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A STUDY ON THE DETERMINATION OF MACRO-ZOOBENTHIC GROUPS AT THE FAMILY LEVEL OF ÇATÖREN DAM (ESKİŞEHİR)

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Abstract

Benthic mud samples were taken with a hand scoop along the coastline surrounding Çatoren Dam. As a result of the examination of the mud samples, Annelida, Gammaridae, Ephemeroptera, Odonata, Chironomidae and Trichoptera samples were determined. Very few Gastropoda and Hydracarina specimens were found.

Keywords: Çatören Dam, Ephemeroptera, Chironomidae, Mollusca, Trichoptera

INTRODUCTION

Çatoren Dam is a dam built between 1983-1987 for irrigation purposes on Harami Stream in Eskişehir.

The body volume of the dam, which is a landfill type, is 499.000 m³, its height from the river bed is 45.00 m, the lake volume at normal water level is 47.00 hm³, and the lake area at normal water level is 4.04 km². The dam provides irrigation service to an area of 10,816 hectares.

Our country has a richness that cannot be underestimated in terms of biological diversity due to its location. However, people have been changing their environment in various aspects, especially in recent years, with superior technological developments. Environmental conditions, which are very valuable in terms of faunistic, floristic, ecological and economic aspects, are adversely affected by such initiatives. As a result of environmental pollution, many balances have been turned upside down, so much so that we are faced with the danger of losing many of them before we learn what kind of riches we have or have the opportunity to get to know them enough.

As it is known, wetlands; drought, biotic factors, precipitation, sea rise, erosion, typhoon and the like, natural causes, human interventions in agriculture, forestry, transportation and accumulation of solid wastes, as well as the extraction of oil, gas and other minerals and hydrological changes in dams and canals. (According to Anonymous, 1987, from Özkan et.al., 1996). As a matter of fact, the frequency of species with names in world invertebrate catalogs, caught in certain places and times, and never seen again is the best proof of this (Viets, 1956; 1987 according to Özkan et.al., 1996).

The number of invertebrate workers has increased significantly as a result of understanding the importance of many features developed by invertebrates on earth to adapt to various and different living conditions and their importance in terms of evolutionary biology.

MATERIALS and METHODS

Sampling was carried out in May 2018 in order to determine the macrozoobenthic invertebrates of Çatoren Dam. Sampling was done by scanning the entire coastline around the dam **Figure 1**.

The sludge samples obtained were sieved and taken into jars containing 4% formaldehyde. In the laboratory, these samples were transferred to jars containing 70% alcohol. Sludge samples were divided into general groups and transferred to small vials under Nikon brand microscope. The extracted specimens were divided into suprageneric groups and stored. Some samples were sorted at the subclass and some at the family level.

Fig. 1. Study area.

RESULT AND DISCUSSION

After the study, Annelida, Gammaridae, Ephemeroptera, Odonata, Chironomidae and Tricoptera specimens were identified. Very few Gastropoda and Hydracarina specimens were found. General information about the groups collected from the area is as follows. Although the highest number of individuals in the study area belonged to the Chironomidae family, the ranking was made according to the systematic order.

ŞUBE : MOLLUSCA

SINIF: GASTROPODA

Gastropods constitute the most crowded group in terms of number of species after Arthropods in the Mollusca phylum. They are found in all three of the marine, freshwater and terrestrial environments. The body regions characteristic of molluska appear most prominently in gastropods. They have a very well developed head. Head regions have tentacles and a pair of eyes. (Demirsoy 1998; Şahin, 2000).

In gastropoda shells, the place where the first fold is located is called the crest (apex), the opening where the last fold ends is called the shell mouth (aperture), and the edge of the shell mouth is called the lip (peristome). In siphon forms, the peristome extends as a groove and surrounds the siphon. In freshwater gastropods, most spiral shells are dextral, facing right. That is, the shell mouth is located on the right. Only in a few species the shell is left-sided, sinistral. All gastropods are bilaterally symmetrical in their juvenile stages. During their later development, bilateral symmetry is disrupted due to the uneven growth of both sides of the body. One side, usually the left side, grows larger; the other side grows little or nothing. Therefore, the internal organs make a 180-degree rotation. This rotation event is called “torsion” (Demirsoy, 1998; Şahin 2000).

ANNELIDA(= Ringworms)

SUBCLASS: OLIGOCHAETA (TERRESTRIAL worms and freshwater worms)

They are annular worms that are usually round in cross section. Their heads, which are not clearly separated from the body, are composed of a small prostomium and a metastomium, which is always hairless. There are no sensory organs and tentacles in the prostomium; It is shaped like a small lobe. The trunk region is made of homonomous segments. When there is a danger of drying, some of the coelomic fluid comes out of the coelom pores and ensures the wetness of the skin. Aquatic Oligochaeta do not have coelomic pores; only some have head pores similar to these on their heads. Their main food is grass, leaves, etc. such as rotten plant matter. Some also eat plant and animal residues mixed with the soil. Parasites are rare (Demirsoy, 1992).

In the circulatory system, the annular veins connecting the dorsal and abdominal veins are found only in the anterior segments, and 5-8 of them, which coincide with the sexual segments, are taut. The annular veins of the posterior segments are fragmented and become a skin-vessel network. The blood is colorless in some and yellow or red in others. Most oligochaeta are skin-breathing. Only a few genera have gills. Excretory organs are nephridia (Demirsoy, 1992).

There are tactile hairs and sense buds as sense organs. Only some of them have simple eyes. The skin of the Lumbricidae carries light sensitive non-pigmented sensory cells (light cells) (Demirsoy, 1992).

FAMİLYA: HYDRACARINA

It is estimated that there are approximately 10,000 water tick species worldwide. Most are parasitic in humans, crops and animals. Species with known exact life stages and developmental stages are very rare. Due to the importance of this subject, it is studied as a separate branch under the name of Acariology.

Usually their colors are various shades of brown, black, orange, green, red or a mixture of these colors. Some of the colors are formed by pigments deposited in the hypodermis. Since some of them are colorless and transparent, their internal organs can be seen from the outside (Demirsoy, 1982).

Water ticks look like tiny spiders. In these, the abdominal segmentation is lost and the abdomen is completely fused with the prosoma.

Another distinctive external feature is the genital area. A group of fused structures is located on the ventral midline or posterior to the epimer and sometimes at the end of the body. On both sides of the genital pore are two valves of unknown function, with several or more pits.

Two pairs of pigmented eyes are located symmetrically on the front of the body and are usually widely separated.

FAMİLYA:GAMMARIDAE (Amphipoda)

Gammarus species are animals in the order Amphipoda in the Malacostraca subclass of Crustacea. amphipoda; It comes from the Latin amphi: different and the Greek apous: foot.

The first and second antennae are well developed, but their exopodites have been lost. While the first antennae have a side flagella, the second antennae always have a flagellum and are longer than the first in most amphibians. The mandibles consist of a chewing plate with a sharp toothed edge and a palp, which is usually three-part. The first maxilla also has a two-part short palp. The second maxilla consists of two endites sitting on a common base.

The first thoracic member has developed into the maxilla and their coxae are fused together. Since the coxae of other thoracic members are flattened into long plaques, the side-printed impression of the animal has an even more active appearance. The second and third thoracic members have turned into grasping and catching members, and these members are also called "Gnathopods". The last three pairs of thoracic segment members are directed posteriorly (Demirsoy, 1982).

Abdominal extremities are also divided into two groups in terms of their shape and functions. In the three pairs of pleopods in the first group, the inner and outer arms are very fragmented. The three posterior pairs (uropods) are in the form of an upright stalk, and their arms are only one or two parts. The telson either remains simple or is partially or completely bisected by a slit passing through its middle.

ORDO: EPHEMEROPTERA

Although Ephemeroptera adults have similar structures, nymphs show various variations due to adaptations to different environments. Their size generally ranges from 4 mm (Caenidae) to 40 mm (Polymitarcyidae), excluding cerci. Depending on the species and environmental conditions, yellow, white, brown, black etc. they show coloration in different tones. Especially in mature nymphs, elongation in body length and wing outlines, and darkening of body color and hairs are observed.

Ephemeroptera species spend about 99% of their lives as nymphs in aquatic environments. They complete their next life as subimago and adults. In adults, the body is long, cylindrical or flattened. The head is quite small. Antennae are very short.

Although most of the species are herbivores, some species feed on detritus or as carnivores. Their most important food is Diatomaceous algae.

Since Ephemeroptera nymphs constitute an important link of the food chain in waters, species diversity and abundance give accurate results in determining the biological productivity of waters.

ORDO : ODONATA

The fact that they can mate and even lay eggs while flying has made them the best adapted animal group of all animals to live in the air. Thinned and elongated abdomens to enable them to fly without flipping in the air allow these amphibian-dwelling animals to be easily distinguished from other insect orders (Demirsoy, 1992).

The head is always the widest part of the body. It is connected to the proportionally small first thorax segment by a very thin neck; so that the head can be easily turned in all directions. The second and third thoracic segments fuse to form a strong part that acts as a support for the muscles. The last thoracic segment narrows in a short distance and connects to the elongated abdomen. The head is characterized by well-developed eyes in terms of its structural and visual functions. The compound eyes with unequal wings (Anisoptera) are developed to cover most of the head, and even to protrude over the back of the head. The compound eyes of those with equal wings (Zygoptera), which are almost hemispherical, are located separately from each other at both ends of the transversely enlarged head. Vision plays an important role in their lives. In Anisoptera, the ommatidia in the upper half of the eyes are always larger and colored differently than the lower half. They have three point-eyes (ossels) on their foreheads. These are only useful for seeing at a short distance, perceiving the change in light intensity and determining the direction of the falling light; they also play an important role in the emergence of the behavior patterns affected by the light. Antennae are of lesser importance as olfactory and tasting organs. There is no hearing organ; they do not react to sound waves (Demirsoy, 1992).

They eat their prey by tearing it apart. The name Odonata was given because of the toothed mandibles. The middle lobe of the lower lip acts as a kind of mat or tray while the food is

being broken down during food intake (Demirsoy, 1992). It is studied under 2 sub-orders;

1.SUB ORDO : ZYGOPTERA

2.SUB ORDO : ANISOPTERA

FAMİLYA: CHIRONOMIDAE

Chirinomidae; It forms the family belonging to the order Diptera from the Insecta class. Chirinomidae show a very wide distribution all over the world. In all waters with continuous larvae, especially at the bottom of the water, 10 cm from the bottom surface. It is abundant in depth and among aquatic plants, and less in other parts of the water. Most are free-living. Some of them are; They remain in special sheaths made of stones, plant parts and mud until the last larval stage.

The bottom animals take the most important place in the inland waters fauna. Among the bottom animals, Chironomidae (Diptera) larvae, which are found in almost every water body, take the first place. Since all Chironomidae spend the winter months in the larval stage, they are abundant in all seasons. Therefore, they are indispensable food animals for fish. Numerous studies have shown that they are consumed with pleasure by fish, contain high levels of important nutrients, especially protein, and are digested quickly and easily by fish. In the waters they are in, the oxygen transmission into the base material, especially mud, affects the aerobic respiration and consequently the mineralization positively. This increases the efficiency of water and ensures the continuity of aquatic life. (Sahin, 1984)

Chironomidae adults lay their eggs in a gelatinous clump. The gelatinous mass protects the eggs from various influences. Within 5-6 days, the spirally curled larvae leave the gelatinous mass. Although their lifestyles are different, their body structures are similar. They have 1-3 pairs of eyes, a pair of antennae, and well-developed mouthparts on their prominent heads. The first thoracic segment has a pair of blunt legs. The last body segment has a pair of thrusters. Other segments are round and unsegmented. They adapt to extreme environmental conditions with houses and galleries.

There are no active swimming larvae. They are found in very fast flowing (3 m/sec) waters, most of them in stagnant or very slow flowing waters, as well as the species that can be found. Some weave nets to escape the influence of water.

ORDO: TRICHOPTERA

Unlike most butterflies, whose wings are often equipped with dense hairs, unlike butterflies, their mouthparts are completely atrophied and their genitals have a completely different structure. They are the closest relatives to butterflies (Demirsoy, 1992).

They have body-length antennae. The compound eyes are quite large. Spot eyes are either absent or there are three. The downwardly directed mouthparts are mainly of the chewing type; however, it is largely vestigial, except for the well-developed tentacles. At rest, the wings are often roofed, rarely flattened on the abdomen; has a leathery structure; they carry more or less hair; sometimes they carry on stamps; but the structure of these scales is different from that of butterflies. During flight, both pairs of wings form a functional unity with the interlocking systems in different structures on the front and rear wing bases. In the young adult stages, they still carry the tracheal gills as a residue on the sides of their abdomen. The genitalia of the female is on the ventral side of the 9th and 10th segments. There is no true ovipositor. Most females carry a pair of cerci on the posterior margin of the 10th segment (Demirsoy, 1992).

There are two species that give offspring a year, in spring and autumn. The species that are active during the day are few; usually after sunset, their activity increases, they come to the light and hide in bushes, holes and crevices during the day. The majority are found in large numbers. Adults live in the wild for a few days to a few months. During this period, the plant sap and secretions also absorb nectar (Demirsoy, 1992).

Although no males have been found in some species, that is, parthenogenetic reproduction is accepted, as a rule, egg laying occurs after fertilization. Sperm are transported by spermatophore. Under natural conditions, eggs are laid in species-specific pellets. Few species spend unsuitable seasons as eggs. Some Anabolia species spend the winter as eggs under stones. Other species live mostly as larva and sometimes as pup (Demirsoy, 1992).

Trichopters have complete metamorphosis. All of the larvae have larval eyes (stemmata) consisting of 6 point eyes. As a rule, well-developed legs always have one segment of the foot (tarsus), a single nail that differs in size according to its function. Larvae often have tracheal gills in the form of filaments or tassels on their abdomen. Domestic animals living in calm and warm waters, large; on the other hand, the larvae living in cold and fast-flowing waters have only very poorly developed tracheal gills. Intestinal gills emerging from the anus also help respiration (Demirsoy, 1992).

CONCLUSION

It is known that Chironomidae and Oligochaeta members are the most common invertebrate groups that can be found at the bottom of any stream (Chekanovskaya, O. V., Hynes, H. B. N., 1970; Macan, 1980). However, it is known that some Chironomidae species are predators of Oligochaeta species (Miall, L. C., 1985; Loden, 1974).

Ephemeroptera, Tricoptera and Gamaridae specimens were only detected at the dam entrance at the point where the stream meets the dam. As it is known, Ephemeroptera and Tricoptera species are used as indicator organisms in the determination of water pollution. This reason could not be determined on the shores of the dam where the water is more polluted and the oxygen level is low. However, since the tolerance ranges of Chironomidae species are wide, they were found in every sample taken.

The fact that the study area is a lake that was created later and the fish fry and eggs thrown into the dam lake in order to support fisheries, undoubtedly affect the bottom invertebrates negatively. Therefore, species diversity is also affected. However, with the improvement to be made, naturally occurring invertebrate groups can be protected and the income level of the villagers who live by hunting can be increased.

In this study, it was aimed to determine the benthic macroinvertebrates of the Çatoren dam. We think that our findings will shed light on more comprehensive studies to be conducted in the future.

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