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Mollusc Records from the Area of Manyas Lake (Bird Paradise Lake) in Western Anatolia, Turkey

Ahmet Öktener[1], Dilian Georgiev[2]*

1 - Department of Fisheries, Sheep Research Institute,
Çanakkale Street 7.km, 10200, Bandırma, Balıkesir, TURKEY
2 - University of Plovdiv, Faculty of Biology, Department of Ecology and Environmental Conservation, 24 Tzar Assen Str., BG-4000 Plovdiv, BULGARIA
*Corresponding author: ahmetoktener@yahoo.com

Abstract. This study was carried out simultaneously with a fish parasitological studies of the first author. Six gastropod species (5 freshwater and 1 hygrophilous terrestrial one) and three mussel species were identified in this case study. Five of the gastropods and two mussel species are first records from Manyas Lake. Although Manyas Lake is a Ramsar area and a National Park, this wetland has not been investigated as detailed in terms of mollusc fauna.

Keywords: Turkey, Manyas Lake, Gastropoda, Bivalvia, biodiversity.

Introduction

Manyas Lake is also known as Bird Paradise Lake (Kuş Cenneti in Turkish). This wetland is situated in western Turkey, located in Marmara Region. This nutrient-rich lake has international importance point of biodiversity, because it is on the bird migration route between Asia, Europe and Africa. More than 270 species of birds have been recorded at the lake. The surface area of the lake is 160 km² and shallow lake with an average depth of 3 meters. The lake is fed by underground water sources and the Kocaçay and Mürüvvetler Stream in the south and Sığırcı Stream in the north of the lake (WWF, 2008; Efe *et al*., 2008).

The importance of this ornithological site was highlighted by Ordinarius Prof. Curt Koswig being German hydrologist and zoologist in 1 April 1938. The 64 ha sanctuary area near Sığırcı Stream to the northeast of the lake was accepted as a National Park by the government in 1959. This area was awarded class a status by the European council in 1976. 10,200 hectare of the lake in 1994 was placed on the Ramsar convention list and whole lake was given protected status in 1998 (WWF, 2008; Efe *et al*., 2008).

The waste from animal farms (poultry, cattle and sheep etc), discharge of domestic and industrial enterprises including acid, fertilizer etc., paddy waters used in agricultural production, waste water containing pesticides causes pollution in Manyas Lake. As a result of this, various studies have shown that limnological parameters in the lake have changed.

Freshwater molluscs are one of the important animal groups that make up

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biodiversity. They form an important ring of the food chain in the aquatic ecosystems. Manyas Lake is one of the most important wetlands in Turkey. Although Manyas Lake is a Ramsar area and a National Park, this wetland has not been investigated as detailed in terms of mollusc fauna to date. BILGIN (1973) found *Anodonta cygnea waterston*i on the southern shores of the manyas lake. BILGIN (1987) reported two bivalv species such as *Unio pictorum ascanicus*, *Unio elongatulus eucirrus* in the karadere stream that spilled into manyas lake. KINZELBACH (1989) found *Anodonta palustris gravida* from manyas lake. BALIK *et al.* (2005) reported six mollusc species (*Radix ovata*, *R. peregra*, *Lymnea stagnalis*, *Planorbis planorbis*, *Anodonta palustris gravida*, *Unio cf. crassus*) in the Sığırcı Stream that spilled into Manyas Lake.

The aim of this preliminary study is to determine mollusc diversity which is an important food source of fish and waterfowl in lake and mollusc species which are intermediate hosts to parasites.

Materials and Methods

Mollusc samples including gastropods and mussels were collected from littoral zones by hand dredge, spatula and oar during parasitological surveys of first author on July 2018-2019. The vegetation areas, aquatic plants, stones and rocks were selected for the material collection randomly. The molluscs found were preserved in 70 % ethanol and stored in glass vials with plastic screw-caps. The data to related their biotopes were recorded on these glass vials and the molluscs cards. The photos of gastropods were performed using Leica 1500 stereomicroscope; Canon EOS 1100D for bivalvs. Identifications and comparisons were performed according to ZHADIN (1952), GLÖER (2002).

Results and Discussion

Six gastropod species (*Lymnaea stagnalis*, *Physella acuta*, *Radix auricularia*, *R. labiata*, *Oxyloma elegans*, *Viviparus viviparus*) and three bivalv species (*Unio mancus*, *Anodonta anatin*a, *A. cygnea*) are reported in this study. *Physella acuta*, *Radix auricularia*, *R. labiata*, *Oxyloma elegans*, *Viviparus viviparus*, *Unio mancus*, *Anodonta anatina* are new records for the mollusc fauna of Manyas Lake.

Phylum Mollusca
Class Gastropoda Cuvier, 1795
Subclass Pulmonata Cuvier, 1814
Ordo Basommatophora
Family Lymnaeidae Rafinesque, 1815
Genus Lymnaea Lamarck, 1799

Lymnaea stagnalis (Linnaeus, 1758) (Fig. 1a).

Stations: 40° 07' 53'' N 28° 02' 57'' E, Dasklyeion.

Habitat: Gravel bottom and sandy bottom.

Records in turkey: YILDIRIM & SCHUTT (1996), YILDIRIM (1998), ÇAMUR ELIPEK (2003), ÖZBEK *et al.* (2004), YILDIRIM (2004), KOŞAL ŞAHIN & YILDIRIM (2007), KOŞAL ŞAHIN (2012), KOŞAL ŞAHIN (2013), AKBABA & BOYACI (2015), ARSLAN *et al.* (2017).

Remarks: the species was reported from the lake by BALIK *et al.* (2005).

Family Physidae Fitzinger, 1833
Genus Physella Haldeman, 1843

Physella acuta (Draparnaud, 1805) (Fig. 1b).

Stations: 40° 07' 53'' N 28° 02' 57'' E, Dasklyeion; 40° 14' 39'' N 27° 57' 18'' E Bereketli.

Habitat: Gravel bottom and sandy bottom.

Records in turkey: BILGIN (1973), SCHUTT & ŞEŞEN (1989), ERTAN *et al.* (1996), YILDIRIM & SCHUTT (1996), YILDIRIM *et al.* (1996), YILDIRIM (1998), YILDIRIM & KARAŞAHIN (2000), ÇAMUR ELIPEK (2003), USTAOĞLU *et al.* (2003), ÖZBEK *et al.* (2004), YILDIRIM (2004), ÖKTENER (2004), AKBULUT *et al.* (2009), KALYONCU & ZEYBEK (2009), KILIÇASLAN & ÖZBEK (2010), ZEYBEK *et al.* (2012), GÜRELLI & ÖZBEK (2012), KOŞAL ŞAHIN (2012), KOŞAL ŞAHIN (2013), ZEYBEK *et al.* (2014), GÜRLEK *et al.* (2016), KOŞAL ŞAHIN & ZEYBEK (2016), KOŞAL ŞAHIN *et al.* (2017), KOŞAL ŞAHIN & ALBAYRAK (2017), ARSLAN *et al.* (2017), GÜRLEK (2019).

Remarks: The species is new record for the lake.

Family Lymnaeidae Rafinesque, 1815
Genus Radix Montfort, 1810
Radix auricularia (Linnaeus, 1758) (Fig. 1c).
Stations: 40° 07' 53" N 28° 02' 57" E, Dasklyeion.
Habitat: Gravel bottom and sandy bottom.
Records in turkey: Bilgin (1967), Geldiay & Bilgin (1969), Bilgin (1973), Schutt (1988), Schutt & Şeşen (1989), Soylu (1990), Ertan *et al.* (1996), Yildirim (1998), Yildirim & Karaşahin (2000), Yildirim (2004), Ustaoğlu *et al.* (2003), Balik *et al.* (2003), Öktener (2004), Özbek *et al.* (2004), Yildirim *et al.* (2005), Koşal Şahin & Yildirim (2007), Kalyoncu *et al.* (2008), Şereflişan *et al.* (2009), Akbulut *et al.* (2009), Kiliçaslan & Özbek (2010), Gürelli & Özbek (2012), Koşal Şahin (2012), Koşal Şahin (2013), Akbaba & Boyaci (2015), Gürlek *et al.* (2016), Koşal Şahin & Zeybek (2016), Koşal Şahin *et al.* (2017).
Remarks: The species is new record for the lake.

Order Stylommatophora
Family Succineidae H. Beck, 1837
Genus Oxyloma Westerlund, 1885
Oxyloma elegans (Risso, 1826) (Fig. 1d).
Station: 40°13' 55" N 28° 02' 55" E, Kuş Cenneti Natural Park.
Habitat: Gravel bottom and sandy bottom.
Records in turkey: Soylu (1990), Schutt & Şeşen (1993), Ustaoğlu *et al.* (2003), Kalyoncu *et al.* (2008), Gürlek *et al.* (2016), Koşal Şahin *et al.* (2017), Gürlek (2019).
Remarks: The species is new record for the lake.

Subclass Caenogastropoda Cox, 1960
Order Architaenioglossa Haller, 1890
Family Viviparidae Gray, 1847
Genus Viviparus Montfort, 1810
Viviparus viviparus (Linnaeus, 1758) (Fig. 1e).
Stations: 40° 07' 53" N 28° 02' 57" E, Dasklyeion; 40° 14' 39" N 27° 57' 18" E Bereketli.
Habitat: Gravel bottom and sandy bottom.
Records in turkey: Çamur Elipek (2003), Öktener (2004), Koşal Şahin & Yildirim (2007), Koşal Şahin (2012), Koşal Şahin (2013), Akbaba & Boyaci (2015), Arslan *et al.* (2017).
Remarks: The species is new record for the lake.

Family Lymnaeidae Rafinesque, 1815
Genus Radix Montfort, 1810
Radix labiata Rossmässler,1835 (Fig. 1f).
Stations: 40° 07' 53" N 28° 02' 57" E, Dasklyeion.
Habitat: Gravel bottom and sandy bottom.
Records in turkey: Bilgin (1967), Geldiay & Bilgin (1969), Bilgin (1973), Schutt (1988), Soylu (1990), Ertan *et al.* (1996), Yildirim (1998), Ustaoğlu *et al.* (2003), Balik *et al.* (2003), Özbek *et al.* (2004), Yildirim (2004), Yildirim *et al.* (2005), Koşal Şahin & Yildirim (2007), Kalyoncu *et al.* (2008), Şereflişan *et al.* (2009), Akbulut *et al.* (2009), Kiliçaslan & Özbek (2010), Gürelli & Özbek (2012), Zeybek *et al.* (2012), Koşal Şahin (2012), Koşal Şahin (2013), Zeybek *et al.* (2014), Akbaba & Boyaci (2015), Gürlek *et al.* (2016), Koşal Şahin & Zeybek (2016), Koşal Şahin *et al.* (2017), Gürlek (2019).
Remarks: The species is new record for the lake.

Bivalvia Linnaeus, 1758
Unionida Stoliczka, 1871
Unionidae Rafinesque, 1820
Unio Philipsson, 1788
Unio mancus Lamarck, 1819 (Fig. 1g).
Stations: 40° 07' 53" N 28° 02' 57" E, Dasklyeion; 40° 10' 56" N 27° 52' 14" E Gölyaka
Habitat: Gravel bottom and sandy bottom.
Records in turkey: Schutt & Şeşen (1993), Öktener (2004), Ekin & Başhan (2010), Ekin & Başhan (2011).
Remarks: The species is new record for the lake.

Anodonta Lamarck, 1799
Anodonta anatina (Linnaeus, 1758) (Fig. 1h).
Stations: 40° 07' 53" N 28° 02' 57" E, Dasklyeion; 40° 10' 56" N 27° 52' 14" E Gölyaka; 40° 14' 39" N 27° 57' 18" E Bereketli.
Habitat: Gravel bottom and sandy bottom.

Records in Turkey: ERCAN *et al.* (2013).

Remarks: The species is new record for the lake.

Anodonta cygnea (Linnaeus, 1758) (Fig. 1i).

Stations: 40° 07' 53'' N 28° 02' 57'' E, Dasklyeion; 40° 10' 56'' N 27° 52' 14'' E Gölyaka; 40° 14' 39'' N 27° 57' 18'' E Bereketli.

Habitat: Gravel bottom and sandy bottom.

Records in turkey: BILGIN (1980), KINZELBACH (1989), SOYLU (1990), ÇAMUR ELIPEK (2003), BAŞÇINAR (2003), ÖKTENER (2004), ÖZBEK *et al.* (2004), KOŞAL ŞAHIN & YILDIRIM (2007), AKBULUT *et al.* (2009), BAŞÇINAR *et al.* (2009), KOŞAL ŞAHIN (2012), KOŞAL ŞAHIN (2013), ERCAN *et al.* (2013), KOŞAL ŞAHIN *et al.* (2017).

Remarks: this species was reported as *anodonta palustris gravida* drouet, 1879 in manyas lake by KINZELBACH (1989).

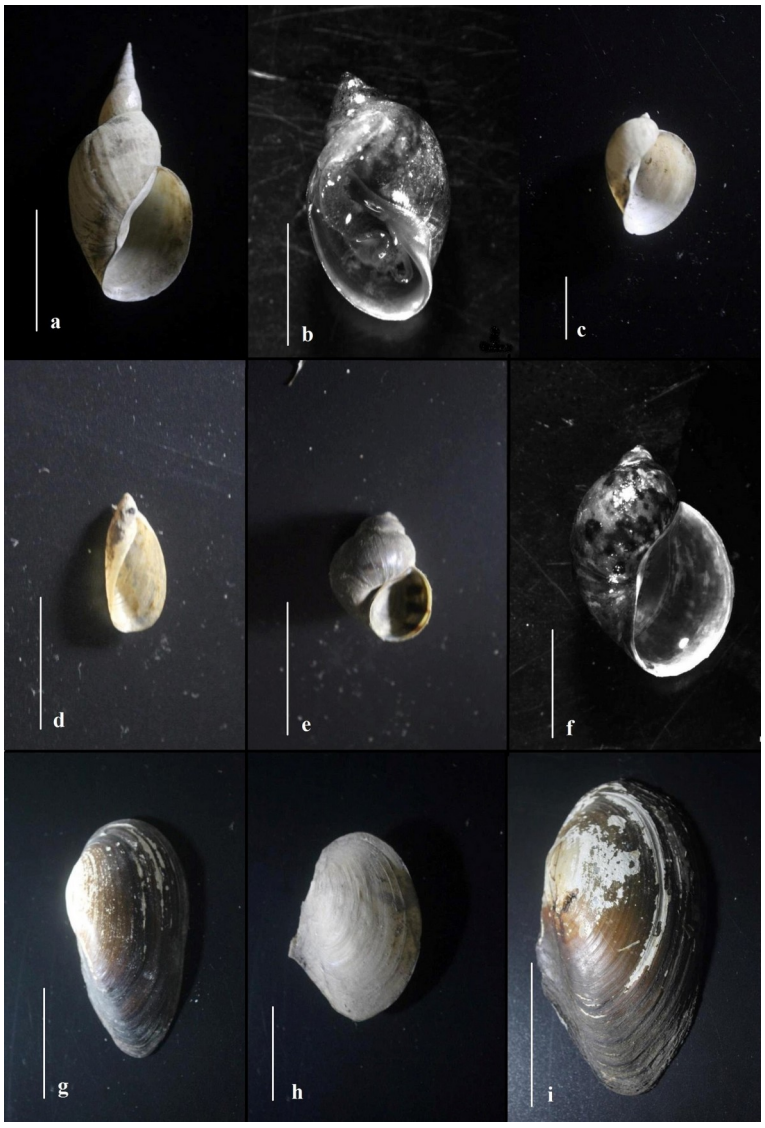

Fig. 1. a. *Lymnaea stagnalis* (2.5 cm), **b.** *Physella acuta* (2.5 mm), **c.** *Radix auricularia* (1.25 cm), **d.** *Oxyloma elegans* (1.5 cm), **e.** *Viviparus viviparus* (3.5 cm), **f.** *Radix labiata* (3 mm), **g.** *Unio mancus* (3 cm), **h.** *Anodonta anatina* (2 cm), **i.** *Anodonta cygnea* (4.5 cm). This contributes researches to determine of molluscs with 7 new mollusc record in Manyas Lake.

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