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**Notes on the Infestation by *Sphyrion lumpi* and Abnormalities in the
Pigmentation of the Oceanic *Sebastes mentella***

by

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Abstract

The overall incidence of abnormalities by the oceanic redfish in the Irminger Sea has declined from 1989 to 1992. This decline is in particular observed for the black spots and the remnants from *Sphyrion lumpi*. High proportion of the fish has abnormal muscular pigmentation. The visual external abnormalities show different pattern of occurrence by males and females. Differences in the infestation rate are observed between the eastern and western Irminger Sea.

Introduction

The characteristics of the stock identification of the oceanic *Sebastes mentella* (i.e. oceanic redfish) are described in the first report of the Study Group on oceanic-type *S. mentella* (ICES, C.M. 1990/G:2). A part of it is the description of an abnormal external coloration and the infestation of the parasite copepod *Sphyrion lumpi* as well as of the lesions caused by the remnants of the parasite.

The existence of a separate pelagic stock of *S. mentella* in the Irminger Sea was known since 1972 (Magnússon 1972). Already then, it was observed that this particular stock was heavily infested by *Sphyrion lumpi* and that the abnormalities in the pigmentation were common. In 1977, a short account on the infestation rate and on the abnormal coloration was given (Magnússon 1977). At that time, the fishing industry was not yet interested in processing oceanic redfish because of the decreased yield caused by these infestations and the other abnormalities of the fish although, by then, it was already assumed that the stock was large.

However, in 1982, the commercial fishery commenced and has been carried out since then, although the infestation is still having a considerable impact on the utilisation of this stock. Therefore, the intensity of the infestation is of important economical interest.

Since the beginning of the commercial fishery on oceanic redfish information on the abnormalities of the species are available, e.g. Reinert (1987), Bakay (1988), Bogovski et al. (1989).

In the short history of the Icelandic fishery on this stock (i.e. since 1989), information have been collected on the species (Magnússon et al. 1990, 1992a, 1992b) i.a. on the abnormalities of the fish of which some aspects are presented here.

Material and methods

The data were collected on board commercial vessels, samples taken from commercial catches and from catches of research cruises. The area in question was the Irminger Sea mainly north of 59°N and the time period of sampling was April to July, during the years 1989-1992. Systematic recording of the external infestation and

of abnormal pigmentation has been carried out during all four years but the systematic evaluation of the muscular pigmentation was commenced in 1991. Also, in 1991, the tabulating of the visual external abnormalities according to body sections was started. The body was divided into 8 different sections on each side (Fig. 1).

In 1989 sampling procedures were developed and the criterias partly not fully defined. All the samples in that year were from commercial catches while in 1990 to 1992 samples were from both research cruises and commercial catches.

Five categories of the external abnormalities of oceanic redfish were applied in this study from the beginning and they are as follows: black spots, red spots, mixed spots, remnants and/or lesions caused by the parasite *Sphyrion lumpi* and *Sph. lumpi* itself. The muscular pigmentation was categorized as light, medium and severe. The material was tabulated to receive information on the overall infestation rate, on the incidence of the different categories and on the differences in this respect according to sex.

Some records from the commercial fishery on the yield of processing by weight were available, of the year 1992.

The division of the area in question into an eastern and western part is defined by a line through the following positions: 62°00'N 35°00'W and 59°30'N 37°00'W.

Results

During this time series (1989-1992), the occurrence of the overall external infestation by *Sphyrion lumpi* and of abnormal pigmentation has decreased markedly from about 69% in 1989 to about 43% in 1992 indicating a trend towards a decline of the incidence of abnormalities (Table 1). This trend is supported by the observations of Icelandic commercial fishermen that the general appearance of the oceanic redfish has improved considerably since the beginning of the fishery, in 1989. However, the incidence of external abnormalities varied greatly even from one haul to another. This was the case both for commercial and for research vessel catches. The discard by the commercial trawlers because of the abnormalities of the fish and damages ranged from about 16% to 26% per trip in 1992.

In Table 2, the incidence of visual external infestation and of abnormal pigmentation is demonstrated for the years 1989 to 1992 by kind of infestation and

abnormal coloration.

The overall infestation for *Sph. lumpi* and remnants combined show some decline from about 38% and 39% in 1989 and 1990 respectively to 32% in 1992. The remnants show a definite decline from about 29% in 1989 to 15% in 1992, while the infestation rate by *Sphyrion lumpi* proper does not show a declining trend rather the contrary. But there is a steady decline in the occurrence of black spots from about 27% in 1989 to 17% in 1992.

In Table 3 the incidence of abnormal muscular pigmentation is shown for the years 1991 and 1992. Part A shows the incidence for all the fish examined, and part B for fish with external infestation. About 40% of all fish examined in both years, 1991 and 1992, were free of abnormal muscular pigmentation. It should be mentioned that all three categories of muscular pigmentation were also observed in fish without external infestation and that fish with external infestation were frequently observed without any muscular pigmentation, e.g. it was about 36% and 28% in 1991 and 1992 respectively. Thus, there is no obvious connection between the external and muscular abnormalities. However, the Table might indicate a possible linkage in the frequency of muscular pigmentation on the one hand and/or external infestation on the other hand which is a subject for further studies.

The infestation rate is much higher for females than for males in all four years of observations varying from 66% to 74% of the infested fish. The overall infestation rate in 1991 was 12.7% for males and 36.3% for females and the corresponding figures for 1992 were 14.2% and 29.2%.

The incidence of all five categories of external abnormal coloration and infestation by body sections (see also Fig. 1) is summarized for the years 1991 and 1992 in Table 4, for males and females separately. The occurrence of the abnormalities per body section were markedly different between males and females. Thus, e.g. for males, the head region was more commonly infested than for females and on the other hand, for females the body sections were much heavier infested. The infestation of the tail region was similar for both sexes. The heavy infestation by *Sph. lumpi* and its remnants were observed to be mainly located in the abdominal region of the females while the abnormal pigmentation accounted for the majority of incidences in the body sections 3 and 4.

During the research cruises in 1991 and 1992, it was observed that the abnormalities were more common in the eastern part of the survey area than in the

western one (Table 5). A possible explanation could be the lower infestation rate of males which were more common in the western part. In general, the heaviest infestation rate was observed on the largest females which were more common in the eastern part at the time of the surveys.

Discussion

The infestation by *Sphyrion lumpi* and the lesions caused by it is not only of biological interest, e.g. as biological tagging etc. but also of considerable concern for the fishing industry. The discarding of fish because of the infestation before processing is relatively high. It is known that parasitical infestation of virgin stocks may decline considerably with increasing exploitation. Such a decline of infestation by *Sph. lumpi* in redfish is known from the Faroe Islands (J. Reinert, pers. communic.).

The decline in the overall infestation rate (Table 1) might indicate this trend as well as the observation of the fishermen that the appearance of the fish had improved. It cannot be excluded, however, that the indicated declining trend in the overall infestation may partly be due to the sampling time and area.

No trend in this respect can be noted by the infestation by *Sph. lumpi*. But it is obvious in the declining number of fish with remnants and black spots. The declining incidence of the remnants and in particular of the black spots would certainly improve the appearance of the fish considerably.

It has been suggested that the muscular pigmentation might be caused by the infestation. Such origin cannot be excluded although severe muscular pigmentation has been observed in fish with no visual external infestation. The frequencies indicate that there might be some connection as a comparison of part A and part B in Table 3 indicates.

A rather surprising difference between the sexes were observed in the incidences of infestation by body sections. Since the males have a relatively high number of infestation in the head region but less on the body sections compared to the females, they should be more suitable for processing. However, in the case of females, the infestation by *Sph. lumpi* is partly concentrated around the abdomen. This region would be to a great extent cut away when filletting and thus cause less harm to the fillets than could be expected.

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Table 1
Oceanic redfish
Percentage of external abnormalities by year

Year	1989	1990	1991	1992
No. of exam.fish	1800	2204	1740	2497
No. of fish w. abnorm.	1248	1382	852	1083
%	69,3	62,7	49,0	43,4

Table 2
Oceanic redfish

Incidence of visual external infestation and of abnormal pigmentation

Year	1989		1990		1991		1992	
No of exam. fish	1800		2204		1740		2497	
	No fish	%	No fish	%	No fish	%	No fish	%
Black spots	482	26,8	559	25,4	369	21,2	434	17,4
Red spots	148	8,2	250	11,3	156	9,0	132	5,3
Mixed spots	38	2,1	178	8,1	123	7,1	151	6,4
Remnants	524	29,1	526	23,9	344	19,8	350	14,0
Sph. lumpi	166	9,2	332	15,1	247	14,2	450	18,0
Tot. no. and %	1358	75,4	1845	83,7	1239	71,2	1527	61,2

Table 3

Oceanic redfish

Incidence of abnormal muscular pigmentation

Year	A) of total exam. fish				B) of infested fish			
	1991		1992		1991		1992	
No of records	1682	%	2491	%	852	%	1088	%
None	684	40,7	986	39,9	309	36,3	290	28,4
Light	595	35,4	1077	43,2	321	37,7	596	58,3
Medium	322	19,1	327	13,1	202	23,7	28	2,7
Severe	81	4,8	101	4,1	20	2,4	108	10,6

Table 4

Oceanic redfish

Incidence of external abnormal coloration and infestation by body sections (both sides) for 1991 and 1992. (See also Fig. 1).

Body section	1991				1992			
	Males		Females		Males		Females	
	No	%	No	%	No	%	No	%
1	82	20,2	44	2,8	128	16,3	51	2,0
2	65	16,0	7	0,5	78	9,9	8	0,3
3	51	12,6	395	25,4	98	12,5	574	21,9
4	38	9,4	389	25,0	71	9,0	597	22,8
5	42	10,3	242	15,5	135	17,2	474	18,1
6	45	11,1	335	21,5	79	10,1	638	24,4
7	54	13,3	72	4,6	139	17,7	150	5,7
8	29	7,1	74	4,8	57	7,3	127	4,9
	406	100,0	1558	100,1	785	100,0	2619	100,1

Table 5

Oceanic redfish

Incidence of abnormalities in the eastern and western Irminger Sea during cruises in 1991 and 1992

	No of stations	1991 No exam fish	Percentage of fish w.abn.
East	16	1307	50,2
West	6	427	44,9
		1992	
East	15	935	43,6
West	12	1070	38,1

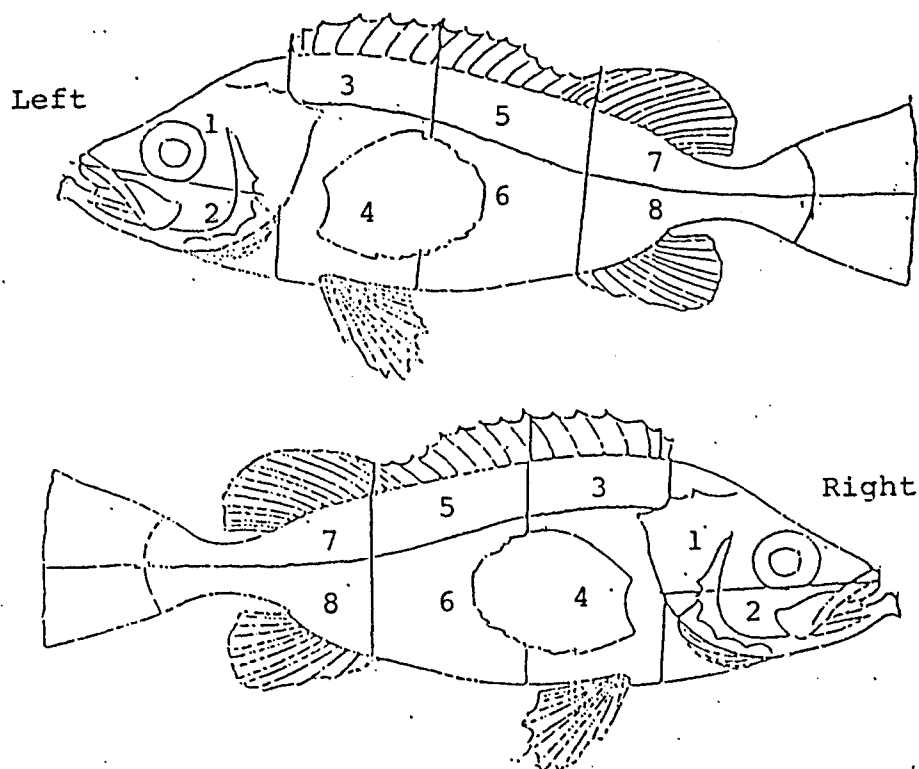


Fig. 1. Body sections