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PSEUDOBANCHIAL TUMOURS IN BLUE WHITING FROM NORWEGIAN WATERS

by

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ABSTRACT

During a cruise off the Norwegian coast from Lofoten to Kristiansund in March 1982 all blue whiting caught were examined for pseudobranchial tumours. 10.7% were found to carry such tumours. The possible relation of the condition of the fish to the tumours is discussed.

RESUME

Lors d'une campagne effectuée en mars 1982 au large de la Côte Norvégienne, entre Lofoten et Kristiansund, une recherche systématique de la présence de tumeur pseudobranchiale fut effectuée sur la totalité des merlans bleus pêchés. 10,7% de ces poissons présentaient la lésion. La possibilité d'une relation entre ces tumeurs et l'état général du poisson est par ailleurs discutée.

INTRODUCTION

The occurrence of pseudobranchial tumours in codfish was first reported in 1929 in cod (Gadus morhua) by Peyron and Thomas (1929) and in Pacific cod (Gadus macrocephalus) and Pacific pollock (Theragra chalogramma) by Yakahashi (1929). More recently pseudobranchial tumours have been reported in cod in the inner Oslo fjord (Lange, 1973), in the northwestern Atlantic (Odense and Morrison 1978, Murchelano and Azarovitz 1979), in the German bight (Dethlefsen 1979) and in the Barents sea (Egidius, Johannessen and Lange 1981). Pseudobranchial tumours from Pacific cod have been recorded by Wellings (1969) and by McCain, Meyers, Gronlund, Wellings and Alpers (1978) and from Pacific cod and pollock (McCain, Gronlund, Meyers and Wellings (1979). The anatomy of the tumours have been described by Lange (1973), Lange and Johannessen (1977), Alpers, McCain, Meyers, Wellings, Poore, Bagshaw and Dawe (1977), Morrison, Appy, Shum, Annand and Odense (1979), Waterman and Dethlefsen (1980) and Dawe (1981).

In 1980 Moeller (personal communication) examined 300 blue whiting (Gadus poutassou) in the Skagerak 30 of which were found to carry pseudobranchial tumours. The aim of our investigation was to verify this finding.

MATERIAL AND METHODS

The survey was carried out board the R/V G.O. Sars on a combined cruise in March 1982 between the Lofoten and Kristiansund. The position of the 25 trawl stations are shown in Fig. 1. Six of the trawl stations were fished with pelagic trawl, the other 19 with bottom trawl. Blue whiting were caught in 21 of the 25 trawl hauls. Blue whiting carrying pseudobranchial tumours were found in 12 of the catches (Fig. 3). Hydrographic data were recorded by use of a CTD-sonde in connection with the trawl stations and in 20 special stations waters samples were collected for primary production measurements.

All blue whiting caught were examined for pseudobranchial tumours. All or up to 100 of the fish were measured and weighed, sex and maturity were determined, degree of digestion, liver condition and amount of parasites on the liver were recorded and otholites were taken.

The pseudobranchial tumours were recorded and measured and most of them were fixed in neutralized formalin. A small sample of the tumours were washed in a disinfectant and inoculated into a cell culture medium. A protozoan which could be kept alive for considerable time, was found in the tumours. The further work on this parasite will be published elsewhere (Egidius and Smith, in preparation).

RESULTS AND DISCUSSION

A total of 1171 blue whiting were caught and examined, 118 of these had pseudobranchial tumours. Most of the fish had bilateral tumours, in six cases the tumour was found on one side only. In three cases in addition to bilateral tumours in the pseudobranchs, small tumours macroscopically identic to the pseudobranchial ones, were found on the gill arches.

During the immediate examination of the blue whiting catches it appeared that the tumour bearing fish were smaller than average. Average length and weight of fish with and without tumours is shown in Table 1. Only three of the catches (stations 141, 142 and 151) were large enough to justify a comparison between these fish. From Table 1 it is evident that the average weight of the tumour bearing is lower than that of the unaffected fish and also length seems affected but to a lesser degree.

No obvious association was found between incidence of pseudobranchial tumour and the sex and maturity of fish. Even though approximately 60% of the tumourbearing fish were in the first stage of maturation, all stages were represented, indicating that the tumour does not affect the development of the gonads.

The liver condition was judged in proportion to the whole fish and no difference between the two groups was detected. The amount of parasites (nematodes) on the liver as recorded was similar in the two groups.

Age-distribution of fish with and without tumours is shown in Fig. 2. No significant difference could be found. The sample of older fish is too small for conclusion to be made that only younger fish is infected.

The main spawning area for the blue whiting is west of the British Isles in March-April, the south-westward migration starting in November-December. However, spawning areas are also found more locally for example in some of the Norwegian fjords indicating that smaller populations may exist. The high incidence of pseudobranchial tumours found in our survey and that of Moeller in the Skagerak, may indicate such populations. Further examination for pseudobranchial tumours in the main blue whiting population may answer this question.

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Table 1. Average lengths and weights of blue whiting with and without tumours.

St. no.	Total numbers	with tumour	Gen. data	Average length		Average weight	
				all	with tumour	all	with tumour
129	11	2	all	31.32	(34)	206.36	(250.-)
130	2		all	31.50		192.50	-
132	6	1	all	36.83	(31)	336.67	(170.-)
133	27		all	34.94		285.56	-
134	16	1	all	32.06	(32)	215.63	(160.-)
135	10	1	all	32.10	(28)	212.00	(160.-)
136	165	6	100 ^x)	35.23	33.92	273.98	(272.-)
139	2	-	all	35.50	-	270.00	-
140	6	-	all	33.83	-	266.67	-
141	164	27 (16.5%)	all	32.89	30.09	218.8	155.19
142	172	26 (15.1%)	all	31.31	29.90	206.46	157.12
143	9		all	36.28	-	312.22	-
144	100	2	all	36.02	(34)	308.25	(232.5)
145	10		all	38.95	-	388.2	-
146	7	1	all	34.07	(25.5)	262.9	(105.-)
147	209	12	100 ^x)	32.39	(30.66)		-
149	22	4	all	34.55	(26.00)	262.4	(125.-)
150	22	-	all	34.45	-	311.4	-
151	211	35 (16.6%)	100 ^x)	34.04	29.81	266.7	127-14
	1171	118 (10.7%)					

^x) Sample of 100 + all with tumour.

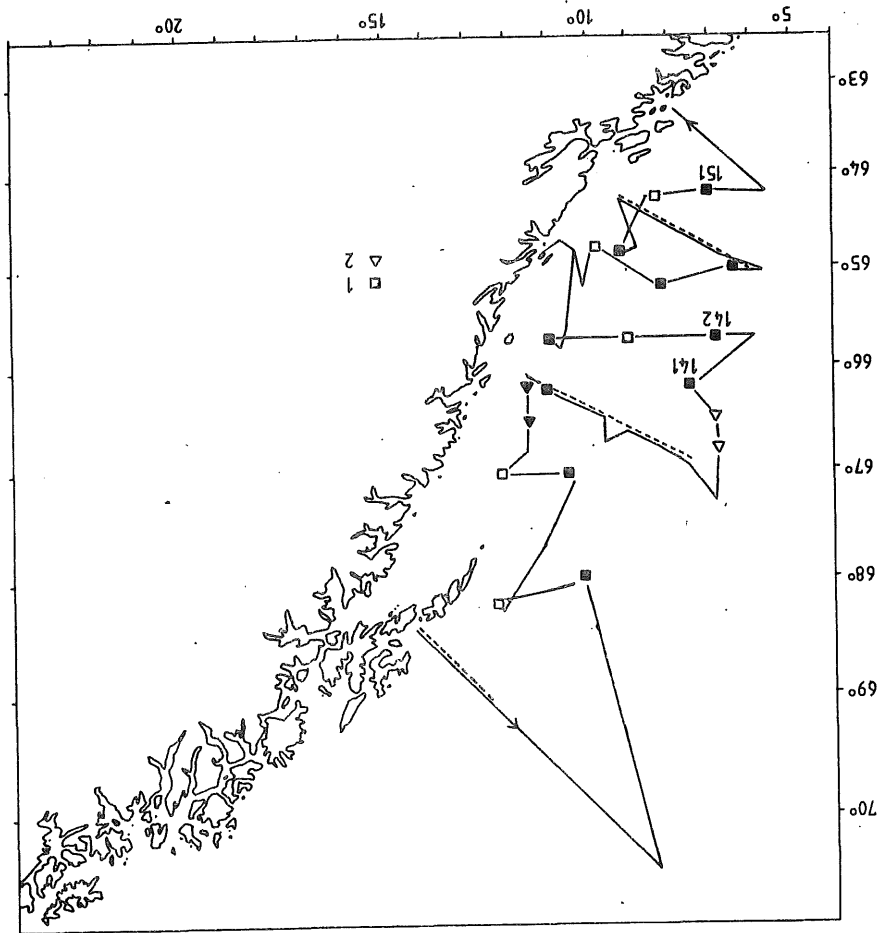


Fig. 1. Cruise tracks and trawl stations where blue whiting was caught. 1) bottom trawl, 2) pelagic trawl. Filled symbols: Infected fish. ---- Special stations.

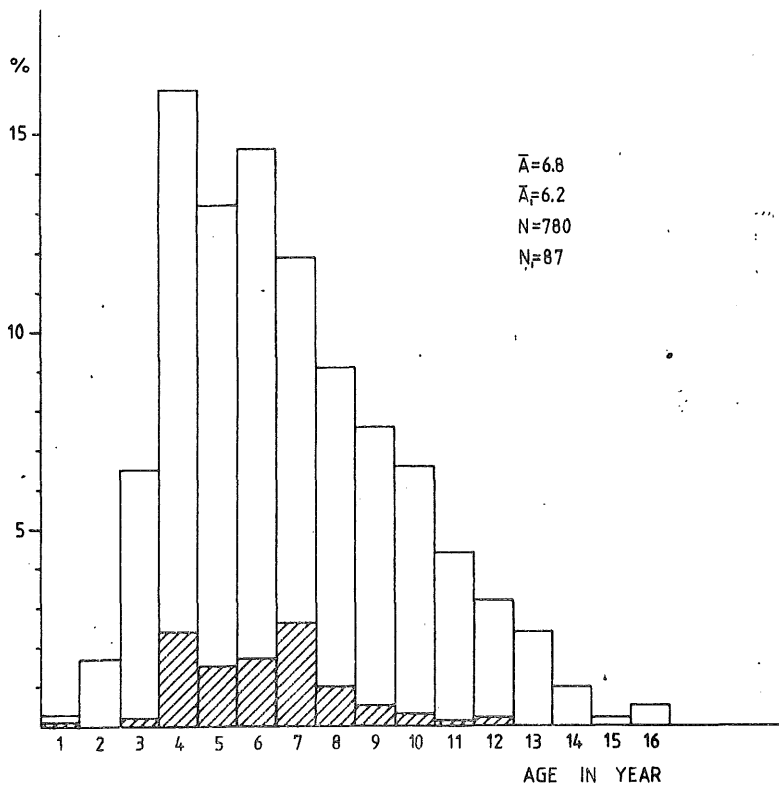


Fig. 2. Total age distribution of blue whiting with hatched part for the infected (i) fish. A: average age.

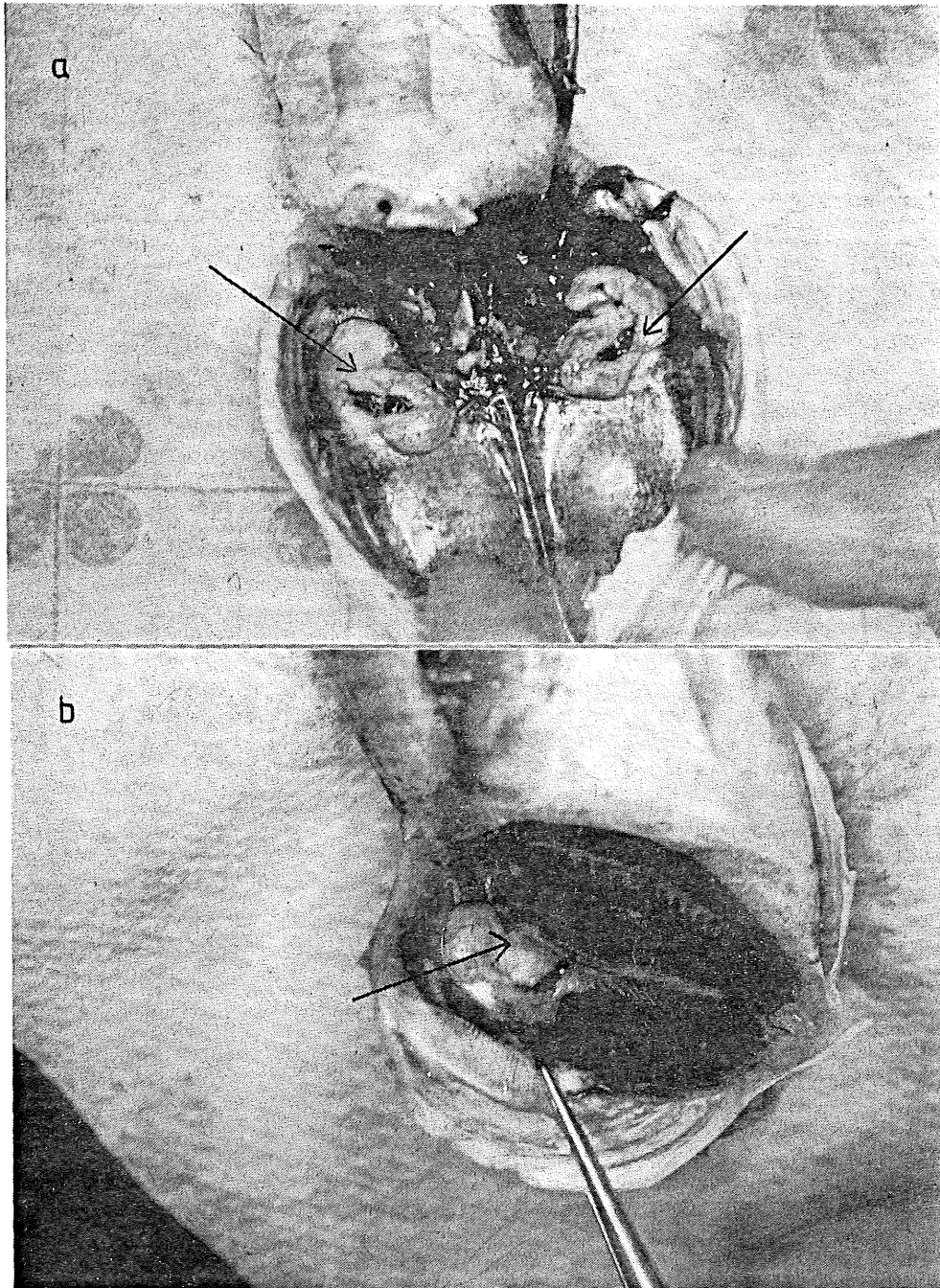


Fig. 3. Tumours in blue whiting. a) ventral view, b) lateral view (operculum opened).

