

## DISEASES OF COD OBSERVED ON SWEDISH SURVEYS IN THE BALTIC

by

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### ABSTRACT

Six Swedish cod surveys were performed in the Baltic between December 1988 and March 1990, in addition to those also in March, June (Bothnian Sea only), August and December 1989. Totally 36.551 cod were caught. They were all checked macroscopically for skin lesions. The total mean frequency was only 1.69%. The lowest values were found in the central part of the Main Basin (SD 27). Large variations between hauls and years as well as high mean values were found in SD 24 and in the NW and S part of SD 25, indicating a possible effect of higher temperatures and/or environmental stress from pollution in the coastal areas in those Subdivisions. The small material from The Bothnian Sea in June consisted mainly of 7-9-year-old fish, which can explain the high frequency of lesions there, 6.1%.

Samples of cod, at least 10 per 5 cm-class per Subdivision taken for collecting i.a. stomachs and otoliths, were also subject for a more thorough macroscopic examination on lesions, deformities and parasites. Very few parasites were found and the prevalence of deformities and lesions were also low (<5% in all seasons and areas).

## INTRODUCTION

The Swedish Institute of Marine Research performs routinely two cod surveys per year in the Baltic. Some years one or two additional surveys are made. This was the case in 1989. Since December 1988 screening the cod for diseases and parasites has been included in the sampling program as an attempt to meet the growing interest in that kind of monitoring (eg. Anon., 1989). Although full pathological expertise were not present on all the surveys the results obtained in 1989 were considered representative and interesting enough to be presented in this report.

## MATERIAL AND METHODS

Between 25 and 50 hauls are made in a Baltic cod survey, mostly with bottom trawl and during day-time. The area normally covered is according to Figure 1. Trawling depth varies between 25 and >200 m, most hauls being in the interval 40-70m.

During the cod surveys all cod are measured to length (in 1 cm-classes). While doing this each specimen was in this monitoring also checked for skin ulcers. Observed open lesions were noted to the length-class of the fish. Numbers or size of lesions were not recorded.

Usually 750-800 cod are picked out (stratified (10 specimen per 5 cm-class per Subdivision) random sampling) for a more detailed investigation and sampling of e.g. otoliths and stomachs. During the six surveys performed since December 1988 those fish were also examined for parasites (*Cryptocotyle* and *Lernaecera*), skeletal deformities and liver nodules in addition to skin ulcers. Other symptoms of diseases were also noted. Information on diseases were included in the main database, i.e. the information was linked to data on individual fish and therefore can be related to length, weight, age, sex, maturity stage and catch data.

## RESULTS

In Table 1. the total number and frequency of skin ulcers are summarized per survey. The variation between surveys is small, except for the survey in June 1989, which was exclusively covering the Bothnian Sea, where the frequency was significantly higher. In the small catch obtained there almost all cod were 7-9 years old.

The variation between areas in the Baltic Main Basin was rather large (Table 2), with the lowest frequency in the central part (between the islands Öland and Gotland, SD 27). The material does not permit a trend analysis, but there is a tendency towards higher ulcer incidence closer to the coasts, which is partly reflected in higher mean frequencies in SD 24, SD 25 S and SD25 NW. In those areas the between haul variation was however also very high. The highest ulcer frequency found in one haul with a significant catch of cod (>100), 12.1%, was close to the coast of Rügen (former DDR zone of SD 24).

The length distribution of cod with skin lesions was approximately the same as for healthy cod except for 0- and 1-group cod (<25 cm), for which the prevalence was lower.

Number and frequency of five types of diseases found on cod, which were examined more carefully during six cruises, are given in Table 3.

Ectoparasites were seldom found, and *Lerneacera* did not occur at all. *Cryptocotyle* was found on 0-3 cod per survey but only in Subdivision 24.

Liver nodules were found in a few cod during two surveys.

Fin erosion was found in low frequencies in all surveys but the one in the Bothnian Bay, where the proportion was 10 times higher.

Skin ulcers were found in slightly higher frequency than in the total screening, 1.9 against 1.7, which is not significant.

Skeletal deformities were equally common as skin ulcers, 1.9% as a weighted mean. Spinal compression was the dominating deformity.

Table 1. Total number and frequency of cod with skin ulcers during six Swedish Baltic cod surveys December 1988 - March 1990.

Survey	Total number of cod examined	Number with skin ulcers	% with skin ulcers
Dec. 1988	8487	246	2,90
March 1989	5852	81	1,38
June 1989	132	8	6,06
Aug. 1989	6297	113	1,79
Dec. 1989	9471	101	1,07
March 1990	6312	69	1,09
Total	36551	618	1,69

Table 2. Frequency of cod with skin ulcers during five Swedish surveys in the Baltic by Subdivision. Subdivision 25 split in four subareas.

Survey	SD 24	SD 25	SD 25	SD 25	SD 25	SD 26	SD 27	SD 28
		NW	C	E	S			
Dec. 1988	4,1		1,5	1,5			0,7	3,0
March 1989	0,9	3,6	1,0	1,3	5,4	0,0	1,4	4,3
Aug. 1989	0,9	5,0	1,9	2,2	4,5	1,0	1,5	0,4
Dec. 1989	5,0	0,6	2,7	0,9			0,4	0,7
March 1990	1,2	1,2	1,1	1,2	0,6	3,0	0,4	0,9
Weighted mean	3,0	2,0	1,5	1,4	2,3	1,3	0,6	1,5

Table 3. Number of cod examined and frequency of five groups of diseases in six surveys.

Survey	Number examined	Skeletal deformities		Skin ulcers		Fin erosion		Liver nodules		Parasites	
		Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Dec. 1988	1437	23	1,6	36	2,5	10	0,7			3	0,2
March 1989	748	16	2,1	19	2,5	4	0,5				
June 1989	132	2	1,5	8	6,1	11	8,3				
Aug. 1989	496	19	3,8	10	2,0	3	0,6	3	0,6	2	0,4
Dec. 1989	1114	18	1,6	9	0,8	5	0,4				
March 1990	758	9	1,2	9	1,2	4	0,5	4	0,5	1	0,1
Total	4685	87	1,9	91	1,9	37	0,8	7	0,1	6	0,1

Bent spines and "pug-heads" also occurred.

None of the disease types was frequent enough to allow for a more detailed analysis as to incidence in relation to e.g. size, age or sex of the cod.

Of other symptoms registered could be mentioned two cod with lateral line necrosis (Thulin et al., 1989) and in some areas several fish with discoloured livers.

## DISCUSSION

Few reports have been found on skin ulceration of Baltic cod. Thulin et al. (op. cit.) found an average frequency of 6% in a coastal investigation in SD 23, 24, 25 and 27. As mentioned above there was a tendency towards higher frequencies closer to the coasts, which might explain this difference. It could be noticed also that Thulin et al. found a prevalence of only 1% in cod at the coast of the Kattegat and the Skagerrak.

Lang and Dethlefsen (1987) investigated skeletal deformities in the south Baltic. They reported frequencies in SD 24 to be about 3% in SD 25 2.5% and in SD 26 1.7%. This is similar to our results though slightly higher. The small material in our investigation does not show the same tendency in distribution on areas, rather the opposite with the lowest prevalence in SD 24 and the highest in SD 26. At least in SD 24 this might be due to the location of the hauls. The hauls made by Lang and Dethlefsen were located closer to the (south) coast. This is shown to be of importance in the German Bight, where the prevalence e.g. in August was 1.18% in the inner part and 0.57% in the outer part of the Bight (Dethlefsen and Lang, 1988).

The two parasites included in the monitoring are both salt water species. The few *Lernaeocera branchialis* found by Lang (1989) all occurred in SD 24 (and 22). Reimer (1970) suggests the limit of the distribution of *Cryptocotyle lingua* to lie just east of Bornholm, but the species is obviously not common close to that limit.

The monitoring of diseases of cod will continue and the methods will be adjusted to meet ICES standards.

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