Scientific Papers. Series D. Animal Science. Vol. LXI, Number 2, 2018
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

FRESHWATER MOLLUSCA FAUNA OF AKYAKA KADINAZMAGI STREAM (GOKOVA - MUGLA)

Hüseyin SASI

Mugla Sitki Kocman University, Fisheries Faculty, Department of Marine - Freshwater Sciences and Tecnology, 48100, Mugla, Turkey

Corresponding author email: hsasi@mu.edu.tr

Abstract

In order to determine the Mollusca fauna of species in Akyaka Azmak Stream, seasonal samplings were made from 2 stations between September 2008–May, 2009. After collecting benthic materials by using a hand-net with 500 µm mesh size and Ekman grab, after sifted, they fixed in 4% formalin solution. As a result of study, totally 10 taxa were determined; all of them belong to Gastropoda as Galba truncatula, Theodoxus anatolicus, Theodoxus fluviatilis, Theodoxus heldreichi, Gyraulus albus, Potamopyrgus antipodarum, Bithynia tentaculata, Bythinella byzanthina, Valvata cristata and Pseudamnicola roddail. The genera of Thedoxus is important for water quality. In the study, they are found very richness at the first station. Also, it has determined some physico-chemical parameter and discussed.

Key words*: Akyaka Stream, Bentic, Freshwater, Mollusca, Mugla.*

INTRODUCTION

Mollusks include large and most intelligent examples of invertebrates and they have occurred entry into nearly every aquatic habitat. Mollusca are probably the most recognizable invertebrate organisms for scientist.

Also their obvious importance in human history, mollusks have played more important role in metazoan evolution and have become one of the most successful animal groups in the earth (Smith, 2001).

Anatolia, with a highly variable relief and a diversified climate and vegetation, can support a similarly rich and diversified fauna of terrestrial and aquatic gastropods. Gastropoda and Bivalvia are common group of macro-benthic. Molluscs have shown to react to environmental changes (Armitage et. al., 1983; Rosenberg and Resh, 1993; Yilmaz, 1992; Smith, 2001; Yildirim et al., 2006).

This reason is important for studies of the relationship between organism and environment. These invertebrates also have economic uses, which some molluscs are used as feed for cattle. Also, Molluscs are well to the understanding of geologic historical developments (Bilgin, 1980; Oktener, 2004). In this group freshwater snails can be intermediate host to some trematoda, also they begin important for human health and economy (Zhadin, 1952).

The classis of Gastropoda is richness and biological as the widest groups with around 40.000 species. Generally, freshwater molluscs (Gastropoda and Bivalvia) were commonly determined from West Anatolia Region to South and East Anatolia Region (Balik et. al., 1994, 2002, 2003a, 2003b; Ustaoglu et. al, 2000; Bilgin 1967, 1973). The investigations freshwater molluscs concerned with in the Blach Sea are quite less (Oktener, 2004).

Akyaka Stream is located Southwestern part of Turkey, in West Mediterranean Basin (Figure 1).

Figure 1. Akyaka Stream and stations (Gokova)

Gokova Area includes Akyaka Azmak Stream is very important wetland area, which is

protected area with PEA (Private Environment Area) by the Ministry of Environment and Forestry. Akyaka is touristic city and near the stream has many restaurants.
There are many threats which are pollution such as tourism activities.
Akyaka Stream is connected in the sea approximately with 5 km canal, which it has a small boat trip for natural aquarium.
This study was carried out to determine mollusca fauna Akyaka Azmak Stream (Gokova, Mugla).

MATERIALS AND METHODS

The materials were taken from littoral zones. The mud (II. station) on these materials was cleaned off on varied mesh sieve with water.
Some species were taken out of aquatic plants. These molluscs found were preserved in 4% formalin or in 70% ethyl-alcohol stored in glass vials with plastic caps.
The data to relate their biotopes were recorded on these glass vials and the molluscs cards. For identification, the most important diagnostic characters of the molluscs as general appearance, apex, apertur, helozon were examined.
All collected samples were examined with a Stereo-microscope, then some photographs were taken and their species were determined. During identification we were used various keys (Zhadin, 1952; Bilgin, 1973, 1980; Schütt, 1991; Yildirim, 1999; Smith, 2001; Yazar and Yildirim, 2005).
In order to determine the Mollusc fauna of species in Akyaka Kadinazmagi Stream (Gokova), seasonal samplings were taken from 2 stations between September 2008 and May 2009.
Sampling was carried out with standard techniques montly (Zhadin, 1952).
After collecting bentics materials by using a hand-net with 500 µm mesh size scoops, sieves, pliers and Ekman grab, were preserved.

RESULTS AND DISCUSSIONS

In this study molluscs, which were collected from Akyaka Stream in Gokova area, have been examined. As a result of this study, 10 species belonging to Gastropoda were determined.
The finding gastropods follow as:
Phylum: Mollusca
Classis: Gastropoda
Subclassis: Pulmonata
Ordo: Basommatophora
Familia: Lymnaeidae
- *Galba truncatula* (Müller, 1774)

Subclassis: Prosobranchia
Ordo: Archeogastropoda (=Diatocardia)
Familia: Neritidae
- *Theodoxus anatolicus* (Récluz, 1844)
- *Theodoxus fluviatilis* (Linnaeus, 1758)
- *Theodoxus heldreichi* (Mertens, 1879)

Ordo: Mesogastropoda (=Monotocardia)
Familia: Planorbidae
- *Gyraulus albus* (Müller, 1774)

Familia: Hydrobiidae
- *Potamopyrgus antipodarum* (Gray, 1843)
- *Bithynia tentaculata* (Linnaeus, 1758)
- *Bythinella byzanthina* (Küsler, 1852)
- *Pseudamnicola roddail* (Paulicci, 1878)

Familia: Valvatidae
- *Valvata cristata* (Müller, 1774)

The species of *Galba truncatula Theodoxus anatolicus*, *Theodoxus fluviatilis*, *Theodoxus heldreichi,Gyraulus albus*, *Potamopyrgus antipodarum, Bithynia tentaculata, Bythinella byzanthina, Valvata cristata*and *Pseudamnicola roddail* are recorded from new area in Akyaka Azmak Stream.

Table 1. Frequency of Mollusca species in Akyaka Stream

Mollusca	I. Station	II. Station
Galba truncatula	++	+++
Valvata cristata	++	+
Gyraulus albus	+++	-
Pseudamnicola roddail	++	-
Potamopyrgus antipodarum	+++	+ +
Bithynia tentaculata	++	+
Bythinella byzanthina	+++	+ +
Theodoxus anatolicus	+++	+
Theodoxus fluviatilis	+ ++	-
Theodoxus heldreichi	+ +	+

***(+++)** Affluent; **(++)** Richness; **(+)** Rarely; **(-)** None

Theodoxus anatolicus, Theodoxus fluviatilis, Gyraulus albus, Bythinella byzanthina and *Potamopyrgus antipodarum* are dominant species in I station (Table 2).

Table 2. The Mean of Some Pyhsico-Chemical Parameters of Akyaka Stream (September, December, 2008 and April, 2009)

Parameter	I. St	II. St
Temperature (^oC)	15.20	15.80
pH	7.32	7.15
DO (mg/l)	7.40	6.50
Saturation (%)	67	62
Conductivity (µS)	4646	5680
Salinity (‰)	2,31	2,32
$(CO_3)^{=}$	13.20	12.60
$HCO3^-$ (mg/l)	286.70	274.50

All the species our finding of Gastropoda have commonly determined Aegean and Mediterranean areas, except for *Pseudamnicola roddail*, which species the first time reported for this study.

Among these species, *Theodoxus anatolicus, Theodoxus fluviatilis* and *Theodoxus heldreichi* are bio-indicator species and important ecological. *Thedoxus* species have lived affluently in clean area. *Galba truncatula* is the richness on the mudy bottom in littoral zone, and we found dominant species at station II. *Gyralus albus*, *Pseudamnicola roddail* and *Theodoxus fluviatilis* is found only in station I. The others studies in Mediterrenean and Aegean Region have shown to the distribution and richness of our finding species which determined in Akyak Stream (Gokova). The stations with the highest species numbers were the 1st.

Defined by several researchers in Turkey, there are 11 species of the genus Theodoxus (Bilgin, 1967; Geldiay and Bilgin, 1969; Bilgin, 1980; Schutt and Sesen, 1993).

Gokova Region has a warm climate. Seasonably variations (September, December and April) of the some physico-chemical parameters are presented in Table 2. In Akyaka Azmak Stream, the water temperatures averaged 15.20 and 15.80 ^oC in the I. and II. station respectively. The mean dissolved oxygen levels were 7.4-6.5 mg/l and the average pH levels were 7.32-7.15.

Most of the systematic studies carried out so far in our country are typological studies. In studies based on populations, there is some statistical analysis of some features (Yildirim et. al., 2006; Sereflisan et al., 2009).

CONCLUSIONS

Gokova Area includes Akyaka Azmak Stream is very important wetland and unique area, which is protected area with PEA statue. The conservation of native species and biodiversity of the region is important for the ecosystem. This important and sensitive area protection status must be maintained and monitoring studies should be carried out. It is necessary that precautions should be taken against intensive tourism pressure.

REFERENCES

Armitage P.D., Moss D., Wright J., Furse M.T., 1983. The performance of a new biological water quality score system based on macroinvertebrates over a wide range of unpolluted running water sites.Water Research, 17(3), 333-47.

Balik S., Ustaoglu M.R., Ozbek M., 1994. Mollusca fauna of tahtalı dam lake locality (Gümüldür-Izmir) mollusca fauna. E.U. Journal of Fisheries, 12, 124-127.

Balik S., Ustaoglu M.R., Ozbek M., 2002. Gökova kaynaklarının Malacostraca faunası hakkında bir ön araştırma. E. Ü. Su Ürünleri Dergisi, 15, 136-138.

Balık, S., Ustaoğlu, M.R., Özbek, M., 2003a. Yuvarlakçay'ın (Köyceğiz-Muğla) Mollusca Faunası. E. Ü. Su Ürünleri Dergisi, 17, 130-136.

Balık S., Ustaoğlu M.R., Özbek M., 2003b. Toros Dağları (Güney Anadolu)'ndaki Bazı Göllerin Mollusca Faunası. E. Ü. Su Ürünleri Dergisi, 16, 125-129.

Bilgin F.H., 1967. İzmir civarı tatlı sularında yaşayan Gastropodlar üzerinde sistematik ve ekolojikaraştırmalar. Ege Üniversitesi, Fen Fakültesi, İlmi Rap. Serisi, No. 36, 1–55 p.

Bilgin F. H., 1973. Batı Anadolu İç sularında Tespit edilen Mollusk türlerinin tanıtılması, ekolojisi ve dağılışları ile bazı Prosobranch'ların anatomilerinde görülen ozellikler. Ege Ü. Fen Fak., Genel Zooloji Kürsüsü, (PhD). Bornova-İzmir, 79.

Bilgin F.H., 1980. Batı Anadolu'nun bazı önemli tatlı sularından toplanan Mollusca türlerinin sistematiği ve dağılışı. Diyarbakır Üniv. Tıp Fak. Der. 8,2, 1-64.

Geldiay R., Bilgin F.H., 1969. Türkiye'nin bazı bölgelerinde tespit edilen tatlısu Mollüskleri. E.Ü. Fen Fak. İlmi Rap. Serisi. No. 90, 1-34.

Oktener A., 2004. A preliminary research on Mollusca species of some freshwaters of Sınop and Bafra. G. U. Journal of Sciences, 17, 21-30.

Rosenberg D.M., Resh V.H., 1993. Introduction to freshwater monitoring and benthic macroinvertebrates. Chapman & Hall, New York, London, 1-9.

Schütt, H. 1991. Fossile Mollusken dreier Anatolischer Ovas. Archive Mollusken, 120, 131-147.

Schütt H., Sesen R., 1993. Pseudamnicola species and other Freshwater Gastropods (Mollusca-Gastropoda)

from East Anatolia (Turkey), the Ukraine and Lebanon. Basteria, 57, 161-171.

Sereflisan H., Yildirim M.Z. Sereflisan M., 2009. The gastropod fauna and their abundance, and some physicochemical parameters of Lake Gölbaşı (Hatay, Turkey). Turk J Zool., 33, 287-296.

Smith D.G., 2001. Pennak's freshwater invertebrates of the United State. John Wiley &Sons Inc.4. Edit., 327-400.

Ustaoglu M.R., Balik S., Ozbek M., 2000. Gediz Deltası ve Sazlıgöl (Menemen-İzmir) tatlı su Mollusca faunası, E.Ü. Su Ürünleri Dergisi, 19, 114-119.

Yazar S., Yildirim Z. 2005. Kayseri Karpuz Sekisi Havzası'nda tatlı su Gastropodlarının araştırılması. J. of Health Sciences, 14, 1-5.

Yildirim M.Z. 1999. Türkiye prosobranchia (Gastropoda: Mollusca) türleri ve zoocoğrafik yayılışları 1. tatlı ve acı sular. Turkish Journal of Zoology, 23, 877-900.

Yildirim M.Z., Koca S.B., Kebapci U., 2006. Isparta ili tatlısularında yayılış gösteren Hydrobioidea (Gastropoda: Prosobranchia) superfamilyası türlerinin bazı taksonomik karakterleri. E.U. Journal of Fisheries & Aquatic Sciences, 23(1/1), 173-177.

Yilmaz M., 1992. Çivril (Işıklı) Gölü Limnoloji Araştırma Projesi Sonuç Raporu. Tarım ve Köy işleri Bakanlığı, Tarımsal Araş. Genel Md., Su Ürünleri Araş. Enst. Md., Egirdir, 1-193.

Zhadin V.I., 1952. Molluscs of fresh and brackish water of the USSR. Zool. Inst. of the Academy Sciences, 46, 1-368.

.