

Cestoda and Monogenea of some teleost fishes off the Mudanya Coast (Sea of Marmara, Turkey)

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Summary

The following helminths are reported from the Sea of Marmara off the Mudanya coast. Cestoda: *Didymobothrium rudolphii* in *Solea solea*, *Clestopbothrium crassiceps* in *Merluccius merluccius*, tetraphyllidean larvae in *Gobius niger*, *G. cobitis*, *M. merluccius*, *Eutrigla gurnardus*, *S. solea*, *Scorpaena scrofa* and *Progrillotia dasyatidis* in *G. niger*. Monogenea: *Trochopus pini* in *E. gurnardus*, *Ligophorus confusus* in *Liza ramada*, *Tetraonchoides paradoxus* in *Uranoscopus scaber*, *Microcotyle mugilis* in *L. ramada* and *Anthocotyle merluccii* in *M. merluccius*.

Key words: Cestoda, Monogenea, teleost fish, Sea of Marmara

Introduction

This is the third paper in which we document the parasitic helminths of teleost fishes in parts of the waterway connecting the Mediterranean and Black Seas. The first (Oguz & Bray, 2006) reported 13 digeneans from fishes of the Sea of Marmara at Mudanya. The second (Keser *et al.* 2007) documented the cestodes, digeneans, nematodes and acanthocephalan from fishes caught in the Dardanelles strait at Çanakkale. These reports are of interest as they give further indications of the as the degree of invasion of individual species from the Mediterranean into the Black Seas. The Mediterranean harbours many more species of all groups than the Black Sea and our results begin to indicate at which points the nature of the fauna changes.

Materials and methods

The study area is in north western Anatolia, 40°22'N, 28°52'E (see figure 1 in Oguz & Bray, 2006). Between November 1990 and May 1993 between 6 and 28 specimens of 8 fish species were collected. The fish were placed

in plastic containers containing seawater and transferred to the laboratory, where they were examined within 24 hours. Methods for necropsy and analysis were adapted from Pritchard & Kruse (1982). All sites were examined for parasites with a stereomicroscope at x12 and x50 magnifications. Data for prevalence, intensity and abundance are given (Table 1.see Margolis *et al.* 1982). Specimens are deposited in Biology Department Faculty of Science and Art, Atatürk University, Erzurum, Turkey.

Results

Cestoda

Spathebothriidea Acrobothriidae

Didymobothrium rudolphii (Monticelli, 1890)

Host: *Solea solea*

Infection site: Intestine.

Voucher specimen reference number: HWML 216123,216125

Remarks: This poorly studied tapeworm has internal serial repetition of reproductive systems, but no external segmentation. It is considered one of the primitive segmented cestodes. It is known mainly from the flatfishes *Solea vulgaris*, *Pegusa impar*, *P. [Solea] lascaris* and *Lepidorhombus boscii* in the Mediterranean, off Naples (Monticelli, 1890), the Saronic Gulf (Papoutsoglou, 1976) and off the mouth of the Tiber (Orecchia *et al.* 1985) and from the north eastern Atlantic off the Portuguese coast (Marques *et al.* 2006; Poddubnaya *et al.* 2006; Marques & Cabral, 2007). Marques *et al.* (2007) reported that there are two cryptic species under this name in *Pegusa lascaris* off the Portuguese coast. As far as we are aware, *D. rudolphii* has not been reported in the Black Sea.

Table 1. Helminth parasites of some fish species of Mudanya Coasts, Turkey. Number of examined fish (N), number of infected fish (In), prevalence (%), range of intensity (M) and mean intensity (X), standard deviation (\pm S.D.) and total (Σ) number of parasite

Host fish species	N	In & (%)	Identified parasite species	M & (X \pm S.D.)	Σ
<i>Gobius cobitis</i>	25	5 (20.0)	Tetraphyllidean larva	1 – 17 (4.8 \pm 6.8)	24
<i>Gobius niger</i>	28	6 (21.4)	<i>Progrillotia dasyatidis</i>	1 – 3 (2.1 \pm 0.8)	13
<i>Gobius niger</i>	28	3 (10.7)	Tetraphyllidean larva	2 – 15 (6.6 \pm 7.2)	20
<i>Eutrigla gurnardus</i>	16	1 (6.3)	Tetraphyllidean larva	1 (1.0 \pm 0)	1
<i>Eutrigla gurnardus</i>	16	1 (6.3)	<i>Trochopus pini</i>	1 (1.0 \pm 0)	1
<i>Merluccius merluccius</i>	39	4 (10.3)	Tetraphyllidean larva	1 – 7 (2.7 \pm 2.8)	11
<i>Merluccius merluccius</i>	39	5 (12.8)	<i>Cleistobothrium crassiceps</i>	1 – 2 (1.2 \pm 0.4) 1	6
<i>Solea solea</i>	56	6 (10.7)	Tetraphyllidean larva	2 – 4 (2.5 \pm 1.3)	15
<i>Solea solea</i>	56	15 (26.8)	<i>Didymobothrium rudolphii</i>	4 – 22 (8.1 \pm 4.9)	122
<i>Uranoscopus scaber</i>	16	10 (62.5)	<i>Tetraoncooides paradoxus</i>	1 – 15 (7.0 \pm 3.9)	70
<i>Scorpaena scrofa</i>	17	1 (5.9)	Tetraphyllidean larva	1 (1 \pm 0)	1
<i>Liza ramada</i>	18	16 (88.9)	<i>Ligophorus confusus</i>	3 – 10 (5.6 \pm 2.1)	90
<i>Liza ramada</i>	18	1 (5.5)	<i>Microcotyle mugilis</i>	1 (1 \pm 0) 1	1

Bothriocephalidea
Bothriocephalidae

Cleistobothrium crassiceps (Rudolphi, 1819)

Host: *Merluccius merluccius*

Infection site: Intestine

Voucher specimen reference number: HWML 216124

Remarks: This is a common parasite of hake in the Mediterranean and north-eastern Atlantic and is reported from a wide variety of related fish over a wide distribution (see: www.nhm.ac.uk/host-parasite-database). Although the hake is found off the Anatolian coast of the Black Sea (Slastenenko, 1959), this parasite has not yet been reported there in this sea.

Tetraphyllidean larvae

Hosts: *Gobius niger*, *G. cobitis*, *Merluccius merluccius*, *Eutrigla gurnardus*, *Solea solea*, *Scorpaena scrofa*.

Infection site: Intestine

Voucher specimen reference number: 9016MPTet 1-6

Trypanorhyncha

Progrillotiidae

Progrillotia dasyatidis Beveridge, Neifar & Euzet, 2004

Host: *Gobius niger*

Infection site: Gall Bladder

Voucher specimen reference number: 9016MPTr 1- 5

Remarks: Identified using Palm (2004) and the description of the plerocerci by Marques *et al.* (2005). The plerocerci are characterized by the possession of 2 bothria, prebulbar organs and a heteroacanthous atypical armature, consisting of 6 principal solid hooks and a single row of 6 – 7 unciniate intercalary hooks. The first principal hook is unciniate, followed by 4 falciform and a single unciniate hook 6(6') about half the size of hooks 5(5'). The bulb ratio is below 8.

Monogenea

Monopisthocotylea

Capsaloidea

Capsalidae

Trochopus pini (van Beneden & Hesse, 1863)

Host: *Eutrigla gurnardus*

Infection site: Gill

Voucher specimen reference number: 9016MPCa 1

Remarks: One specimen apparently belonging to the species *T. pini* was recovered. As far as we are aware the only report of a *Trochopus* from this host is that of *Trochopus tubiporus* (Diesing, 1836) in the Mediterranean Sea by Euzet *et al.* (1993). The species has been reported in several species of gurnard, from the north Atlantic and the Mediterranean Sea (Lawler, 1981; Radujkovic & Euzet, 1989), but not in the Black Sea.

Dactylogyridea

Dactylogyridae

Ligophorus confusus Euzet & Suriano, 1977

Host: *Liza ramada*

Infection site: Gill

Voucher specimen reference number: HWML216127

Remarks: This is a common parasite of *Liza ramada* in the Mediterranean Seas (see www.nhm.ac.uk/host-parasite-database), but, as far as we are aware, it has not been reported in the Black Sea. Altunel (1982) reported this host/parasite combination in the Turkish Aegean Sea.

Tetraoicoidea

Tetraoncooididae

Tetraonchooides paradoxus Bychowsky, 1951

Host: *Uranoscopus scaber*

Infection site: Gill

Voucher specimen reference number: HWML 216126

Remarks: This is a common parasite of *U. scaber* in the Mediterranean and Black Seas (see Euzet *et al.*, 1993; Gaevskaia & Dmitrieva, 1997).

Polyopisthocotylea

Microcotylidae

Microcotyle mugilis (Vogt, 1878)

Host: *Liza ramada*

Infection site: Gill

Voucher specimen reference number: 9016MPMi 1

Remarks: This species is a common parasite of *L. ramada* in the Mediterranean (Euzet *et al.* 1993, Radujkovic & Euzet, 1989) and has recently been reported in the Black Sea in this host (Dmitrieva & Gaevskaia 2001).

Discocotylidae

Anthocotyle merluccii (van Beneden & Hesse, 1863)

Host: *Merluccius merluccius*

Infection site: Gill

Voucher specimen reference number: HWML216139

Remarks: This is a very widespread and common parasite of hakes (*Merluccius* spp.) in the Atlantic Ocean Basin, the south-western Indian Ocean and the eastern Pacific Ocean (see www.nhm.ac.uk/host-parasite-database). As far as we are aware it has not been reported in the Black Sea.

Conclusions

Oguz & Bray (2006) found that only two of thirteen digenean species they reported in the Sea of Marmara were found in the Mediterranean Sea but not in the Black Sea. Keser *et al.* (2007) found that closer to the Mediterranean, in the Dardanelles, only one of eleven fully identified helminth species was (probably) not found in the Black Sea. Of the species reported in the present paper, several worms have not yet been found in the Black Sea, namely *Didymobothrium rudolphii*, *Cleistobothrium crassiceps*, *Progrillotia dasyatidis*, *Trochopus pini*, *Anthocotyle merluccii* and *Ligophorus confusus*.

In the case of *C. crassiceps* and *A. merluccii* this is probably because their host, the hake *Merluccius merluccius* is rare and localized in the Black Sea (Slastenenko, 1959). A similar reason may account for the absence of records of *D. rudolphii* from the Black Sea, in that its host *Solea solea* only occurs, rarely, in the southwestern Black Sea.

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