FIRST REPORT OF *MAZOCRAES ALOSAE* (HERMAN, 1782), *PRONOPRYMNA VENTRICOSA* (RUDOLPHI, 1891) AND *LECITHASTER CONFUSUS* ODHNER, 1905 IN PONTIC SHAD *ALOSA IMMACULATA* BENNET, 1835 NEAR TURKISH COASTS OF THE BLACK SEA

A. Özer[1*], T. Öztürk[1], Y. Kornyychuk[2]

[1]*Sinop University, Sinop, Turkey*
[2]*Institute of Biology of the Southern Seas, Crimea, Ukraine*

Abstract

In the present study, a total of 31 specimens of pontic shad, Alosa immaculata Bennet, 1835 (Pisces: Clupaeidae) caught in the Black Sea coasts near Sinop, Turkey in 2010 were investigated for their parasite fauna. Four parasite species were identified: Mazocraes alosae (Herman, 1782), Pronoprymna ventricosa (Rudolphi, 1891), Lecithaster confusus Odhner, 1905 and Hysterothylacium aduncum (Rudolphi, 1802). H. aduncum was the core species with infection prevalence of 96.7% and mean intensity value of 97.1 ± 18.1 parasites per infected fish, followed by M. alosae (61.3% and 3.2 ± 0.5), P. ventricosa (35.5% and ± 12.5) and L. confusus (29% and 8.2 ± 2.8), respectively. In the present study, Mazocraes alosae, Pronoprymna ventricosa and Lecithaster confusus are reported from pontic shad off Turkish coasts of the Black Sea for the first time.

Key words: Alosa immaculata, parasites, Black Sea

INTRODUCTION

The pontic shad, *Alosa immaculata* Bennett, 1835 from Clupeidae family, is an anadromous pelagic fish of great economic value for all the Black Sea countries. The main habitats of this species are the Black Sea, the Azov and Caspian Seas [10, 30]. It prefers to feed in the southern part of the Black Sea [9]. There are five *Alosa* species near Turkish Black sea coasts; *Alosa caspia caspia* (Eichwald, 1838), *Alosa maeotica* (Grimm, 1901), *Alosa pontica* (Eichwald, 1838) (Syn; *Alosa immaculata* Bennett, 1835), *Alosa tanaica* (Grimm, 1901) and *Alosa fallax* (Lacepede, 1803) [3,14, 18, 31]. This fish species is captured along all the Black Sea the coasts including Anatolian coast, where present study was conducted near Sinop. Its capture value increased from 720 tonnes to 2582 tones in the last decade with some little fluctuations [1]. However, the overall stocks of pontic shad in the Black Sea seem to be under threat mainly due to excessive fishing and pollution [20]. Parasite fauna of *Alosa immaculata* (syn.: *Alosa (Caspialosa) kessleri pontica*) near north, NW, western and eastern coasts of the Black Sea have been studied [6, 8,15, 26, 27, 28] as well as in the Sea of Azov [22, 29], Danube [25] and Dniper river [16] estuaries. Nevertheless, despite of economical value of the fishes in Turkey, studies on the parasite fauna of *Alosa* spp. near Turkish coasts of the Black Sea are limited [11] and there were no data on the parasite fauna of the most numerous member of the fish genus in the Black Sea, pontic shad *Alosa immaculata*. Present study is the first one providing data on both parasite fauna and infection levels of *Alosa immaculata* off Anatolian coast of the Black Sea.

MATERIAL AND METHOD

In the present study, the parasite fauna of 31 fish specimens of pontic shad *Alosa immaculata* Bennet, 1835 caught by fishermen near Sinop (Turkey) in 2010 was studied. Parasitological investigation was

*Corresponding author: aozer@sinop.edu.tr
The manuscript was received: 14.02.2013
Accepted for publication: 18.05.2013

conducted at the Faculty of Fisheries and Aquatic Sciences in Sinop. Dissections were performed with the aid of a dissecting microscope at magnification up to x40 using standard parasitological techniques. The following tissues and organs were examined: skin, fins, gills, mouth, liver, gallbladder, swimbladder, gonads, kidney, heart, lateral musculature, mesenteries, oesophagus, stomach, pyloric caeca and intestine. Metazoan parasites were picked up, counted and treated separately from the lumen and from the surface of the digestive tract. Thin squash preparations were prepared from heart, liver, kidney, gonadal tissue and bile and were examined using a light microscope at magnification x 100–1000.

Infection prevalence (%) and mean intensity and abundance of infection [5] were calculated.

RESULTS

We detected four parasite species in the pontic shad samples: metazoan parasites were represented by one monogenean, two digeneans and one nematode species (Table 1). Overall infection prevalence, mean intensity and abundance values were 96.77%, 110.53± 18.78 parasites per infected fish and 106.96 ± 18.51 parasites per examined fish. *Hysterothylacium aduncum* occurred both as freely moving larvae, preadults (stage IV) and adults. Infection prevalence (%) was the highest for *H. aduncum* and followed by *Mazocraes alosae, Pronoprymna ventricosa* and *Lecithaster confusus* (Table 1). *Hysterothylacium aduncum* had the maximum mean intensity value (97.06 ± 18.10) and followed by *Pronoprymna ventricosa* (29.72 ± 12.53).

DISCUSSIONS

Despite of diverse parasite fauna of *Alosa immaculate* known in the Black Sea [6, 8, 11, 15, 26, 27, 28], the present study yielded only four helminth parasites, one of ecto- (monogenean) and 3 endoparasitic nature. The number of parasites identified in this fish host in the region studied is similar to those reported from other authors from this host (Table 1).

The shads, members of Clupeidae family, are anadromous fishes and they migrate to freshwater for spawning and *vise versa* for maturation, largely determined by changes in physiological condition of host. This adaptation to both environments may have more effects on the parasite loads of ectoparasitic nature than internal parasites in migratory fish.

Trematode *P. ventricosa* is known from pyloric caeca and intestine of different marine fishes, mainly Clupeidae, in North-Eastern Atlantic, Mediterranean, Caspian Sea, Black Sea and the Sea of Azov [4].

In the Black Sea it was registered for the first time off Caucasian coasts by [8] – she founded and described four specimens of a new genus, *Pentagramma* (now it is a synonym for *Pronoprymna*) from the gut of one *Alosa immaculata.* Later this trematoda species was found from *Alosa* spp. in NW part of the sea, along Crimean Black Sea coasts (all the data on this region were summarized [15], off Bulgarian coast, in Azov Sea, Paleostomi Lake (Caucasus) and Dniper and Danube rivers estuaries (Table 1), as well as near Bosporus Strait [21] – but in later case from another fish hosts.

Hemiurid trematodes *Lecithaster confusus* is also a widely distributed parasite of marine fish. Its second intermediate hosts are marine copepods, this explains infection of plankton-eating Clupaeidae. The helminth has been registered from *Alosa immaculata* as in different region of the Black Sea as in Azov, including rivers estuaria (Table 1).

Mazocraes alosae is a gill monogenean species specific to Clupaeidae and abundant from *Alosa immaculata* all over the Black and Azov seas, following the host (Table 1).

The less specific parasite of four registered is nematode *Hysterothylacium aduncum.* It is widely distributed species known in the Black Sea from a lot of fish species. Pontic shads off Anatolian Black Sea coasts revealed to be highly parasitized with *H. aduncum*, in terms both of larval and adult helminths.

Table 1 Infection indices and localities reported for parasites have been found from *Alosa immaculata* Bennet, 1835 off the Anatolian coast the Black Sea

Parasites	Infection indices		Location	Authors
	P (%)	Intensity		
Mazocraes alosae	45.8	4.5 (1 – 12)	Black Sea: Sevastopol (Crimean coast)	[23]
	13 – 56,6	1 – 16	Azov Sea, Kerch Strait	[29]
	-	-	Black Sea: Sevastopol (Crimean coast)	[13]
	16.6	3.0 (1 – 18)	Black Sea: Sevastopol (Crimean coast)	[27]
	42.1*	3.0 ± 0.5*	Kerch Strait	[28]
	10.7**	4.3 ± 0.8**		
	61.3	3.2 ± 0.5	Black Sea: Sinop (Anatolian coast)	Present study
Pronoprymna ventricosa	4 specimens in 1 fish		Black Sea: Batumi (Caucasian coast)	[8]
	90.3	8 – 38	Black Sea: Novorossiysk (Caucasian coast)	[26]
	83.8	2 – 65	Gulf of Odessa (North-Western Black Sea)	[6]
	20-33	-	Dnieper river delta	[17]
	-	-	Paleostomi Lake	[7]
	7 - 100	3 – 840	Azov Sea, Kerch Strait	[29]
	-	-	Black Sea: Sozopol (Bulgarian coast)	[12]
	-	-	Black Sea: Sevastopol (Crimean coast)	[15]
	-	-	Azov Sea	[22]
	16.6	6.1 (1-37)	Kerch Strait	[27]
	33.3*	14.0±4.0*	Kerch Strait	[28]
	21.4**	121.0±51.2**		
	35.5	29.7 ± 12.5	Black Sea: Sinop (Anatolian coast)	Present study
Lecithaster confusus	-	-	Black Sea: Batumi (Caucasian coast)	[8]
	90.3	15 - 65	Black Sea: Novorossiysk (Caucasian coast	[26]
	8.3	3.3	Black Sea: Odessa (NW Black Sea)	[6]
	-	-	Danube river estuary	[25]
	-	-	Dniper river estuary	[16]
	-	-	Paleostomi Lake	[7]
	7,1 - 50	1 – 24	Azov Sea, Kerch Strait	[29]
	-	-	Azov Sea, Don river, Taganrog estuary	[22]
	-	-	Black Sea (Crimean coasts)	[15]
	29.0	8.2 ± 2.8	Black Sea: Sinop (Anatolian coast)	Present study
Hysterothylacium aduncum	14 - 86	2 – 50	Azov Sea, Kerch Strait	[29]
	-	-	Black Sea (Crimean coasts)	[15]
	33.0	0.3 (1)	Black Sea: Sevastopol (Crimean coast)	[27]
	66.6	51.5±15.3	Kerch Strait	[28]
	35.7	36.0±15.4		
	96.8	97.1 ± 18.1	Black Sea: Sinop (Anatolian coast)	Present study

during migration of *Alosa:* * from the Black Sea to Azov Sea; ** from Azov Sea to the Black Sea

CONCLUSIONS

Three marine fish helminthes specific to Clupaeidae fishes, *Mazocraes alosae, Pronoprymna ventricosa* and *Lecithaster confusus* are reported from pontic shad off Turkish coasts of the Black Sea for the first time – it gives an additional data on their areas in the Black Sea.

REFERENCES

[1] Anonymous: TUIK Fisheries Statistics, 2011, Ankara, Turkey.

[2] Barzegar, M., Bozorgnia, A., Youssefi, M.R., Hosseinifard, S.M.: Determination of *Alosa caspia persica* parasites in fresh and brine water of Caspian Sea. World Journal of Fish and Marine Sciences (2012) 4(2): 175-178.

[3] Bilecenoğlu, M., Taşkavak, E., Mater, S., Kaya, M.: Checklist of The Marine Fishes of Turkey. Magnolia Pres, Auckland, New Zealand. Zootaxa (2002) 113: 194 p.
[4] Bray, R.A., D.I. Gibson, Jones, A.: Keys to the Trematoda. Vol. 3. CABI Publishing and The Natural History Museum, Wallingford, 2008, p: 509-522.
[5] Bush A.O., Lafferty K.D., Lotz J.M., Shostak A.W.: Parasitology meets ecology on its own terms: Margolis *et al*. revisited. Journal of Parasitology (1997) 83(4): 575-583.
[6] Chernishenko A.C.: Data on parasite fauna of fishes of Odessa Gulf. Proc. Of Odessa Univ., (1955), Vol. 145(7): 211-222 (in Russian).
[7] Chernova T.N.: To studying of parasite fauna of fishes in Paleostomi Lake. Proc. of I-st All-Union Symp. on parasites and diseases of water animals. Kiev, Naukova dumka (1970), 132-134.
[8] Chulkova V.N.: Parasites of marine fishes in the vicinity of Batumi (Black sea). Uch. Zap. Leningrad State Univ., (1939), No. 43, Ser. Biol. Sci., 11: 21-32 (in Russian).
[9] Ciolac, A.: Migration of fishes in Romanian Danube River. Applied Ecology and Environmental Research (2004) 2(1): 143-163.
[10] Coad, B.: Shad in Iranian waters. Shad Journal (1997) 2(4): 4-8.
[11] Çetindağ, M.: *Pronoprymna ventricosa* (Rudolphi, 1819), a new digenetic teramatoda from the *Alosa fallax* caught from the Black Sea in Turkey. Ankara Üniversitesi, Veteriner Fakültesi Dergisi (1993) 40(2): 311 – 317 (in Turkish).
[12] Dimitrov G.I.: Investigation of helminths from fishes off Bulgarian coast of the Black Sea. PhD theses, Sofia, (1989), 35.
[13] Dmitrieva E.V.: Monogeneans of the Black Sea fishes (fauna, ecology, zoogeography). PhD theses. Sevastopol, (1998), 186 (in Russian, with English summary).
[14] Ergüden, D.: The molecular systematic of shad (*Alosa* spp.) in Turkish Seas. Ph.D. Thesis, (2007) Çukurova University, Adana (In Turkish).
[15] Gaevskaya A.V., Kornyychuk Y.M.: Parasitic organisms as a component of ecosystems of the Black Sea near-shore zone of Crimea. In: Modern condition of biological diversity in near-shore zone of Crimea (the Black sea sector) / Ed. V.N. Eremeev, A.V. Gaevskaya; NAS Ukraine, Institute of Biology of the Southern Seas. Sevastopol: EKOSI-Gidrophizika, (2003), 425 – 490 (In Russian, with English Summary)
[16] Komarova T.I.: Helminthes of commercial fishes of Dnieper estuary. Problems of Parasitology: Proc. Ukr. Paras. Soc., (1964), 77-89 (in Russian).
[17] Koval V.P.: Parasite fauna of fishes on Dnieper estuary. Proc. of Kiev Univ., biol. ser., (1962), N5, 1, 98-104.
[18] Kuru, M.: Recent Systematic Status of Inland Water Fishes of Turkey. G.Ü, Gazi Eğitim Fakültesi Dergisi (2004) 24(3): 1–21.
[19] Mamedova S.N.: The faunistic and biological characteristics of fish parasites of the Absheron peninsula coastal waters of the Caspian sea. International Journal of Natural Resources, Special Issue on the Caspian Sea (2009), p 59 – 62.
[20] Navodaru, I.: Exploitation of *Alosa pontica* in the Danube Delta, Romania. In: Stock Assessment in Inland Fisheries (ed. Cowx, I.G.), Fishing New Books, Oxford, (1996) p 448-453.
[21] Nikolaeva V.M.: Parasite fauna of the local stocks of some pelagic fishes of the Black Sea. Pros. Sevast. Biol. St., vol. XVI, (1963), 387-438 (in Russian).
[22] Nizova G.A., Syrovatka N.I.: Helminthes of commercial fishes of Azov Sea basin, their epizootological and epydemiological importance. Proc. Main problems of fishery in Black Sea and Azov Sea basins. Rostov-on-Don, (2000), 176-183 (in Russian).
[23] Osmanov S.U.: Materials on parasite fauna of the Black Sea fishes. Proc. of Leningrad Pedagogical Inst., (1940), Vol. 30, 187-266 (in Russian, with German Summary).
[24] Pazooki, J., Masoumian, M.: Synopsis of the Parasites in Iranian Freshwater Fishes. Iranian Journal of Fisheries Sciences (2012) 11(3): 570-589.
[25] Petrushevsky G.K.: Parasite fauna of clupeid fishes of the Black Sea. Izvestiya of VNIORH, (1957), vol. XLII, 304-314 (in Russian).
[26] Pogoreltceva T.P.: Data on parasite fauna of fishes in the North-Western part of the Black Sea. Proc. Inst. of Zool., (1952), Vol. VIII, 100-120 (in Russian).
[27] Popjuk, M.P.:Helminth fauna of pelagic fishes off Crimea (The Black Sea). Ecologia Morya (2009), 78: 75-80 (In Russian, with English summary).
[28] Popjuk M.P.: Parasitefauna of three species of mass pelagic fish during migration through the Kerch Strait. Ecologia Morya (2011), 18: 73-80 (In Russian, with English summary).
[29] Solonchenko A.I. Helminth fauna of Azov Sea fishes. Kiev: Naukova dumka, (1982), 150 (in Russian).
[30] Whitehead, P.J.P.: FAO Species Catalogue. Clupeoid Fishes of the World. An Annotated and Illustrated Catalogue of the Herring, Sardines, Pilchards, Sprats, Anchovies and Wolf - herrings. Part 1. Chirocentridae, Clupeidae and Pristigasteridae. FAO Fisheries Synopsis. (1985) 7(125, Pt. 1): 303.
[31] www.fishbase.org
[32] Youssefi, M .R., Hosseinifard, S.M., Halajian, A., Amiri, M.N., Shokrolahi, S.: *Pronoprymna ventricosa* (Digenea: Faustulidae) in *Alosa caspia* Fish in North of Iran. World Journal of Fish and Marine Sciences (2011) 3(2): 104-106.