

Epidemiological Study on Frequency of Myxosporidian Diseases in Freshwater Fish Stemming from Aquatic Habitats Pertaining to the Danubian Delta Biosphere Reservation

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Abstract

In the study we aimed at estimating prevalence of two Myxosporidian diseases (Henneguyosis and Myxoboliosis), in order to measure their frequencies and distributions within populations of *Esox lucius*, *Sander lucioperca* (Henneguyosis) and *Perca fluviatilis* (Myxoboliosis) originating from Sontea-Fortuna (S.F.) and Gorgova-Uzlina (G.U.) aquatic habitats, within the Biosphere Reservation of Danubian Delta, Romania.

The biologic material was selected without prior knowledge of the disease status. Prevalence was determined by classifying fishes as either diseased/infected or not, at one moment in time (Point prevalence). The prevalence was determined as the proportion of diseased/infected individuals within the studied fish species.

The research started in 2003 and finished in 2008. In *Esox lucius* maximum prevalences were found during the years 2005 (10.26% in S.F. aquatic habitats) and 2008 (11.43% in G.U. aquatic habitats); in *Sander lucioperca* maximum prevalences were found during the years 2004 (15.91% in G.U. aquatic habitats) and 2006 (16.67% in S.F. aquatic habitats); in *Perca fluviatilis* maximum prevalences were found during the years 2003 (8.97% in S.F. aquatic habitats) and 2004 (15.93% in G.U. aquatic habitats).

Overall, during the research period, an over-dispersed distribution of the parasites was noticed within both aquatic habitats.

Keywords: freshwater fish, *Henneguya psorospermica*, *Myxobolus* sp., prevalence

1. Introduction

The Myxosporidia group (Phylum Myxozoa) comprises of Metazoa parasites inhabiting freshwater and marine fish (occasionally, Amphibia and Reptiles [1]).

Many species cause severe outbreaks in both farmed and wild fish. *Henneguya* are important fish pathogens, gills being oftenly the most affected organ. *Myxosporidia* spores are reported on the cartilage of caudal peduncle, within gills, fins, epithelium, connective tissue and muscle [2]. For the majority of myxozoans, the oligochaete stage – actinospore – is the infective stage to a susceptible fish. Most actinospores have been

reported in the families Nadidae and Tubicidae, although the parasite specificity in the invertebrate host is still unclear [3].

Romania hosts the greatest part of the Danube Delta and the best preserved ecosystems therein. The epidemiology of parasitic diseases in fish tend to change according to the environmental changes and other influencing factors, which altogether lead up to difficulty in determining a predictable pattern of disease. This aspect has been inferred also regarding the myxozoan infection in fish, which does not have a clear pattern of host specificity and may show a discontinuous prevalence [4].

The aim of the scientific work was to make an estimation of the prevalent cases of two Myxosporidian diseases, henneguyosis and mxosporidiosis, within the Danube Delta area and to make a comparison between the two estimations.

2. Materials and methods

A total of 3267 fishes were examined from 2003 to 2008. There were two study groups which included fish found infected with *Myxobolus* sp (2272 European perches, *Perca fluviatilis*) and *Henneguya psorospermica* respectively (995 pikes, *Esox lucius*, and zanders, *Sander lucioperca*).

The fish was clinically and pathologically examined, then a microscopic examination was being carried out so that the presence and morphology of the parasitic spores were established.

The cyst samples were examined in light microscopy on fresh and stained preparations; for the latter, we used the green malachite technique.

The prevalence of *Myxobolus* sp. and *Henneguya psorospermica* within the two groups was estimated using the point prevalence method: the proportion of animals in a population that are infected or diseased.

3. Results and discussion

On the examinations of myxoboliosis cases the fish showed abdominal dilatation due to ascites, haemorrhage and muscular necrosis. A prominent emaciation in some cases was also noticed. The

parasitic cysts were found in the connective tissue and within the liver.

The old cysts were found encapsulated by connective tissue (fig. 1).

The parasitic cysts were examined in light microscopy (fig. 2). They were of round shape and possessed one or two polar capsules.

The prevalence of infection with *Myxobolus* sp. had different proportions within the European perch: 7.67% in the Sontea – Fortuna natural complex and 12,91% in the Gorgova – Uzlina natural complex (table 1).

As for henneguyosis, a large number of parasitic cysts varying in size, morphology and site of infection between the two studied species of fish were noticed (figs 3 and 4). The gills were hyperemic and into the opercular cavity an extremely consistent mass of branchial mucus was present. Clinically, both species showed signs of anaemia and hypoxo.

Microscopically, the isolated spores were spindle-shaped, with 2 symmetric polar capsules; at the posterior end, two appendices were present (fig. 5); the description fitted the morphology of *H. psorospermica* in both cases, despite the differences shown in morphology of the cysts between the two species.

The prevalence of henneguyosis in the pike and zander was: 7.45% in pike and 10.15% in zander in the Sontea – Fortuna natural complex, and 8.12% in pike and 11.11% in zander in the Gorgova – Uzlina natural complex (table 2).



Figure 1. *Myxobolus* sp. cysts in *Perca fluviatilis*

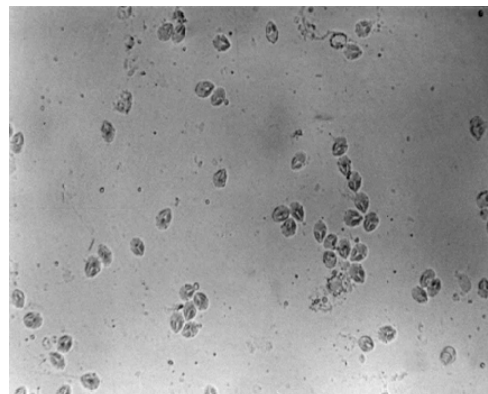


Figure 2. *Myxobolus* sp. spores in *Perca fluviatilis* (x 400)

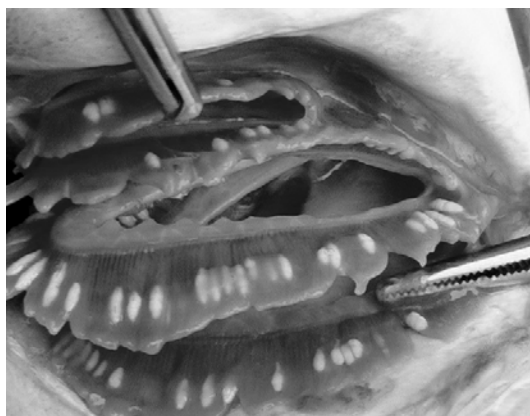


Figure 3. Cysts of *Henneguya* in *Sander lucioperca*



Figure 4. Cysts of *Henneguya* in *Esox lucius*

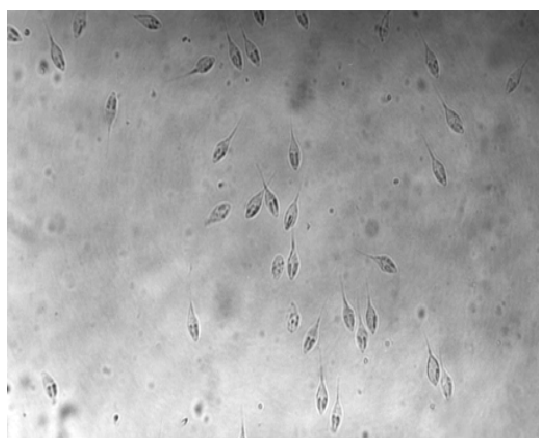


Figure 5. *Henneguya psorospermica* spores in *Sander lucioperca*

Table 1. The prevalence of *Myxobolus sp.* infection in European perch (*Perca fluviatilis*) stemming from Şontea – Fortuna and Gorgova – Uzlina natural complexes

Year	Analysed samples		<i>Myxobolus sp.</i> infection			
	Şontea – Fortuna	Gorgova – Uzlina	Infected		Prevalence	
			Şontea – Fortuna	Gorgova – Uzlina	Şontea – Fortuna	Gorgova – Uzlina
2003	145	272	13	42	8.97	15.44
2004	169	226	11	36	6.51	15.93
2005	173	295	15	28	8.67	9.49
2006	133	258	10	31	7.52	12.02
2007	121	196	8	26	6.61	13.27
2008	116	168	9	19	7.76	11.31
Overall analysed	857	1415	66	182	7.67 ¹	12.91 ²

¹7.67 = the main value for the prevalence in the Şontea – Fortuna natural complex

²12.91 = the main value for the prevalence in the Gorgova – Uzlina natural complex

Table 2. The prevalence of *Henneguya psorospermica* infection in pike (*Esox lucius*) and zander (*Sander lucioperca*) stemming from Şontea – Fortuna (S.F.) and Gorgova – Uzlina (G.U.) natural complexes

Year	Analysed samples				<i>Henneguya psorospermica</i> infection							
	pike		zander		Infected				Prevalence			
	S.F.	G.U.	S.F.	G.U.	pike		zander		pike		zander	
	S.F.	G.U.	S.F.	G.U.	S.F.	G.U.	S.F.	G.U.	S.F.	G.U.	S.F.	G.U.
2003	54	51	43	47	5	3	4	2	9.26	5.88	9.30	4.26
2004	47	45	35	44	3	4	3	7	6.38	8.88	8.57	15.91
2005	39	41	31	33	4	3	2	3	10.26	7.32	6.45	9.09
2006	41	48	36	39	2	5	6	4	4.88	10.42	16.67	10.26
2007	52	42	45	43	4	2	5	6	7.69	4.76	11.11	13.95
2008	32	35	34	38	2	4	3	5	6.25	11.43	8.82	13.16
Overall analysed	265	262	224	244	20	21	23	27	7.45 ¹	8.12 ²	10.15 ³	11.11 ⁴

¹7.45 = the main value for the prevalence in pike from the Şontea – Fortuna natural complex

²8.12 = the main value for the prevalence in pike from the Gorgova – Uzlina natural complex

³10.15 = the main value for the prevalence in zander from the Şontea – Fortuna natural complex

⁴11.11 = the main value for the prevalence in zander from the Gorgova – Uzlina natural complex

4. Conclusions

4.1. In *Esox lucius* maximum prevalences were found during the years 2005: 10.26% in S.F. aquatic habitats, and 2008: 11.43% in G.U. aquatic habitats.

4.2. In *Sander lucioperca* maximum prevalences were found during the years 2004: 15.91% in G.U. aquatic habitats, and 2006: 16.67% in S.F. aquatic habitats.

4.3. In *Perca fluviatilis* maximum prevalences were found during the years 2003: 8.97% in S.F. aquatic habitats, and 2004: 15.93% in G.U. aquatic habitats.

4.4. An aggregated (uneven) distribution of the parasites was noticed within both aquatic habitats.

4.5. According to the main prevalences which were obtained for Myxoboliosis and Henneguyosis within the two natural complexes, it resulted that the frequency of the studied Myxobolioses in Gorgova-Uzlina was higher with 0.007-0.055% then in Sontea-Fortuna.

References

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