DEUTSCHE VETERINÄRMEDIZINISCHE GESELLSCHAFT e. V.

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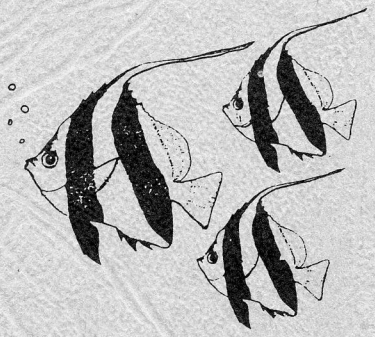

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Incidence and pathological significance of some insufficiently known parasite species in goldfish cultured in aquaria

Csaba Székely and Kálmán Molnár

From the parasitological point of view the aquarium can be considered a miniature habitat which greatly influences the species and number of parasites living in it. As a general rule, this habitat reduces or excludes the occurrence of parasites with a complicated developmental cycle; on the other hand, because of the high fish density it affords increased chances for the occurrence of parasites of broad host range and direct development. The parasite fauna of fishes kept there can be only a minor source of aquarium infection; in the majority of cases parasitic infection comes from fishes transferred into the aquarium from elsewhere and from food originating from natural waters. Under aquarium conditions the development of parasitosis is facilitated by the high fish density (which is much higher than in farm ponds) and by the easily occurring other predisposing factors (e.g. low O_2 content, high nitrite, nitrate or ammonia content).

The type of parasitoses and the parasite fauna are decisively determined by the species of the aquarium fish. In marine and tropical fish, apart from a few directly developing specific parasites, only parasites of an extremely broad host range cause problems. On the other hand, fish species closely related to those living in Hungarian natural waters can be colonized by a large number of parasites introduced with the food or, possibly, with the aquatic vegetation. This may result in symptoms similar

to those seen on farm-pond fishes and in deaths.

In this respect, the goldfish is one of the most exposed aquarium fishes, as in Hungary its close relatives, the common carp and the crucian carp (Carassius carassius) are common in the natural waters. Furthermore, in recent years Carassius auratus gibelio, which can be considered to belong to the same species as the goldfish, has also become widespread.

In our study, the following parasite species were demonstrated in goldfish.

Parasite species most frequently occurring in goldfish

Cryptobia branchialis	Kinetoplastomonada
Ichthyobodo necator	Kinetoplastomonada
Trypanosoma borelli	Kinetoplastomonada
Trichodina spp.	Peritricha
Ichthyophthirius multifiliis	Hymenostomata
Chilodonella cyprini	Cyrtostomata
Goussia carpelli	Coccidiomorpha
Sphaerospora sp.	Myxosporea
Pleistophora hyphessobriconnis	Microsporea
causative agent of granulomatosis	?
Gyrodactylus medius	Monogenea
Gyrodactylus schulmani	Monogenea

Of these parasites, most frequently the ectoparasitic flagellates and ciliates, especially Cryptobia branchialis, Ichthyobodo necator, Trichodina spp., Chilodonella cyprini,

and Ichthyophthirius multifiliis cause problems. These parasites are introduced into the goldfish cultures with the food almost day by day and the losses caused by them can only be prevented by systematic treatment. In Hungary, malachite green, formalin and FMC solutions are used by ornamental fish culturists to control the above diseases; however, prior to transportation a short exposure to 2 to 3 % NaCl solution is widely used for preventive purposes.

Monogeneans are also common parasites of the goldfish which is known to have 15 monogenean parasite species. Most of them occurs in Hungary on goldfish cultured in farm-ponds; however, in aquarium goldfish only Gyrodactylus spp. have been reported to cause losses. Our results show that the most frequent monogenean parasite of the goldfish is G. medius, but G. schulmani can also be considered rather common.

Until quite recently, gyrodactylosis has been considered a negligible disease as in the Hungarian farm-ponds organophosphates are effectively used against this parasitosis. However, our recent observations made in aquaria support the data obtained in other countries (Goven et al., 1980) according to which gyrodactyli parasitizing the goldfish become resistant to organophosphate derivatives. Thus, gyrodactylosis has also become a dangerous parasitosis. In such cases much more expensive anthelmintics have to be used, e.g. exposure to mebendazole solution. Attention should be called, however, to the importance of completely changing the water of the aquarium after mebendazole ex-

posure, since cyprinids are highly sensitive to prolonged (4- to 5-day) exposure to this drug (Székely and Molnár, 1988).

The above-listed parasites and parasitoses are known to all experts of fish pathology. In the following, we shall report on parasitoses which sometimes might have an important pathological role but their occurrence in aquaria is insufficiently documented.

1. Trypanosoma borelli infection. Severe trypanosomosis of goldfish breeders kept in aquaria was observed on several occasions. In blood samples taken from the infected fish the number of parasites sometimes came close to 20 % of the red blood cell counts. The severely infected fish were depressed, emaciated, had reduced appetite, were lying on the bottom and many times were gasping for breath on the surface. The occurrence in goldfish of Trypanosoma borelli, a parasite of broad host range, is not a novelty. The fish were kept exclusively in aquaria and throughout their life they did not have any contact with leeches considered to act as the intermediate host. This fact indicates that in this case the blood parasites were transferred from one fish to another directly, without an intermediate host. We have found only one reference to this surprising phenomenon: in connection with Trypanoplasma salmositica infection of salmons Bower and Margolis (1983) observed that at a high fish density and direct bodily contact between the fish transcutaneous infection was a distinct possibility.

2. Goussia carpelli infection: In 6- to 7-week-old goldfish fry we frequently saw signs indicative of coccidiosis and the mass occurrence of developmental stages and oocysts in the gut. The infected fry showed retarded growth, emaciation, and their head was disproportionately large. The abdomen was sunken. The fish showed reduced motility, they were lying on the bottom in groups or gasping on the water surface. Such severe symptoms were accompanied by a substantial number of deaths.

An interesting feature was that goldfish and common carp fry reared free from infection and placed in the infected stock as contact controls never became infected in spite of having ingested, in all probability, the excreted oocysts. At the same time, both the goldfish and the common carp reared infection-free developed severe coccidiosis after having been fed tubifex from natural waters. In agreement with our earlier studies on common carp (Molnár, 1979) and with experimental results obtained by Kent and Hedrick (1985), we are of the opinion that the tubifex food serving as carrier is responsible for the severe coccidiosis of aquarium-reared goldfish fry. Data of the literature suggest (Musselius et al., 1965) that furazolidone is effective against this infection. However, in our experience the affected fish are reluctant to ingest the medicated feed, thus this treatment is not reliable.

3. Renal sphaerosporosis. The disease was observed in the 6- to 7-week-old goldfish fry in which coccidiosis was also diagnosed. In severe Sphaerospora infection the

fry were emaciated, retarded in growth, exhibited exophthalmus and ruffled scales, and many of them died. On dissection, besides the hydropic signs, numerous trophozoites and spores of a Sphaerospora species were demonstrable in the renal tubules. In the blood of these fish the early developmental stages of sphaerospores were also found. It is known from the work of Csaba et al. (1984) that in the common carp, of the early developmental stages of sphaerospores the smaller, so-called C stages occur in the blood, while the larger, so-called K stages in the swimbladder wall where they cause swimbladder inflammation. In goldfish no developmental stages were found in the swimbladder wall. On the other hand, in the blood the typical C stages were accompanied by large numbers of developmental stages containing 15 to 30 daughter cells (these latter stages corresponded to the K stages). The existence of such circulating K stages has been reported by Baska and Molnár (1988) from the asp and white bream. A typical feature of the K stages found in the blood of goldfish is that the primary cells consistently contained, besides the secondary cells, 2 hitherto unknown, unidentified cell components.

As the blood stages markedly differ from those seen in the common carp both in morphology and in location, we suppose that the Sphaerospora species occurring in goldfish is not identical with Sphaerospora renicola. Our failure to produce renal sphaerosporosis by inoculating goldfish with swimbladder stages from common carp also speaks against such an identity.

We assume that our aquarium fish become infected by an insufficiently known Sphaerospora species parasitizing Carassius auratus gibelio. The mode of infection is unknown. Fry fed tubifex consistently developed renal sphaerosporosis. However, in several cases the disease occurred also in stocks in which the eggs obtained by artificial breeding were hatched after disinfection and the fry was reared infection-free exclusively on Artemia nauplii and diet. It is not known whether infection was caused by spores attached to the eggs or the fry were infected by actinosporeans coming from tubifex, as suggested by Wolf and Markiv (1984) and El-Matbouli and Hoffmann (1987). The latter could be explained in one way only: after getting through the digestive tract of breeders previously fed on tubifex, actinosporeans attached to the eggs and caused infection,

Sphaerosporosis of goldfish can, in all probability, be effectively controlled by feeding a medicated diet containing Fumagillin DCH. Its effectiveness for controlling sphaerosporosis of common carp has already been reported (Molnár et al., 1987).

4. Pleistophorosis. Microsporeosis caused by Pleistophora hyphessobriconnis is a common disease of neon fish. In Hungary it has been reported from minnow and goldfish as well. In goldfish the location of the parasite is surprising: this typically muscle parasite was found on the peritoneum of goldfish. The pathogenicity of this parasite to the host is not known.

5. Granulomatosis. This disease, originally described by Landsberg and Paperna (1985), has frequently been reported in Hungary. It causes premature culling and death of goldfish breeders. In severe infection foci extending to all organs are seen after opening the abdominal cavity. The infected breeders become emaciated, show disorders of movement, and in the final stage immediately preceding death frequently a secondary infection resembling abdominal dropsy develops. According to our observations the disease is transmitted with the eggs and the young foci can already be demonstrated in the fry. Species identification of the pathogen has been unsuccessful so far. In our opinion, the parasite is closely related to the parasite demonstrated from salmons as dermocystidium by McVicar and Wootten (1979) and that described by Kovács-Gayer et al. (1986) as the dermocystidium-like pathogen of the common carp. Unfortunately, no effective therapy is known at present. Granulomatosis is considered the most significant disease of goldfish.

References

Baska, F. and Molnár, K. (1988): Blood stages of Sphaerospora spp. (Myxosporea) in cyprinid fishes. Dis. of Aquat. Org. 5. 23-28.

Bower, M.S. and Margolis, L. (1983): Direct transmission of the haemoflagellate Cryptobia salmositica among Pacific salmon (Onchorhynchus spp.). Can. J. of Zool. 61. 1242-1250.

Csaba, GY., Kovács-Gayer, É., Békési, L., Bucsek, M., Szakolczai, J., Molnár, K. (1984): Studies into the possible protozoan aetiology of swimmbladder inflammation in carp fry. J. Fish Dis. 7. 39-56.

El-Matbouli, M. and Hoffmann, R. (1987): The role of the Tubifex as an intermediate host of the Myxosporidians. 2nd Intern. Symp. of Ichthyoparasit. Sept. 27- Oct. 3. 1987. Tihany, Hungary.

Goven, A., Gilbert, P., Gratzek, B. (1980): Apparent drug resistance to the organophosphate dimethyl(2,2,2-trichloro--1-hydroxiethil)phosphonate by monogenetic trematodes. J. Wildl. Dis. 16. 343-346.

Kent, M.L. and Hedrick, R.P. (1985): The biology and associated pathology of Goussia carpelli (Léger and Stankovitch) in goldfish Carassius auratus (Linnaeus). Fish Pathol. 20. 485- 494.

Kovács-Gayer, É., Csaba, GY., Rátz, F., Békési, L., Szakolczai, J. (1986): Granulomatosis bei Cypriniden, unbekannten Erreger bei Karpfen. DVG Tagung der Fachgruppe "Fischkrankheiten". München, 28-29.Oktober. 1986.

Landsberg, J.H. and Paperna, I. (1985): Parasite induced kidney granuloma in the goldfish, Carassius auratus. EAFP 2nd Intern. Conf. Montpellier. 72.

Mc Vicar, A.H. and Wootten, R. (1979): Disease in farmed juvenile atlantic salmon caused by Dermocystidium sp.Fish Diseases: Third COPRAQ-Session. 23-26. Oct. Münich. 1979. 165-172. Ed. by W. Ahne. Springer Verlag, Berlin, Heidelberg, New York.

Molnár, K. (1979): Studies on coccidia of Hungarian pond fishes coccidia and further prospects of their control. Proc. of the Intern. Symp. on Coccidia. November 28-30. 1979. Prague. 179-183.

Molnár, K., Baska, F. and Székely, CS. (1987): Fumagillin, an efficacious drug against renal sphaerosporosis of the common carp Cyprinus carpio. Dis. of Aquat. Org. 2. 187-190.

Musselius, V.A., Laptev. V.I., Ivanova, N.SZ. (1965): O kokcidioze karpov. Trudi VNIIPRH. 13. 69-77. (in russian).

Székely, CS. and Molnár, K. (1988): Efficacy of the anthelmintic mebendazole against monogeneans of different fish species. Intern. Symp. on Monogenea. 7-13 August. 1988. Ceske Budejovice.

Wolf, K. and Markiv, E. (1984): Biology contravenes taxonomy in the Myxozoa: New discoveries show alteration of invertebrate and vertebrate hosts. Science. 225. 1449-1452.