

Seasonal variations in parasites found in mullet (*Mugil platanus* Günther, 1880) juveniles captured on the Uruguayan coast of the River Plate.

D. Carnevia and G. Speranza.

Department of Aquaculture and Aquatic Organisms Pathology. Institute for Fishery Research. Faculty of Veterinary. Tomás Basáñez 1160, Montevideo, 11300, Uruguay.

Abstract

The present study reports on the main parasites found in mullet (*Mugil platanus*) and their prevalence throughout the year on Uruguayan coasts of the River Plate. The following parasites were found: *Ichthyobodo necator*, *Trichodina* sp., *Scyphidia* sp., *Gyrodactylus* sp., *Dactylogyrus* sp., *Metamicrocotyla* sp., *Dicrogaster* sp., *Phagicola* sp. and "Scolex polymorphus".

The viability of mullet (*Mugil platanus* Günther, 1880) culture in Uruguay has been investigated for several years (Mazzoni & Carnevia, 1982; Carnevia & Mazzoni, 1983a; Carnevia, 1987; Carnevia et al., 1988; Carnevia et al., 2001). Capture of juveniles smaller than 100 mm from coastal waters of the River Plate estuary and their subsequent seeding in fresh water constitute an important part of the culture program. During capture and adaptation to fresh water, these fish are subject to strong stress with depletion of immune response and the consequent appearance of parasitic affections. Thus, constant supervision and monitoring of the parasites in captured fish is required in order to establish prophylactic strategies to minimize losses. Other reports describe the parasites found in juvenile and adult mullet captured on the River Plate coast (Carnevia & Mazzoni, 1983b; Carnevia & Mazzoni, 1986; Mazzoni et al., 1986). This is to report on the seasonal variation in parasite

prevalence to determine the best times for capture and to improve the planning of prophylactic strategies.

15-20 fish were captured monthly during four years, with trawling nets, at each of three definite places of the shore zone, next to the mouth of rivers and streams on the coasts of the River Plate estuary, between Montevideo and Piriápolis. A total 2238 fish were sampled. Fresh skin smears, gills, intestines, liver and spleen were observed in the laboratory under light microscopy at 100, 200 and 400 x. Mean water salinity where the fish were captured was 15 ppt, with a maximum of 22 ppt and a minimum of 3 ppt, averaging 28,1 ppt in summer, 15,8 ppt in autumn, 5,3 ppt in winter and 12,6 ppt in spring. Mean water temperature was 18,4 °C for summer samplings, 15,6 °C in autumn, 10,6 °C in winter and 14,3 °C in spring. Captured fish were sized between 23 and 100 mm, averaging 48 mm.

	S	O	N	D	J	F	M	A	M	J	J	A
	Spring			Summer			Autumn			Winter		
<i>Ichthyobodo necator</i>	44,1			32,5			0,0			0,0		
<i>Trichodina sp.</i>	82,7			89,4			69,2			100,0		
<i>Scyphidia sp.</i>	12,8			52,5			30,0			0,0		
<i>Gyrodactylus sp.</i>	39,5			21,2			2,5			8,3		
<i>Dactylogyrids (*)</i>	9,0			4,2			2,5			8,3		
? <i>Dicrogaster sp.</i>	58,0			23,4			28,2			54,2		
<i>Phagicola sp.</i>	48,1			17,0			7,6			8,3		
<i>Scolex polymorphus</i>	0,0			17,0			7,6			8,3		

Table 1. Prevalence of parasites over the four seasons (percentage of fish analyzed). (*) These data correspond only to *Dactylogyrus sp.*; *Metamicrocotyla sp.* was found only in one instance.

The following parasites were found:

Protozoa: *Ichthyobodo necator*, *Trichodina sp.* and *Scyphidia sp.* in the skin and gills.

Monogenean trematodes: *Gyrodactylus sp.* in the skin, *Dactylogyrus sp.* and *Metamicrocotyla sp.* in the gills.

Digenean trematodes: adult *Dicrogaster sp.* in intestine lumen, and *Phagicola sp.* (larval metacercarial stage) in liver, spleen and intestine wall.

Cestodes: "*Scolex polymorphus*" larvae in intestine lumen.

Prevalence of the different parasites throughout the year is shown in table 1. No significant difference in parasite prevalence was recorded for the three sampling places ($P > 0,05$)

Despite being a wide spectrum parasite among fresh water fishes, *Ichthyobodo necator* was not cited for the genus *Mugil* in the references consulted. It showed maximum prevalence in spring and summer, without occurrences during the rest of the year.

Trichodina sp. was also found in the Gulf of Mexico, Venezuela, Brazil and Peru in mugilids (Armas de Conroy, pers. com.). It was cited by Paperna & Overstreet (1981) in mugilids of the Black Sea, Mediterranean Sea, coasts of Louisiana and Florida in U.S. and coasts of South Africa. In Uruguay, we observed high prevalence throughout the year, with the highest values in winter. In Brazil, Conroy et al. (1985) found high prevalence (68,9 %) in winter, and moderate (33,3 %) in spring. Armas de Conroy (1982) reported prevalence of 42,5 % for Peru.

Scyphidia sp. presented maximum prevalence in summer, disappearing in winter. Conroy et al. (1985) found it on Brazilian coasts only in winter with low prevalence (4,4 %). It was cited by Armas de Conroy (1982) with a 10 % prevalence on Peruvian coasts and in Alabama coasts by Paperna & Overstreet (1981).

Gyrodactylus sp. was cited in mugilids in the Gulf of Mexico and Japan Sea (Paperna & Overstreet, 1981), on Georgia coasts (Rawson, 1976), and Venezuela (Conroy & Conroy, 1985). In Uruguay, it presented maximum

prevalence in spring and summer, and low prevalence in autumn and winter. This differs from the findings of Rawson (op. cit.), who notes for *Mugil cephalus* on the U.S. coasts, high prevalence in autumn (> 80 %) and very low in summer for class 0 individuals; and high prevalence in spring (> 90 %) and autumn (65 %) and lower in summer (20 %) for class 1 individuals. Conroy & Conroy (op. cit.) cited prevalence higher than 90 % in spring and between 20 and 65 % in summer and autumn.

Although several genus of dactylogyrids have been cited affecting genus *Mugil* species on the coasts of the Gulf of Mexico, Venezuela, Brazil, pacific coast of Mexico and Peru (Armas de Conroy, pers. com.), and North Atlantic European coasts, Mediterranean, Black Sea, Red Sea, and pacific coast of Russia (Paperna & Overstreet, 1981), no reference is made of *Dactylogyrus* sp. affecting mugilids. We found low prevalence throughout the year (2,5 - 9,0 %), while Conroy et al. (1985) found high prevalence of dactylogyrids in spring (46,7 %) and low in winter (1,3 %) in Brazil.

Metamycrocotylya sp. has been cited for mugilids in Brazil, California, Mexico, United States, Egypt, France, India and Hawaii (Paperna & Overstreet, 1981). In the present study, only one parasited specimen was found in spring.

Adults of several species of digenean trematodes in the intestine of genus *Mugil* fish have been cited by Conroy et al. (1985) and Paperna & Overstreet (1981), in seas and oceans worldwide. Specifically, genus *Dicrogaster* is cited for the Mediterranean

coasts, Georgia, and Louisiana by the latter authors. In our fish, prevalence of digenean was higher in winter and spring, dropping in spring and autumn. Conroy et al. (1985) described prevalence of 26,7 % in spring and only 8,4 % in winter. Armas de Conroy (1982) indicates a prevalence of 76,9 % for Peru.

Infestations by heterophyids have been cited by Paperna & Overstreet (1981) on Mediterranean, American and Asian coasts and Hawaii. Genus *Phagicola* has been cited for the U.S. Atlantic coasts (Paperna & Overstreet op. cit.) and Brazilian coasts (Conroy et al., 1985; Ruy de Almeida, pers.com.). In Uruguay, prevalence was found to be considerably high in spring (48,1 %) and quite low in the other seasons, which coincides with that reported by Conroy et al. (op cit.) in Brazil, who found a maximum of 93,3 % in spring and a minimum of 0 % in winter in *Mugil liza* juveniles. Armas de Conroy (op cit.) reports a prevalence of 72,5 % in mugilids of Peru. We observed that the larger is the size of the captured fish, the larger the number of metacercariae per specimen, possibly as a result of successive reinfestation. We observed parasited fish longer than 25 mm, coinciding with Conroy et al. (op cit.) who found the same in Brazil in mugilids longer than 23 mm. These results seem to differ from those of reported by Paperna (1975), who did not find parasited mugilids smaller than 50 mm and very low infestation levels (6 %) in fish smaller than 90 mm on the Mediterranean coasts of Israel.

The presence of tetraphyllidean larvae in intestine named "*Scolex polymorphus*" was cited by Conroy et al. (1985) in mugilids of Ven-

ezuela and Brazil, and by Paperna & Overstreet (1981) in *Mugil cephalus* of the Gulf of Mexico. In this study, prevalence was found to be low in summer and medium in autumn, without occurrences in winter and spring; while Conroy et al. (op cit.) found 13,3 % in spring and 0 % in winter on Brazilian coasts. In our studies we found an infestation intensity at between 68 and 210 cestodes per fish, which is lower to those levels cited by Conroy (over 200 cestodes per fish) and Paperna & Overstreet (600 – 4500 cestodes per fish).

In sum, several parasites were observed in mullet juveniles captured on Uruguayan coasts, a factor of particular relevance when used as seed for aquaculture. Prevalence of most of these parasites varied throughout the year, showing higher infestation levels in spring and summer. Probably related with water characteristics (salinity and temperature) as well as of stage of migration of juveniles from the sea to the estuary system, further research remains to be carried out to establish these relationships.

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