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Chironomidae (Diptera) and Gammaridae (Amphipoda) Fauna in Dupnisa Cave (Sarpdere Village, Demirköy, Kırklareli)

Nurcan Özkan

Trakya University, Faculty of Education, Department of Science Teacher, Edirne, Turkey
E mail: nurcanozkan@hotmail.com

Özet: ***Dupnisa Mağarası'nın (Sarpdere Köyü, Demirköy, Kırklareli) Chironomidae (Diptera) ve Gammaridae (Amphipoda) Faunası.*** Dupnisa Mağarasına 20.08.2001 ve 06.07.2004 tarihlerinde 2 arazi çalışması gerçekleştirildi. 4 örnekleme lokalitesinden Chironomidae (Diptera) ve Gammaridae (Amphipoda) familyalarına ait örnekler toplandı. Daha sonra laboratuvarda mikroskop altında teşhisleri gerçekleştirildi. 1 nolu lokalitede Chironomidae familyasına ait larva bulunmadı. 2 nolu lokalitede *Paratrissocladius excerptus* (Walker, 1806); *Epoicocladius ephemerae* (Kieffer, 1924); *Polypedilum (Tripodura) scalaenum* (Schrank, 1803), 3 nolu lokalitede *Macropelopia nebulosa* (Meigen, 1804); *Telmatopelopia nemorum* Goetghebuer, 1921; *Paratrichocladius rufiventris* (Meigen, 1830); *Rheotanytarsus sp.; Micropsectra praecox* Wiedemann, 1918 ve 4 nolu lokalitede *Heleniella orniaticollis* Edwards, 1929; *Chaetocladius piger* Goetghebuer, 1913; *Psectrocladius barbimans* Edwards, 1929; *Polypedilum (Tripodura) scalaenum* (Schrank, 1803); *Micropsectra praecox* Wiedemann, 1918 türleri bulundu. Gammaridae familyasından ise 4 örnekleme lokalitesinin herbirinde yalnız *Gammarus arduus* G.S. Karaman, 1973 türü saptandı.

Anahtar Kelimeler: Dupnisa mağarası, Chironomidae, Gammaridae, Kırklareli, Trakya.

Abstract: Two different field surveys were carried out in Dupnisa cave on the twentieth of August, 2001 and on the sixth of July, 2004. Specimens from Chironomidae (Diptera) and Gammaridae (Amphipoda) families were sampled from four different localities. The samples were then brought to laboratory and their identifications were done with microscopy. While no larvae from Chironomidae was found in the first locality, those of *Paratrissocladius excerptus* (Walker, 1806); *Epoicocladius ephemerae* (Kieffer, 1924) and *Polypedilum (Tripodura) scalaenum* (Schrank, 1803) were found in the second of *Macropelopia nebulosa* (Meigen, 1804); *Telmatopelopia nemorum* Goetghebuer, 1921; *Paratrichocladius rufiventris* (Meigen, 1830); *Rheotanytarsus sp.* and *Micropsectra praecox* Wiedemann, 1918 in the third and of *Heleniella orniaticollis* Edwards, 1929; *Chaetocladius piger* Goetghebuer, 1913; *Psectrocladius barbimans* Edwards, 1929; *Polypedilum (Tripodura) scalaenum* (Schrank, 1803) and *Micropsectra praecox* Wiedemann, 1918 were found in the fourth locality. On the other hand, Gammaridae was found to be represented in each of four localities with a single species, *Gammarus arduus* G.S. Karaman, 1973.

Key Words: Dupnisa cave, Chironomidae , Gammaridae, Kirklareli, Thrace.

Introduction

Dupnisa Cave (41°50'29" N; 27°33'25" E), placed at 6 km to the south of Sarpdere and almost 50 km to the southeast of Kirklareli, is located at northwest hillside of Mahya Mountain (1031 m), the highest hill of the Istranca Mountains (Fig. 1). Dupnisa is the second biggest cave of Thrace in terms of length after Two Eye Cave in Catalca. It consists of two grounds and three caves. This formation is evaluated as ``System of Cave``. The main gallery in which a stream flows underground is called as Dupnisa and the others through the system are called as Dry and Girl Caves (Fig. 2) (Nazik et al. 1998).

Dupnisa Cave system's area has got some morphological illustrations from the late myosin, pliocene and kuvarterner rolief systems. Dupnisa cave, which consists of a single gallery of 1977 m in lengths, has almost a stable inside weather that is very cold and damp. The average temperature of the cave is 10-12°C and its absolute humidity is almost 95%. There is an underground stream inside the cave with a specific flow and there are ponds with their depths reaching sometimes to 2 m. in some places (Paksuz, 2004).

Figure 1. Map of Turkish Thrace. (■) denotes the geographical location of Dupnisa Cave System.

The studies regarding larval chironomid fauna in Turkey have been carried out by the following authors; Şahin (1984, 1987, 1991), Şahin et al. (1988), Kırgız (1988), Özkan (2006, 2006a, 2006b), Özkan and Elipek (2006, 2007), Polatdemir and Şahin (1997) and Taşdemir et al. (2007) and those regarding amphipod fauna have been carried out by Yeşilmen

(1993), Yeşilmen and Kırgız (1996), Kocataş et al. (2001), Sezgin et al. (2007), Özbek and Güloğlu (2005), Özbek and Ustaoğlu (1998, 2005), Özbek et al. (2007) and Özbek and Balık (2009).

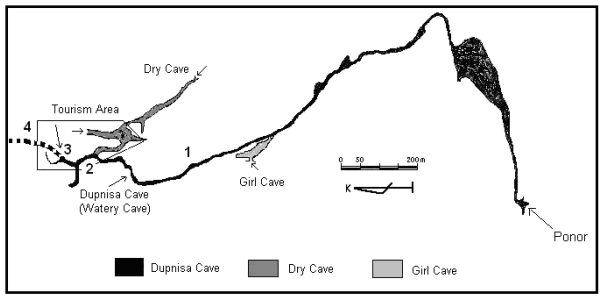

Figure 2. The spatial layout of Dupnisa Cave System and the sampled localities within; first locality (1) inside of the cave and 400 meters far from the cave entrance; second locality (2) inside of the cave and 40 meters far from the cave entrance; third locality (3) cave entrance; and forth locality (4) the stream 50 meters far from the cave exit.

Few studies have been performed inside caves in Turkey aiming to reveal of the faunal compositions of Arthropoda and Annelida living in these caves (Balık et al. 2002; Özbek and Güloğlu, 2005). The study of Özbek and Güloğlu (2005) in Peynirlikönü Cave in Anamur is a specific example with which the authors reported a blind type of *Gammarus ustaoglui* Özbek and Güloğlu, 2005, a species adapted itself inside the cave. The other study conducted so far in caves mostly belongs to vertebrates (Albayrak, 1993; Furman and Özgül, 2002, 2004; Paksuz, 2004; Paksuz et al. 2007).

In some previous studies, gammarids of Kirklareli city in the Thrace region was investigated by Yeşilmen (1993) and chironomids was investigated by Özkan (2003); and cave vertebrates (bats), were investigated by Paksuz et al. (2007). However, invertebrates living inside the cave and its surroundings weren't taken into consideration. For this reason this study was performed in Dupnisa Cave with the aim of making a contribution to the cave researches.

Material and Method

The samples were taken from four different localities in Dupnisa Cave on the twentieth of August, 2001 and on the sixth of July, 2004 (Fig. 2). The first locality is 400 m away from the entrance of the cave and has a water level of 80 cm, and its ground is covered with big stones. The second locality is 40 m away from the entrance of the cave and has a water level of 20-30 cm, and its ground is covered with sand. The entrance of the cave is the third locality consisting of a few pools filled with water having a height of 10 – 20 cm and sandy bottom. This locality is also represented with water flowing among the big rocks. The fourth locality, with a stream of water in 10 cm height and a bottom covered with sand, decayed leaves and a little amount of mud is 50 m away from the entrance of the cave.

The biological samples were collected with pliers from different fine sleeves by hand mud ladle. They were fixed in 70% alcohol. The samples were then brought to the laboratory, put in tubes and then in jars by giving each a protocol number. Body fragments of gammarid's were used for systematical diagnosis were dissected and investigated under the microscope. They were determined in glycerin. Chironomid's head and body were also separated under the microscope. Temporary preparations were done initially but they were then converted to permanent ones (Şahin, 1984). The studies carried out by Yeşilmen (1993) and Karaman and Pinkster (1977, 1977a) were used in identifications of Gammaridae and those of Özkan (2003) and Şahin (1984, 1991) in identifications of Chironomidae.

Results

The microscopic investigations of the collected materials showed that many specimens of Gammaridae were found in the first locality of Dupnisa Cave, but no other living specimens have been encountered. Many Gammaridae and Chironomidae few specimens were found in the second and a lot of Gammaridae and a few species of Chironomidae were found in the third localities. The number of Gammaridae and also the number of the species of Chironomidae in the fourth locality gradually increased with increasing distance between the cave and the stream gets (Table 1). The number of specimens and species of Chironomidae and Gammaridae determined at each locality inside Dupnisa Cave were given in Table 1.

The number and diversity of Chironomidae species were found abundant in the third and fourth localities, whereas the larvae of Chironomidae were not found anywhere in the first locality of the cave. The common species found in the second and fourth localities were *P. (Tripodura) scalaenum* (Schrank, 1803) and was *Micropsectra praecox* Wiedemann, 1918 in the third and fourth localities. The increase of species in number in the third and fourth localities can be related to the rough ground of the cave and to warm weather providing an environment optimum for living specimens. *P. (Tripodura) scalaenum* (Schrank, 1803) is the first and *M. praecox* Wiedemann, 1918 is the second abundant species found in the stream outside the cave. Two eye-stained gammarid specimens without any pigment structures were found under the binocular microscope. It is known that the species become blind through their adaptation periods to local environment of the cave they live in. This is thought to be whether it is an abnormal case for those of the specimens having eyes without any pigment or a normal case for specimens to adapt itself into the environment. Although this structural change seen as unpigmented eyes in some species with developed eyes can be considered as an abnormality, it can also be an adaptive trait evolved as an adaptation strategy in dim and mostly dark cave environment.

Table 1. The number of specimens and species of Chironomidae and Gammaridae fauna of the Dupnisa Cave.

First locality	N*
Subfamily: Gammaridae	
Genus:. *Gammarus* J.C. Fabricius, 1775	
Species: *Gammarus arduus* G.S. Karaman, 1973	200+
Second locality	
Subfamily: Gammaridae	
Genus:. *Gammarus* J.C. Fabricius, 1775	
Species: *Gammarus arduus* G.S. Karaman, 1973	200+
Subfamily: Chironominae Goetghebuer, 1928	
Tribus: Chironomini Edwards, 1928	
Genus: *Polypedilum* Kieffer, 1912	
Species: *Polypedilum (Tripodura) scalaenum* (Schrank, 1803)	1
Subfamily: Orthoclaiinae Edwards, 1939	
Genus: *Paratrissocladius* Zavrel, 1924	
Species: *Paratrissocladius excerptus* (Walker, 1856)	2
Genus: *Epoicocladius* Sulc & Zavrel, 1924	
Species: *Epoicocladius ephemerae* (Kieffer, 1924)	1
Third locality	
Subfamily: Gammaridae	
Genus:. *Gammarus* J.C. Fabricius, 1775	
Species: *Gammarus arduus* G.S. Karaman, 1973	200+
Subfamily: Tanypodinae Goetghebuer, 1927	
Genus: *Macropelopia* Thieneman, 1916	
Species: *Macropelopia nebulosa* (Meigen, 1804)	1
Genus: *Telmatopelopia* Fittkau, 1962	
Species: *Telmatopelopia nemorum* Goetghebuer, 1921	1
Subfamily: Orthocladiinae Edwards, 1939	
Genus: *Paratrichocladius* Santos Abreu, 1918	
Species: *Paratrichocladius rufiventris* (Meigen, 1830)	5
Subfamily: Chironominae Goetghebuer, 1928	
Tribus: Tanytarsini Edwards, 1929	
Genus: *Rheotanytarsus* Thienemann & Bause, 1913	
Species: *Rheotanytarsus sp*	2
Genus: *Micropsectra* Kieffer, 1908	
Species: *Micropsectra praecox* Wiedemann, 1918	3
Fourth locality	
Subfamily: Gammaridae	
Genus:. *Gammarus* J.C. Fabricius, 1775	
Species: *Gammarus arduus* G.S. Karaman, 1973	200+
Subfamily: Orthocladiinae Edwards, 1929	
Genus: *Heleniella* Gouin, 1943	
Species: *Heleniella orniaticollis* Edwards, 1929	9
Genus: *Chaetocladius* Kieffer, 1911	
Species: *Chaetocladius piger* Goetghebuer, 1913	1
Genus: *Psectrocladius* Kieffer, 1906	
Species: *Psectrocladius (Psectrocladius) barbimans* Edwards, 1929	1
Genus: *Polypedilum* Kieffer, 1912	
Species: *Polypedilum (Tripodura) scalaenum* (Schrank, 1803)	43
Genus: *Micropsectra* Kieffer, 1908	
Species: *Micropsectra praecox* Wiedemann, 1918	14

**N: The number of specimens*

Discussion

As a result of this present study, no species that adapted itself completely to cave life was found. This can be explained by the fact that the water coming to the cave directly from a stream water running above the ground, traveling inside the cave and leaving again reaching the ground level again might be a limiting factor preventing life inside the cave. The existence of a long stream inside the cave might lead one to think that organisms adapted themselves to cave life might be found.

Gammarus arduus G.S. Karaman, 1973 was found to the most abundant species distributed in studied localities Kirklareli where the altitudes are not much and water bodies run slowly and roughly (Yeşilmen, 1993). The abundance of *Gammarus arduus* in the localities of the research area corresponds to the studies carried out so far.

Our present results showed that the species found to constitute the aquatic fauna in and around Yelköprü Cave (Izmir-Dikili) (Balık et al. 2002) appeared to be different from the species found in our study. This species composition disagreement between these studies can be related to the warmer water conditions in the Yelköprü Cave.

In conclusion, this study aimed to contribute cave studies where new and endemic species are likely to be found. We believe that our results provide a basis for future studies with which more interesting results could be obtained.

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