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ICHTHYOPHONUS HOFERI AND ANISAKIDAE LARVAE IN HERRING AND SPRAT IN THE NORTH-EASTERN BALTIC

by

Aleksei Turovski, Robert Aps
& Tiit Raid

Estonian Marine Institute
32 Lai Str., EE0101 Tallinn
Estonia



Abstract

The highly pathogenous fungus *Ichthyophonus hoferi* as well as anisakoid nematod larvae supposed to be connected in some way with the observed meagerness of herring were taken under parasitological monitoring in Estonian waters since 1991. The *I. hoferi* infestation in herring in the Gulf of Finland is obviously dying away and in sprat it was practically vanished in 1993. However in the North-Eastern part of the Gulf of Riga some herring with capsules of *I. Hoferi* in the heart muscle tissue were found. The possible connection between those infestations and migrations of fishes is discussed.

Introduction

In our report to ICES in 1992 (Turovsky, Aps & Raid 1992) we stated the presence of highly pathogenous parasitic fungus *Ichthyophonus hoferi* in Baltic herring and sprat in Estonian waters and significant increase in infestation by anisakoid larvae in herring. The pathogenicity of these parasites to fish and, in case of anisakoid nematods, also to mammals encouraged us to continue our studies in 1993.

Material

The material was collected in the Gulf of Riga (herring) and the Gulf of Finland (herring and sprat) from Estonian commercial landings. Altogether 1460 herring and 670 sprat were analysed from June 1992 to June 1993.

Results and discussion

The microscopic surveillance did in no cases at all revival ichthyophonosis in Estonian waters up to June 1993. The microscopic study of the heart, kidney and liver showed in period

under consideration the spores of *I. hoferi* in 11 samples of Baltic herring in the Gulf of Finland, in 3 samples from the Gulf of Riga, in 7 samples from the Western Estonian Archipelago (Muhu Island); and in 4 samples of sprat in the Gulf of Finland. So the prevalence of *I. hoferi* in clupeids fall from approximately 3% in the autumn 1991 - spring 1992 well under 1% in the autumn of 1992 - spring of 1993.

Clupeids infected by *I. hoferi* belonged to age groups over 4. Two specimens of herring, 7 and 9 years old respectively, were of particular interest because in their livers and hearts the so called capsules of *I. hoferi* formed by host tissues over the dead spores of fungus were observed. The similar capsules including dead and isolated hyphae of the fungus were observed in a number of specimens of eel-pout *Viviparus blenni* (*Zoarces viviparus*) in 1978-1984 in the Gulf of Riga and Western Estonian Archipelago mainly. In 1993 we found them again in *V. blenni* with prevalence up to 17% in the Gulf of Riga (n=17) and the Gulf of Finland (n=28). The capsules resembled very much the ones described by Möller and Anders (1983).

The invasion by the larvae of nematodes of Anisakidae observed in herring in 1992-1993 had the same pattern as in 1991-1992 (Turovsky, Aps, Raid 1992): from September to early March over 90% of meagre herring were infected by larvae of the genus *Contracaecum* mainly, but from April to June the prevalence of nematodes in meagre fish fall well under 20%. It is possible that meagre already exhausted fish burdened by the helminthic infection did not survive the springtime, but the question whether the growth of infection occurred in autumn is one of the causes of meagerness or is it a consequence of the changes in a feeding strategy of fish already inclined to meagerness is not clear yet. Curiously enough, in one specimen of herring from the Gulf of Finland (age 4) we found 39 specimens of *Cystidicola farionis* in swim bladder (perforated) and body cavity, a specific parasite of swim bladder of *Osmerus eperlanus*.

To conclude we suppose that *I. hoferi* presence in Estonian water is due to arrival of some peripheric waves of ichthyophthiriosis of the Baltic into the Gulf of Finland along probably also the spring migrations. In Estonian waters *I. hoferi* is retreating now into deposition in bottom fishes, particularly in *Viviparus blenni*. This infection would probably die away as it occurred in 1989s.

References

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oocysts of parasite indicate a long established adaptive interrelation between the Baltic herring and *E. sardinae*, whose oocysts obviously pass free from hosts organism into marine environment during the spawning. It is well known, that in most cases such evolutionally well established connections between host and parasite are never too antagonistic and in fact we didn't find any seriously affected male fish. But in this case the supposition must be made that at least a part of the infected herrings examined may belong to the population parasitologically familiar for some long period with these coccidian.

The vast majority of herring in our samples belonged to age groups 2-3, so we couldn't prove the postulate of Kabata (1963) that a steady rise in invasion by *E. sardinae* exists in herring until the age of six whereupon the invasion decreases again. Some herring at age 5-9 we were able to analyse (n=38) showed indeed such a tendency.

In herring of age 2-3 years we observed acertain variability in the size (diameter) of ripe oocysts. The oocysts in herring collected in the Gulf of Riga were slightly larger than the ones from the Gulf of Finland, 40-62 (average 44) μm and 34-46 (average 38) μm , respectively. 600 oocysts were measured from each of the Gulfs.

In sprat (Table 2) infestation by *E. sardinae* is still at a very low rate compared with herring and the tendency to the seasonal oscilation in the rate of invasion observed in herring (Table 1) was not found in sprat. The sudden rise in both prevalence and intensity of infestation in sprat in May 1993 was observed in samples also infected by *Ichthyophonus hoferi* (in 2 sprats). Wether this fact is a coincident connected with occasional migration or is it due to some decrease in resistance caused by those parasites is not clear.

To conclude we are able to point out that *E. sardinae* infestation is established in clupeids in the Gulf of Finland at least from 1991. It is still unclear whether it is due to recent migrations of herring and sprat or did invasion by oocysts taken place in Estonian waters.

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Table 1

The prevalence (%) of *Eimeria sardinae* (oocysts in testicles) in 2-3 year old Baltic herring in the Gulf of Riga and the Gulf of Finland in 1991-1993.

Year	Month	n	G. of Riga	n	G. of Finland
1991	IX		-	100	18
	X	25	24	100	22
	XI	25	36	100	31
	XII		-	100	36
1992	I		-	100	33
	II	100	62	100	34
	III	100	74	100	42
	IY	20	75	100	44
	Y	20	50	100	36
	YI		-	100	11
	YII		-	100	6
	YIII		-	100	10
	IX	20	20	100	14
	X	20	40	100	49
	XI		-	100	44
	XII		-	100	62
1993	I	30	80	100	72
	II	40	75	100	74
	III	40	75	100	78
	IY	40	80	100	72
	Y		-	100	76
	YI		-	100	24

Table 2

The prevalence (%) of *Eimeria sardinae* (oocysts in testicles) in sprat in the Gulf of Finland in 1992-93 (n=20 monthly)

Year	1992				1993					
Month	IX	X	XI	XII	I	II	III	IY	Y	YI
Prevalence	20	20	15	15	20	10	10	5	80	60