Scholtz, 2001). Its members, which are primarily marine but also occupy some freshwater, terrestrial and groundwater habitats, are extremely diverse.

In Turkey, freshwater Malacostracans have received much less attention from native scientists than other freshwater animals such as fish and some other invertebrates. Some species, which have economic value (e.g. *Astacus leptodactylus*), have been studied well while others have been almost untouched.

Although many foreign scientists have studied the taxonomy of freshwater Malacostraca species in Turkey

since the beginning of the 20th century (Vavra, 1905; Coifman, 1938 etc.), the first study by native scientists concerning the taxonomy of freshwater Malacostraca species was by Geldiay and Kocataş (1970), which concerned the *Astacus* populations of Turkish freshwaters. Seven years later, the same authors published a study on the freshwater crabs of Turkish freshwaters (Geldiay and Kocataş, 1977).

There are a few studies about the taxonomy of Malacostraca species of Yuvarlak Stream and its vicinity. The first one was reported by Kazancı et al. (1992) on the limnology of Lake Köyceğiz. In a part of this study, the benthic fauna of Lake Köyceğiz and surrounding freshwaters were reported and *Palaemonetes antennarius*, *Heterotanais guerneyi*, *Sphaeroma*

serratum, *Gammarus* sp. and *Echinogammarus* sp. were given as the Malacostraca fauna of the study area.

The second one, by Kazancı and Dügel (2000), was on the water quality of Yuvarlak Stream. In general, this study focused on the physico-chemical characteristics of the stream and determining the water quality by using some indices that consider the invertebrate fauna of the stream. In this respect, all the determined taxa were given at the generic level, namely *Palaemonetes* sp. and *Gammarus* sp.

Barlas et al. (2000) also investigated Yuvarlak Stream in terms of physico-chemical and biological aspects. Similar indices to those in Kazancı and Dügel (2000) were used to determine the water quality of the stream. Only *Gammarus* sp. and *Palaemonetes* sp. were given as members of the Malacostraca fauna of Yuvarlak Stream.

The latest study concerning the Malacostraca fauna of Yuvarlak Stream was by Özbek et al. (2003). In this study, the authors reported about the variability and ecology of *Echinogammarus antalyae*, which was recorded from Turkish freshwaters for the second time.

Materials and Methods

Malacostraca specimens were collected by 500 µ mesh hand-net and an Ekman Birge grab (at the last 2 stations) at 10 stations (Figure 1; Table 1) monthly between May 2001 and April 2002.

Collected specimens were fixed firstly in 4% formalin solution in the field and then preserved in 70% ethanol in the laboratory and deposited in the collection of Ege University Faculty of Fisheries.

Some of the papers used in the determination of sampled specimens are as follows: for Amphipods: Karaman (1971), and Karaman and Pinkster (1987); for Isopods: Lejuez (1966) and Kırkım (2000); for Decapods: Holthius (1961), Geldiay and Kocataş (1970, 1977), and Brandis et al. (2000); and for Mysids: Ariani and Wittmann (2000).

Results and Discussion

Eleven taxa were determined in this study (Figures 2 and 3). The taxonomical positions and distributions of the

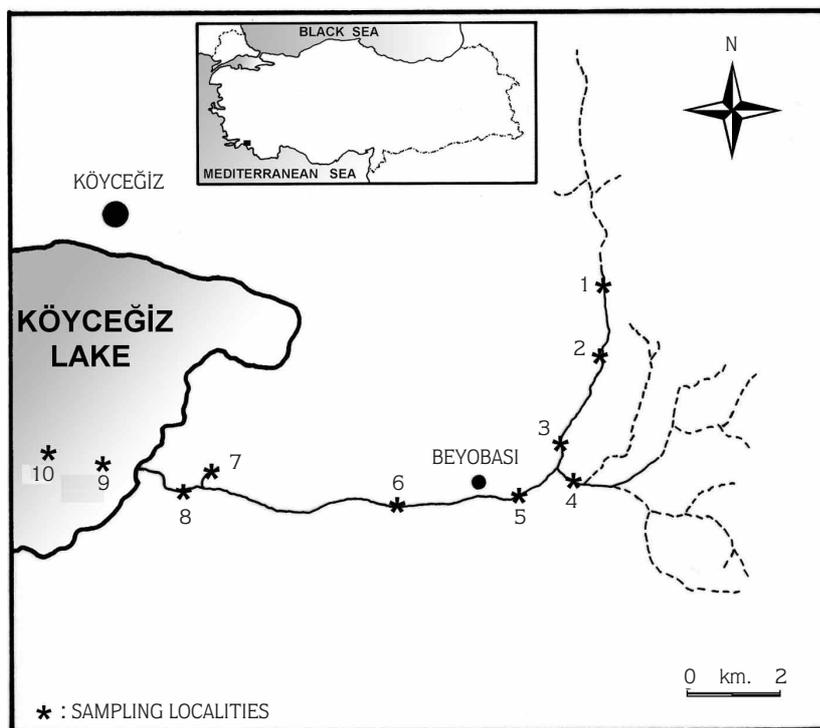


Fig. 1. Sampling stations.

Table 1. Sampling stations and their coordinates.

| Stat. No. | Locality | Coordinates |
|-----------|--|--------------------------------|
| 1 | Spring | 36° 56' 50" N 28° 48' 37" E |
| 2 | Before Trout farm | 36° 56' 19" N 28° 48' 37" E |
| 3 | After Trout farm | 36° 54' 48" N 28° 47' 53" E |
| 4 | Karaboğsak Stream | 36° 54' 39" N 28° 47' 47" E |
| 5 | Beyobası village | 36° 54' 21" N 28° 45' 30" E |
| 6 | Before Nasıf Dede Stream | 36° 54' 22" N 28° 43' 30" E |
| 7 | Nasıf Dede Stream | 36° 54' 34" N 28° 42' 18" E |
| 8 | After Nasıf Dede Stream + River Mouth | 36° 54' 39" N 28° 41' 31" E |
| 9 | Lake Köyceğiz + Beyond the River Mouth | 36° 54' 36" N 28° 41' 18" E |
| 10 | Lake Köyceğiz | 36° 54' 38" N 28° 41' 07" E |

determined taxa according to the stations are shown in Table 2. Between the fourth and sixth stations no Malacostraca specimens were found. Among all of the stations, the richest was the ninth one, which was just beyond the mouth of the stream (Table 2).

Gammarus balcanicus, a well known species from the springs and cool running waters, found in the first and second stations agreeable in terms of ecological characteristics. We encountered the species almost in all months during the study period, abundantly at the first 2 stations and rarely at the third (Table 2). Accompanying *G. balcanicus* was *Gammarus longipedis*, which is an endemic Amphipod species and reported from only a few localities in Anatolia so far (Karaman and Pinkster, 1987). The authors described *G. longipedis* as a cave species, but we found the specimens at the source of Yuvarlak Stream. In this respect, we thought that *G. longipedis* can live in aquifer and spring waters. An old record of this species indicates the distribution area as southern Anatolia (Karaman and Pinkster, 1987) and we expanded its original distribution area towards the west

in the present study. We thought both of the localities were connected to each other via groundwater systems through the Taurus Mountains region because of the karstic construction of this area.

The finding of *Echinogammarus antalyae* specimens in the seventh to tenth stations was interesting, because of its original distribution area given by Karaman (1971). This endemic species had been reported only 1 locality (Kırgöz, Antalya) in Anatolia and was recently reported from Yuvarlakçay for the second time (Özbek et al., 2003).

In both grab and hand net samplings, which were performed in the lake and at the shore, we found no *O. platensis* specimens. They were only collected from under aquatic plant masses, which were piled up by waves at the shore of the lake.

C. orientale was found only at the ninth and tenth stations, *L. hookeri* at seventh, ninth and tenth ones and *C. carinata* only at the ninth one (Table 2). All 3 species are distributed mainly in the sea, but also penetrate to brackish water systems such as Lake Köyceğiz.

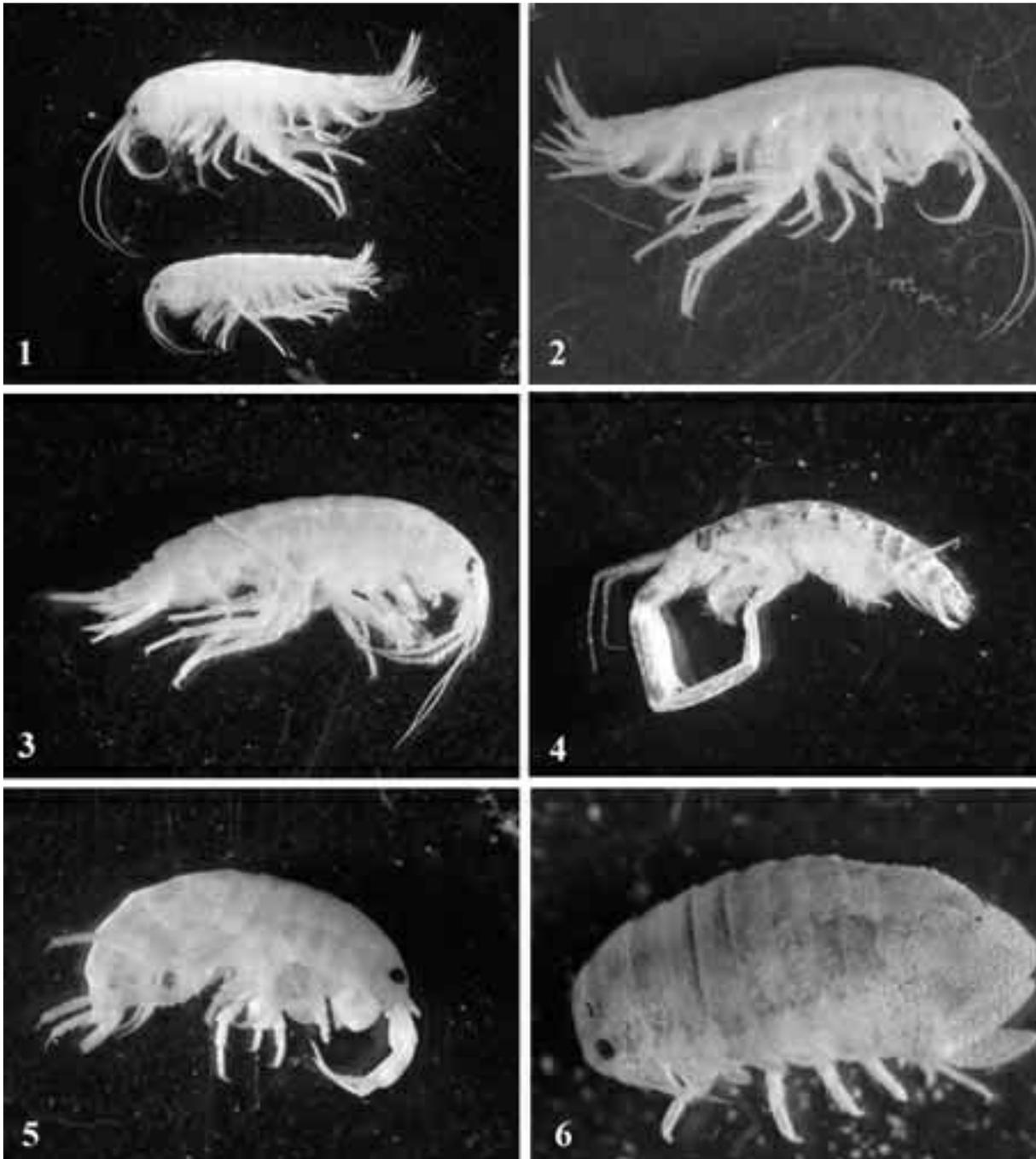


Figure 2. Pictures of determined taxa (1: *G. balcanicus*, 2: *G. longipedis*, 3: *E. antalyae*, 4: *C. orientale*, 5: *O. platensis*, 6: *L. hookeri*).

The palaemonid shrimp, *P. antennarius*, was found at the lower reaches and mouth of the stream. In particular, at the seventh station and at the mouth of the stream, where dense aquatic plants were observed, many specimens were sampled together with Atyiid shrimp and *E. antalyae* specimens.

Because of the narrow and slender rostrum, which has a tip curved upwards, and the shape of the endopod of the first male pleopod, we decided that the Atyiid specimens differ from the nominal subspecies and belong to *A. desmarestii orientalis*, as described by Holthius (1961).

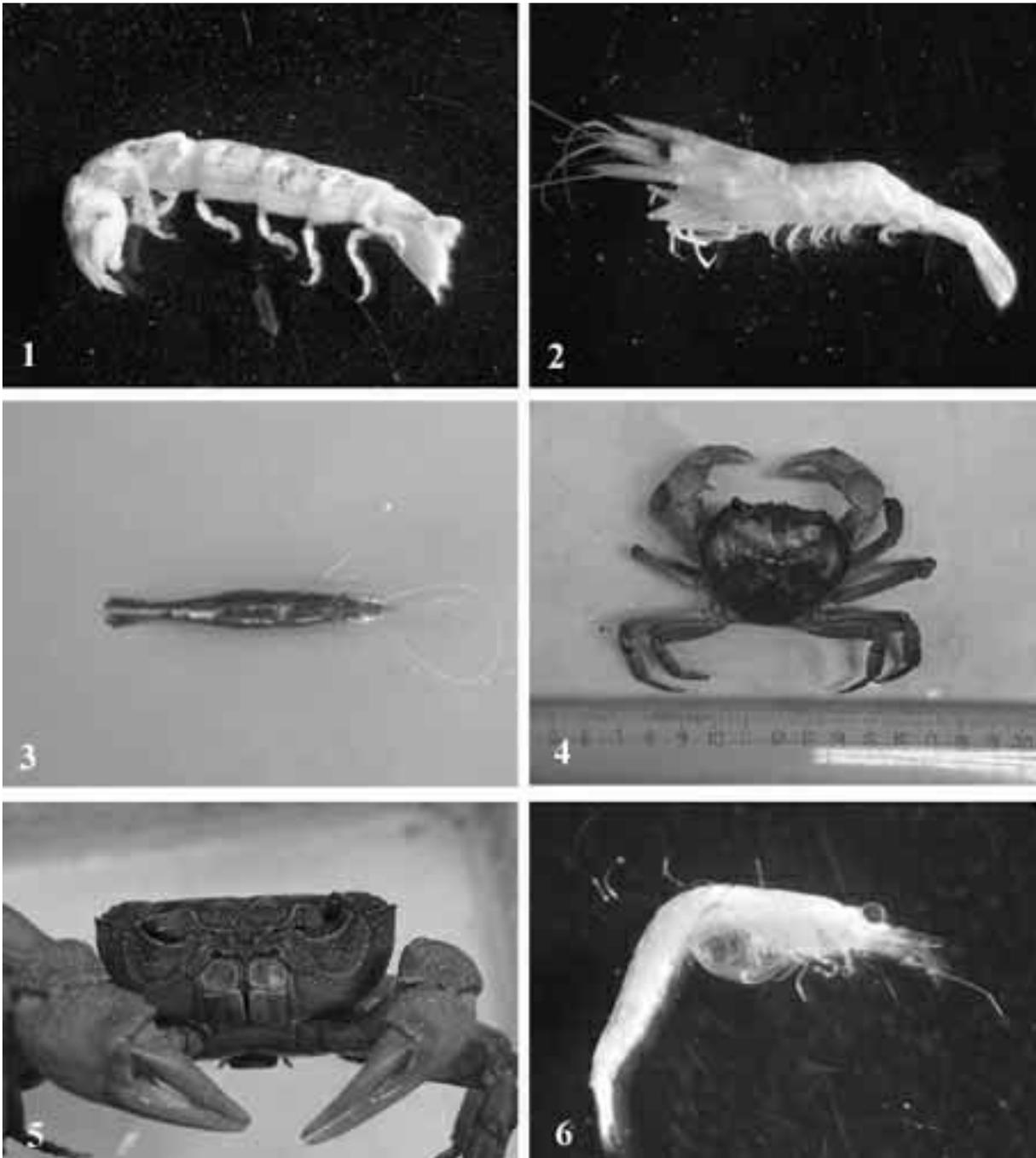


Figure 3. Pictures of determined taxa (1: *C. carinata*, 2: *P. antennarius*, 3: *A. desmarestii orientalis*, 4: *P. potamios*, 5: *P. potamios* (frontal view), 6: *D. mesohalobia mesohalobia*).

The only mature crab specimen, *P. potamios*, was a male and was sampled at the second station. In fact, we sampled many young crab specimens at the fourth and

seventh stations, but it is hard to determine the specific level from immature and female specimens. Therefore they were rejected.

Table 2. Distribution of the taxa according to the stations and value of sampled specimens (Δ: a few, ●: more, ■: many).

| TAXA | STATIONS | | | | | | | | | |
|--|----------|---|---|---|---|---|---|---|---|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| AMPHIPODA | | | | | | | | | | |
| <i>Gammarus balcanicus</i> , Schäferna 1922 | ■ | ■ | Δ | | | | | | | |
| <i>Gammarus longipedis</i> , G. Karaman & Pinkster 1987 | ● | | | | | | | | | |
| <i>Echinogammarus antalyae</i> , G. Karaman 1971 | | | | | | | ■ | ● | Δ | Δ |
| <i>Corophium orientale</i> , Schellenberg 1928 | | | | | | | | | ■ | ■ |
| <i>Orchestia platensis</i> , Krøyer 1845 | | | | | | | | ● | | |
| ISOPODA | | | | | | | | | | |
| <i>Lekanesphaera hookeri</i> , (Leach 1814) | | | | | | | Δ | | Δ | Δ |
| <i>Cyathura carinata</i> , (Krøyer 1847) | | | | | | | | | Δ | |
| DECAPODA | | | | | | | | | | |
| <i>Palaemonetes antennarius</i> , (H. Milne Edwards 1837) | | | | | | | ■ | ● | Δ | Δ |
| <i>Atyaepyra desmarestii orientalis</i> , Bouvier 1913 | | | | | | | | ● | | |
| <i>Potamon potamios</i> , (Olivier, 1804) | | | Δ | | | | | | | |
| MYSIDACEA | | | | | | | | | | |
| <i>Diamysis mesohalobia mesohalobia</i> , Ariani & Wittmann 2000 | | | | | | | | | Δ | |

During the field study, a few mysid specimens were sampled at the ninth station. The specimens numbered 6 in total; of these, 1 was an adult male and the others were females. Because of the insufficient number of male specimens, the authors decided to give them as *D. mesohalobia cf. mesohalobia*. Ariani and Wittmann (2000) identified the subspecies *D. mesohalobia mesohalobia* from a brackish habitat in NW Anatolia. To date, there has been no record concerning the distribution of this subspecies in Turkey. In this study, we expanded the distribution area of *D. mesohalobia mesohalobia* towards the south.

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Because it is in the Köyceğiz- Dalyan Protected Area, Yuvarlak Stream is of great importance and must be managed with a programme based on scientific thought. The authors think that this study can assist future protection activities.

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