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# MYCOBACTERIUM OR FISH TUBERCULOSIS!

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**“The origin of bacterial infections, such as Fish Tuberculosis is mostly poor hygienic, polluted, overcrowded conditions with bad feeding practices!”**

## Abstract

**F**ish diseases play an important role in the aquarium hobby. Therefore it remains important that we have a good diagnosis, prevention and treatment. During our studies & research on fish diseases in the aquarium hobby we find more & more cases of infection with the gram-positive bacteria *Mycobacterium* spp. . Since it is very difficult to cure this bacterial infection and since it can cause infections with humans (zoonosis Tank Granuloma), we must plan good prevention and husbandry.

## Introduction

References to literature are indicate with (number)

Bacterial diseases are very common in our aquarium fish (1)! Especially tropical waters where fish are raised & kept in high density, and fed with infected live or frozen food: an ideal environment for many pathogenic bacteria. Different species of *Mycobacterium* do exist in nature and can be found in our freshwater and marine aquarium fish (2). Although *Mycobacterium marinum*, *M. chelonae*, *M.*



*gordonae* and *M. M. fortuitum* (3) are the most common ones, we will not go into detail on all different *Mycobacteria*. Fish Tuberculosis is a chronic, progressive disease that causes serious losses. Unfortunately this bacterial infection shows up with different symptoms amongst our fish and is difficult to make an accurate diagnosis, even with the help of a microscope. This article we will focus on the published studies, the diagnosis, the prevention and the treatment.

**Several interesting studies that have been done on *Mycobacterium* on aquarium fish**

Study (4) during 3 years (2002-2005) in Italy, there were 387 private aquaria studied and showed 47% had MB-infection; also in 127 batches of imported fish they found that 30% had MB,

Study (5) in Czech Republic on 322 freshwater aquarium fish (36 species) with 58% showing MB, (4)

Study (6) of several public aquaria and 6 breeders in Moravia, CZ. showed that 43% of the examined fish had MB.

Study (7) in Slovenia: 35 aquarium fish (with Guppy, Goldfish, Cichlids, Gourami, Xipho, Corydoras, etc.) were investigated for the

presence of mycobacteria by culture and molecular methods. Isolates of mycobacteria were obtained in 29 cases (82.9%).

Study (8) in India: MB. infection was checked and found in 3 species, *Carassius auratus* (Gold fish), *ndinoacara rivulatus* (Green terror cichlid) and *Thorichthys meeki* (Fire mouth cichlid)

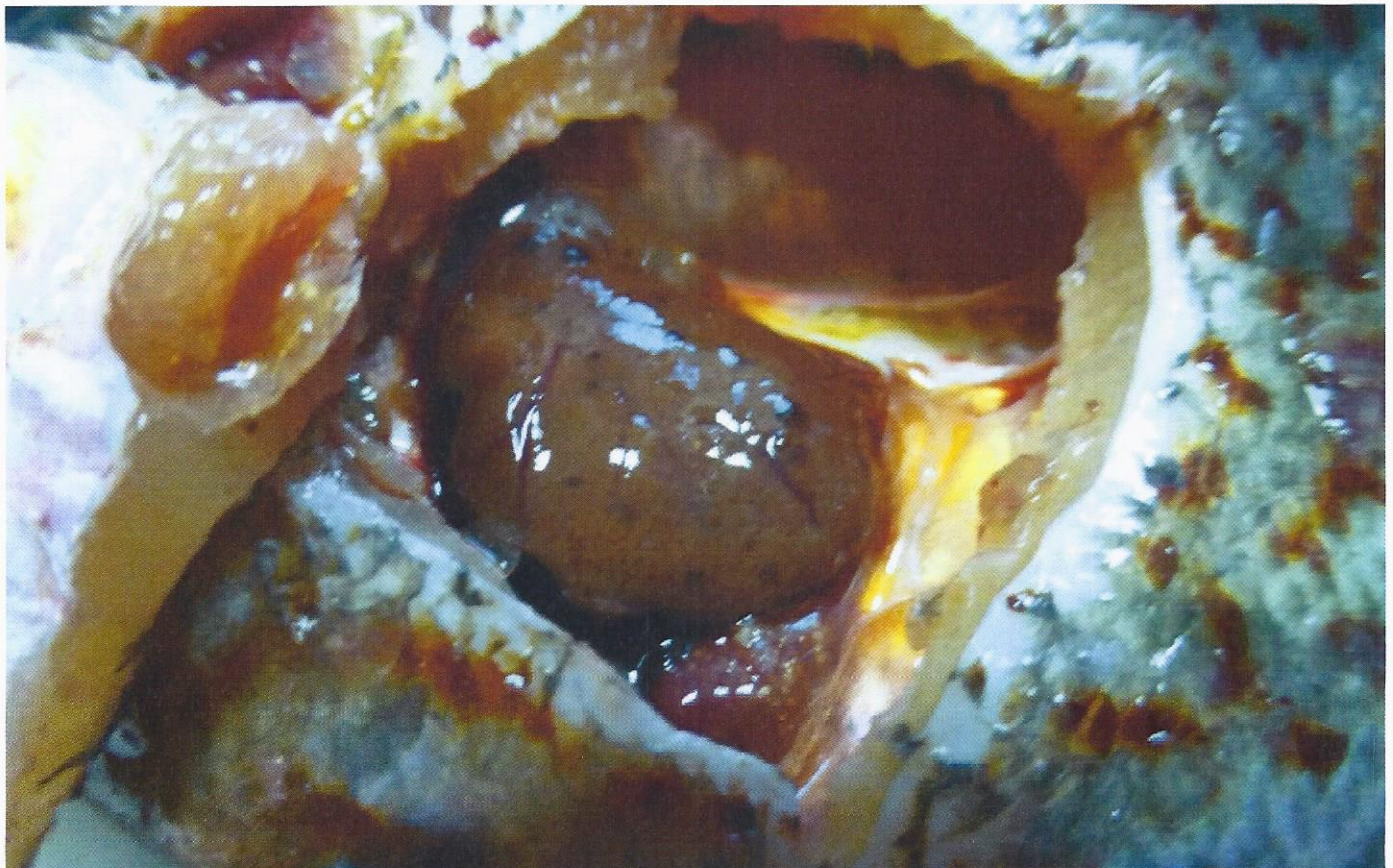
Study (9) in Spain on 38 different taxa, from several pet shops and private hobbyists. 200 different fish were checked for MB: *Tanichthys*, *Piranha*, *Hyphessobrycon*, African and South American Cichlids, *Betta* and other Gouramis; most MB was found in Guppies, Platies, Swordtails, Discus, *Trichogaster* and *Oryzias*. In total 40% of the examined fish had MB.

Study (3) in Poland from 136 ornamental fish (from shops and hobbyists ) 51% were found positive for MB; the fish examined where Neon, Guppy, Goldfish, Zebra Danio , Platy, Scalare, and Molly.

**How do we recognize or find a *Mycobacterium* infection?**

This bacterial infection is atypical or has many different appearances: discoloration, darkening, emaciation, anorexia, loss of appetite, lethargy, resting on bottom, whitish necrotic or reddish ulcers, pop-eye, abdominal swelling or spinal

Left: *Apistogramma* with swollen belly due to MB  
Below: Dissected Discus with granulomas in organs





deformation. Since this disease progresses over time, we find it most often in the older fish, therefore it is sometimes called the 'old age syndrome' (10)(16).

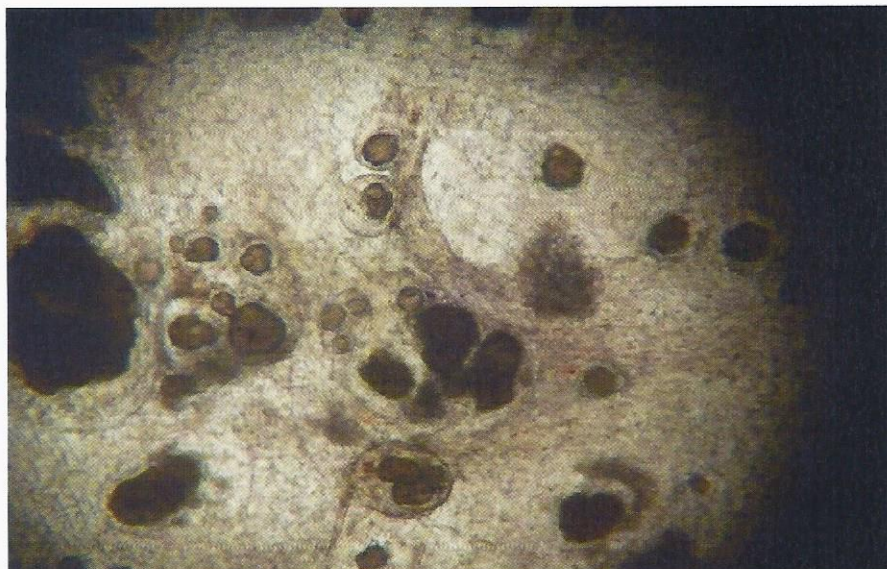
#### **Microscopic examination**

When we perform a microscopical examination, we can find tubercles (granulomas) in the organs: kidney, spleen, liver, gonads, skin and sometimes in the gills. (Photos) Also fish without granulomas can be infected with the *Mycobacteria*. We have learned from several studies that 80% of the tubercles are 'encapsulated' infections of the bacteria *Mycobacterium*. Only the microbiological laboratory can confirm & determine the Bacteria. Some fish will show minor lesions or less advanced symptoms: these fish will also have less tubercles and the organs will have less damage. It happens often that in your aquarium some species will be seriously infected (with badly infected organs) while others are slightly infected and show no signs at all! Sometimes many *Mycobacteria* are on skin, gills and internal organs without showing any tubercles.

#### **Prevention of Fish Tuberculosis (*Mycobacterium*)**

The origin of bacterial infections, such like Fish Tuberculosis is mostly poor hygienic, polluted, overcrowded conditions with bad feeding practices!

When we want to prevent the spreading of this bacterial infection, we have to understand that this infection is passed on by the mother-fish via the gonads/eggs, directly to the babies: so the babies are born with the infection. Also fish food, such as live & frozen mosquito larvae and fish for human consumption, are often contaminated with *Mycobacterium*(11)(12)(13)(14). Please note that freezing does not kill this bacteria! Proper heating or cooking of live or frozen



Liver from Discus with tubercles (200x)



Spleen from Rainbowfish with tubercles (200x)



12 year old Cardinal tetra with MB





*Crossocheilus* with spinal deformation due to MB



*Julidochromis* with necrotic ulcer due to MB



Discolored & skinny Discus with MB

fish food is the best method to free of pathogenic microbes. In aquaculture it is a common practice to purchase food 'free from microbes', therefore 99% use granulated food!

In the aquarium, the infected fish can pass on their bacterial infection via the feces or when eaten by their compatriots. Fish that show above advanced signs (see photos) should be separated in a quarantine tank or euthanized. Breeders should select proper breeding stock to avoid further transmission.

For aquarists: proper water conditions, selected food and avoiding overcrowding is the best prevention planning! Buy from a good fish supplier who takes proper actions to avoid these kind of infections.

#### **Treatment of Fish Tuberculosis (*Mycobacterium*)**

In most cases, when fish are seriously infected, especially when there many granulomas in the organs, it is usually too late to treat.

In the beginning stages, you can help the fish by strengthening the defense (immune) system with a food that contains probiotica (such as bacteria *Pediococcus* to improve the gut flora & digestion) and prebiotica (such as yeast extracts that stimulate the immune system): this helps the fish to fight the bacterial infection.

Antibiotics can be used as medications but are only available upon prescription by a veterinarian. In this case we recommend the treatment with Kanamycin: 50 ppm during 48hrs, change the water and repeat the treatment 4 times (15) (10); Also Doxycycline mixed in the food: 100-200mg/100 g fish food fed during 2 à 3 weeks.

From recent research & testing, we can recommend the use of Dr. Bassleer Biofish Food FUCO. It is a high quality food with nutraceuticals = it contains





Finger of aquarist infected with *Mycobacterium*: tank granuloma

immunostimulants (yeast extracts), probiotics (*Pediococcus*) and extracts from marine algae Kelp (*Laminaria*) that is used to combat bacterial infections. Recommended feeding during 20 to 30 days and no other food.

**Tank Granuloma (Zoonosis): mankind infected by the fish pathogenic bacteria *Mycobacterium***

It can (seldom) occur with aquarists that handle the aquarium fish and clean the aquaria & filter. When the aquarist has wounds or lesions, and when he/she doesn't take proper hygienic measures there is a risk of an infection! Usually it takes 2 to 8 weeks to show-up as infected wounds. Just proper hygiene prevents this infection: like you finished working in your garden where you wash your hands with soap or disinfectant! If you have an infection that looks like this, tell your doctor that you have an aquarium and that he has to check for Tank Granuloma or gram-positive bacteria. Several reports have published on this matter (16)(17) (18)

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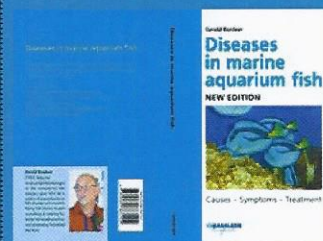
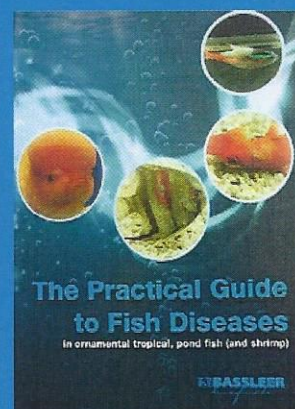
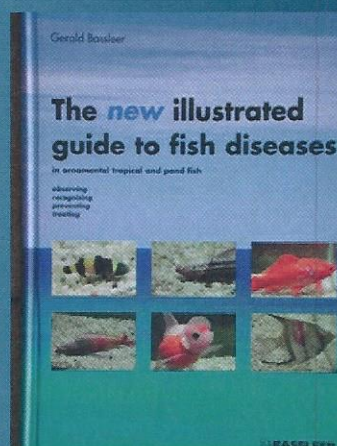
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