Research Paper Fisheries

Aquarium Fish: Study on Mycobacterial Infection

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ABSTRACT

The present paper reports on the mycobacterial infection in short of aquarium fishes. The mycobacterial infection of freshwater fish was first described as early as 1897 by Bataillon. Samples of tissue for culture examination were homogenized in a mortar, then centrifuged, treated using the HCl – NaOH method. The growth of mycobacterial strains was monitored every 2 weeks for a periodic of two months. On the basis of biochemical methods, it was found that in the fish with granulomas which we examined, species of mycobacterium were also isolated from the fish tissue examined.

From a pathogenic perspective, it is also important to note that the mycobacteria did not occur in the affiliated fish independently, but were always found together with other species of mycobacteria pathogenic for fish. It may therefore be assumed that they were not the main cause of disease in the fish, but may have appeared with the weakening for the organism or simply through accompanying mycobacterial "contamination".

KEYWORDS Aquarium fish; disease diagnosis; granulomas; mycobacteria.

1. Introduction

Chronic infections caused by – different species of mycobacteria have been found in fish from the Mediterranean sea [sea bass (Dicentrarchus labrax), sea bream (Sparus ourata), silver mullet (Mugil curema) and amberjack (seriola dumerili)] [1]. Mycobacterial infections were also found in sea fish in Japan, causing economic losses [2]. There was a spontaneous outbreak of – mycobacteriosis in fancy veiltail guppies (Lebistes reticulates), raised on an ornamental fish farm in Venezuela. Numerous mycobacteria were detected in smears from the kidneys, liver, mesentery and spleen of the fish and from clinical ill fish with listlessness, emaciation, spinal curvature, sunken eyes and loss of colour [3-4].

Mycobacteriosis was found in two stocks of zebrafish (Brachydanio rerio) in the presence of symptoms like skin erosions and ulceration along the flank just caudal to the pectoral fins, hyperemic gills, petechia around the opercula, abdominal distention, emaciation, congested liver with inflammation and multifocal hepatic necrosis [5-6]. found mycobacteriosis in fish of the delta smelt species (Hypomesus transpacificus) in the wild and kept in captivity at a time when they were subject to different stresses (a water – temperature higher than 17 °C or the period of spawning). Mycobacteriosis was diagnosed in wild rabbitfish (Siganus rivulatus) populations associated with commercial mariculture cages and inhabiting various sites along the Israeli Red Sea coastline. Materials and methods:

The first phase of the work:

In the first phase of our work, a total of 40 aquarium fish which had been delivered for examination from stocks in the Latur District collected from different aquariums (Fig. 1) with different health problems were examined (Table 3.1). Their bodies were subjected to path morphological and microscopic examination of native preparates with a focus on granulomatous lesions in the skin and in parenchymatous organs. The wet mounts were subsequently stained according to Z – N to identify AFR. Skin scrapings and prints of the skeletal musculature and individual organs of the body cavity (hepatopancreas, kidney and contents of the intestine) from each fish were examined.

The second phase of the work:

In the second phase, a further 17 randomly selected individuals from five species of aquarium fish (Fig. 2) with granulomas in parenchymatous organs were culturally examined (Table 2). Samples of tissue for culture examination were homogenized in a mortar, then centrifuged, treated using the HCl – NaOH method and cultured at temperatures of 25°C and 37°C on three media (One egg yolk medium according to Herrold, one liquid Serum medium according to Sula & one egg medium according to stonebrink). The growth of mycobacterial strains was monitored every 2 weeks for a periodic of two months [7-9].

The mycobacterial strains obtained were identified according to their morphological appearance as by staining according to Z – N and using biochemical methods.

Table 1: Pathomorphology and Ziehl – Neelsen staining (first part of the study)

PM Examination			Z – N Staining		
Lesions	No	%	AFR	No	%
-	12	30.00	-	13	32.5
			+	03	07.5
+	28	70.00	-	05	12.5
			+	09	22.5
Subtotal			-	08	20.0
			+	02	05.0
Total	40	100		40	100

PM = Pathomorphology (findings of granulomas) in parenchymatous organs.
Z – N = Ziehl – Neelsen staining.
AFR = Acid fast rods after the Z – N staining.



Fig.1 : *Xiphophorus maculates* Male (Gunther, 1866) (Platy)

Table 2: Mycobacteria detection by culture examination in parenchymatous organs with granulomas (second part of the study)

Z – N Staining			Culture Examination		
AFR	No	%	Isolation	No	%
-	7	41.2	-	4	57.1
			+	3*	42.9
+	8	47.0	-	1	12.5
			+	7	87.5
++	2	11.8	-	0	0
			+	2	100
Subtotal			-	5	29.4
			+	12	70.6
Total	17	100		17	100

Z – N = Ziehl – Neelsen staining.
AFR = Acid fast rods after the Z – N staining.
(- not detected, + detected in low concentration, ++ detected in massive amounts)



Fig. 2 : *Poecila sphenops* (Valemciemmes, 1846) (White Molly)



Fig. 3 : Growth of *Mycobacterium spp* on agar plate

Discussion:

The first phase of the work

From the identification of granulomatous lesions in more than 70% of the fish examined originating from stocks of aquarium fish in the Latur District, with health problems, it is possible to draw conclusions about the high frequency of chronic infections accompanying the creation of granulomas. Since AFR were not found in all granulomas lesions through direct microscopy (Table 1), it is possible to presume infection through other sources causing the creation of granulomas.

The reverse finding was made in three fish in which pathomorphological changes of a granulom character were not found, but in which AFR were found through direct microscopy (Table 3.1). The cause of probably the initial phase of the pathomorphological process before the creation of visible granulomas in the parenchymatous organs. It may also have been a question of contaimination of the body surface, branchiae on digestive tract of aquarium fish with non – pathogenic mycobacteria from the water environment, in which mycobacteria often occur. Fig. 3.

The second phase of the work

In the second phase of our work, by comparing the results of direct microscopic and culture examination for the presence of AFR, we had a higher yield from culture examination (Table 2). The pathomorphological examination of fish supplemented by direct microscopic examination for the detection of AFR may therefore be considered as a fast, but only auxiliary examination. This is indicated by the culture identification of mycobacteria pathogenic for fish in three individual without microscopic identification of AFR. The negative cultivation identified AFR (Table 2) may be explained by a devitalisation of mycobacteria through the defence mechanisms of the host out, such as, e.g. a low number of live mycobacteria in the tissue examined, which may have been killed during the preparation of the sample.

Conclusions

From a pathogenic perspective, it is important to note that the mycobacteria did not occur in the affiliated fish independently, but were always found together with other species of mycobacteria pathogenic for fish. It may therefore be assumed that they were not the main cause of disease in the fish, but may have appeared with the weakening for the organism or simply through accompanying mycobacterial "contamination".

Mycobacterial infections in fish also present a risk factor for the human population. They become infected while working with the contents of aquaria with infected fish.

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