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PARASITIC NEMATODES IN STOMACHS OF GREY SEALS, HALICHOERUS GRYPUS, AND COMMON SEALS, PHOCA VITULINA, ALONG THE NORWEGIAN COAST.

By

Arne Bjørge*

Institute of Marine Research,
Bergen, Norway.

*Present address: Dept of Nature Conservation, Ministry of Environment,
P.O. Box 8013, Dep., Oslo 1, Norway.

ABSTRACT

The nematode infestation in stomachs of 55 grey and 127 common seals were examined in the period 1976-1980. The seals were caught in Norwegian coastal waters between 62° and 67° North. In 48 adult grey seals the infestation averaged 1 521 nematodes. In seven young grey seals (1-4 years old) the infestation was significantly lower, and averaged 519 nematodes. In 127 common seals (one year old and older) the infestation averaged 60 nematodes, and the infestation showed no significant increase with increasing age of the common seals. The number of nematodes did not differ significantly between the sexes of both species.

Sub samples of nematodes in 51 grey and 43 common seals were taken for species identification. Phocanema decipiens (cod worm), Anisakis sp. (herring worm) and Contracaecum osculatum were recorded in both seal species. The species distribution of nematodes was 93.7 % P. decipiens, 4.6 % Anisakis sp. and 1.7 % C. osculatum in adult grey seals, and 44.1 % P. decipiens, 44.6 % Anisakis sp. and 11.3 % C. osculatum in young grey seals. In common seals the infestation consisted of 66.0 % P. decipiens, 26.2 % Anisakis sp. and 7.8 % C. osculatum without any significant change in the species distribution in seals of different ages.

INTRODUCTION

Three species of parasitic nematodes are recorded from stomachs of grey seals (Halichoerus grypus) and common seals (Phoca vitulina) in Norwegian coastal waters: Phocanema decipiens (cod worm), Anisakis sp (herring worm) and Contracaecum osculatum (Benjaminsen et al. 1978). The same species also occur in grey and common seals in Great Britain (Young 1972).

Larval stages of these nematodes are parasiting many species of fish. Larval cod worm infect the flesh of some commercial valuable fishes (like cod) to the extent that they are considered as a significant problem to the fishing industry. The industry claims that the problem is increasing. In this connection are the Norwegian fisheries authorities (wich also are responsible for the management of seals) conducting a culling program on common and grey seals. This program is aimed to reduce the interactions between the seals and inshore fisheries.

MATERIAL AND METHODS

Parasitic nematodes were counted in the stomachs of 55 grey seals and 127 common seals. The seals were caught along the Norwegian coast from Stad (62° North) to Helgeland (67° North) in the period 1975-1980. Subsamples of 30 nematodes from each of 51 grey and 43 common seals were taken for species identification. Differences in morphology of the intestines of the nematodes were used for proper identification. The nematodes were made transparent with the use of lactophenol, and they were studied through a binocular microscope (Berland 1976).

RESULTS

Number of nematodes.

There was no significant numerical difference in the infestation between the sexes of both seal species. The infestation did not increase significantly in common seals after the first year of age. This infestation is therefore presented as an average per seal within area and year (Table 1).

The difference in infestation between young and adult grey seals could only be compared in one sample comprised of 4 young seals (1-4 yrs old) and 13 adult seals (5-30 yrs old) caught at Froan in 1977. Young seals contained an average of 650 nematodes, while the adults contained an average of 1272 nematodes in this sample. The average infestation in adult grey seals, all samples pooled together, was 1521 nematodes (Table 2).

Among the grey seals a 17 year old female was severly infested, she contained 5591 nematodes. The lowest infestation was 50 nematodes, found in a 16 year old male.

In common seals the infestation varied from 0 to 453 nematodes per seal.

Species distribution of nematodes.

Phocanema decipiens, Anisakis sp. and Contracaecum osculatum were found in both seal species, and these were the only nematodes recorded in the subsamples. The species distribution of nematodes averaged 66.0 % P.decipiens, 26.2 % Anisakis sp. and 7.8 % C.osculatum in common seals of all ages, 44.6 % Anisakis sp. and 11.3 % C.osculatum in young grey seals and 93.7 % P.decipiens, 4.6 % Anisakis sp. and 1.7 % C.osculatum in adults. The averages are shown in Table 3. The full extent of the change in species distribution of nematodes with increasing age of the seals in the sample from Froan with both young and adult grey seals (mentioned above) is shown in Fig. 2.

DISCUSSION

Large variations in nematode infestations between local stocks of seals, and large variations from one year to the next within local stocks are most likely due to changes in the diet of the seals.

The life cycles of Phocanema decipiens and Anisakis sp., the two most abundant nematode species in stomachs of seals in Norwegian coastal waters, show many similarities. Both species have invertebrates (Crustacea) as hosts for the first larval stages, fishes at the intermediate stages; and they both mature in marine mammals. However, the life cycle of Anisakis sp. follows a pelagic food chain while the life cycle of P.decipiens follows a benthic food chain (Bjørge 1979). Changes in the species distribution of parasitic nematodes in grey seals and common seals may therefore be related to changes between pelagic and benthic food items for the seals.

The higher per cent of Anisakis sp. in young than in adult grey seals in one area may thus also indicate a preference for more pelagic food species in the former group. This is supported by the food content recorded in the stomacs of these seals. However, grey and common seals in Norwegian waters seem mainly to be opportunistic feeders. The availability of different food species may therefore have considerable impact on the selection of food, with subsequent effects on the species distribution of gastro-intestinal parasites of the seals.

A major ecological event like the breakdown of the herring stocks, may have caused the increased infestation of cod worm (Fig. 3). A study of possible effects from changes in food composition related to the effects of changes in the size of the seal stocks, should therefore be conducted to substantiate proper management of the cod worm problem.

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Table 1. No of parasitic nematodes recorded in stomachs of common seals in Norwegian coastal waters from 62°N to 67°N.

Area	Year	No of seals	Average no of nematodes per seal	Standard deviation
Møre	1978	31	28	8
"	1979	42	94	21
"	1980	32	63	10
Froan	1977	2	58	13
"	1978	4	17	8
Vikna	1977	10	51	32
"	1979	4	15	8
Hortavær	1980	2	36	10
All areas		127	60	

Table 2. No of parasitic nematodes recorded in stomachs of grey seals in Norwegian coastal waters from 62° N to 67° N.

Area	Year	No of seals	Average no of nematodes per seal	Standard deviation
Adults				
Vega	1975	1	3 050	
"	1976	11	2 160	441
"	1977	6	1 095	342
"	1978	3	1 024	610
"	1979	2	328	151
Froan	1977	13	1 272	23
"	1978	12	1 613	3
Adults, all areas		48	1 521	
Immatures				
Vega	1976	1	302	
Vikna	1977	2	365	
Froan	1977	4	650	
Immatures, all areas		7	519	

Table 3. The species distribution of parasitic nematodes recorded in stomachs of grey and common seals in Norwegian coastal waters from 62° N to 67° N.

Host		Area	Year	Species distribution, %		
Specie	No			Phocanema	Anisakis	Contrac.
Grey seals adults	11	Vega	1976	95.8	3.9	0.3
"	6	"	1977	93.3	5.6	1.1
"	13	Froan	1977	90.5	8.1	1.4
"	14	"	1978	95.3	1.4	3.3
	44			93.7	4.6	1.7
Grey seals juv.	1	Vega	1976	80.0	16.7	3.3
"	4	Froan	1977	25.5	65.5	9.0
"	2	Vikna	1977	63.3	16.7	20.0
	7			44.1	44.6	11.3
Common seals	10	Vikna	1977	39.2	42.5	18.3
"	2	Froan	1977	81.8	10.4	7.8
"	31	Møre	1978	73.6	22.0	4.4
	43			66.0	26.2	7.8

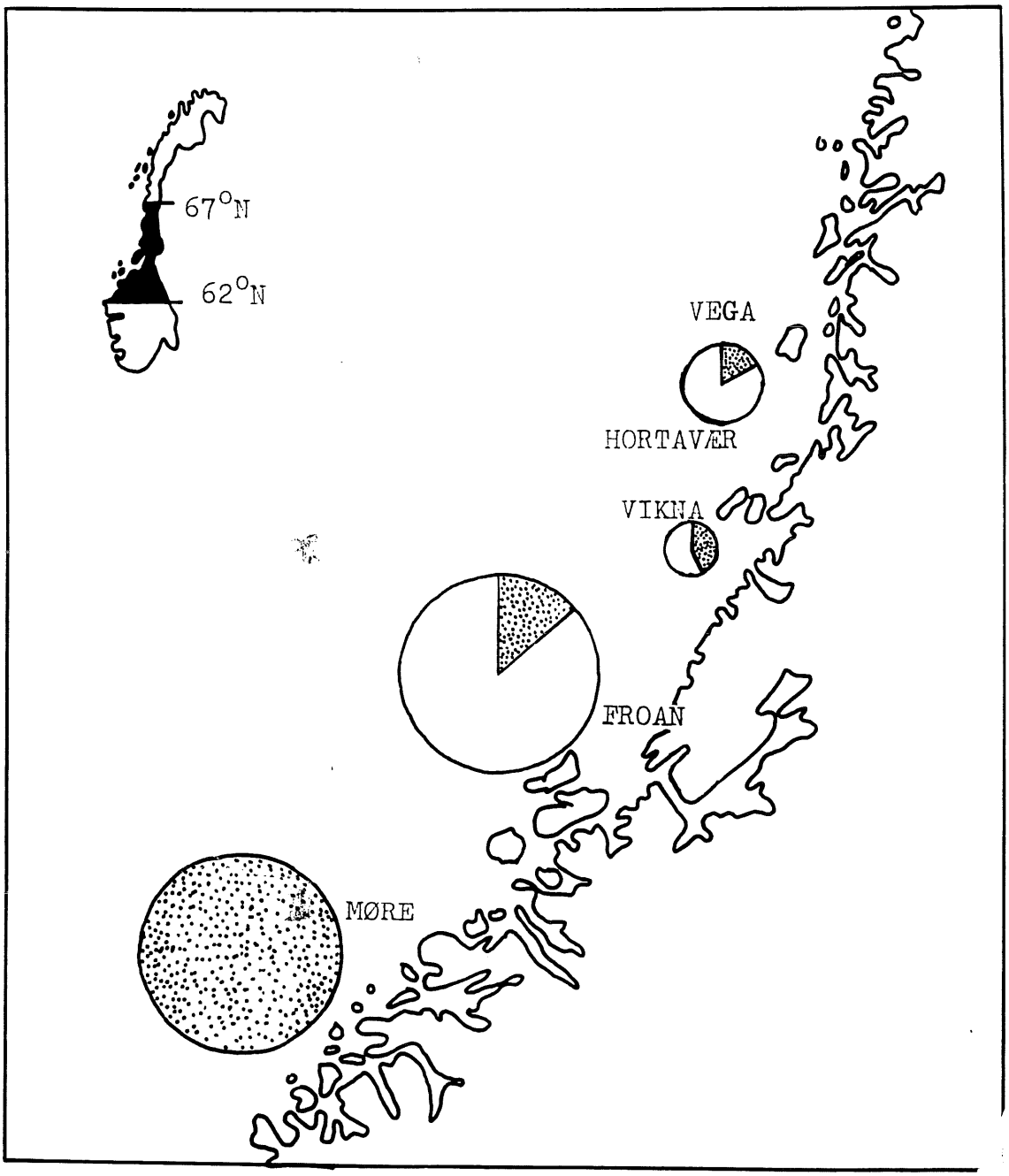


Fig.1. The map shows the sampling sites for grey ar common seals included in this report. The circles ind the abundances of seals; diameter=1 cm: 500 seals, emp circles: grey seals and dotted circles: common seals.

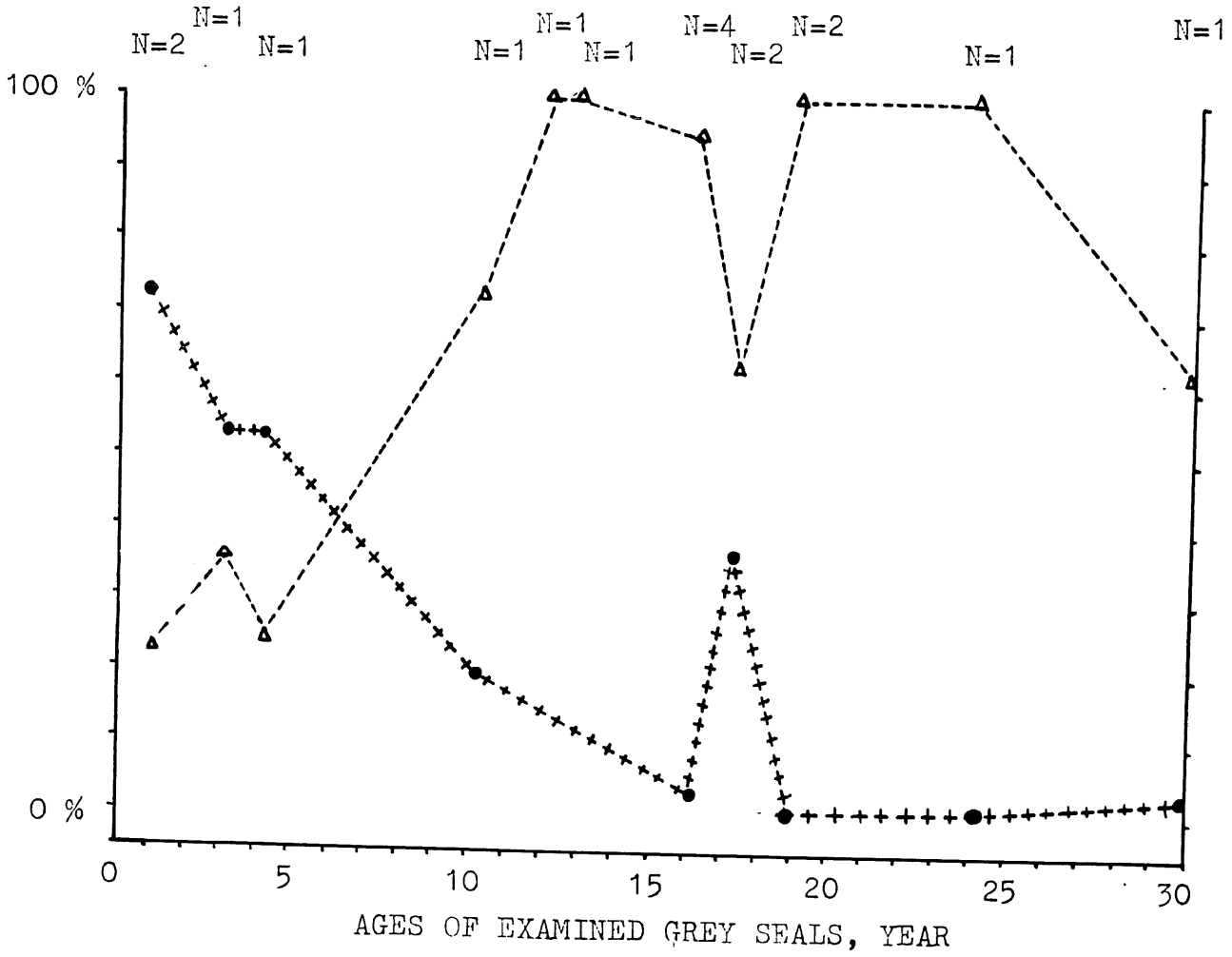
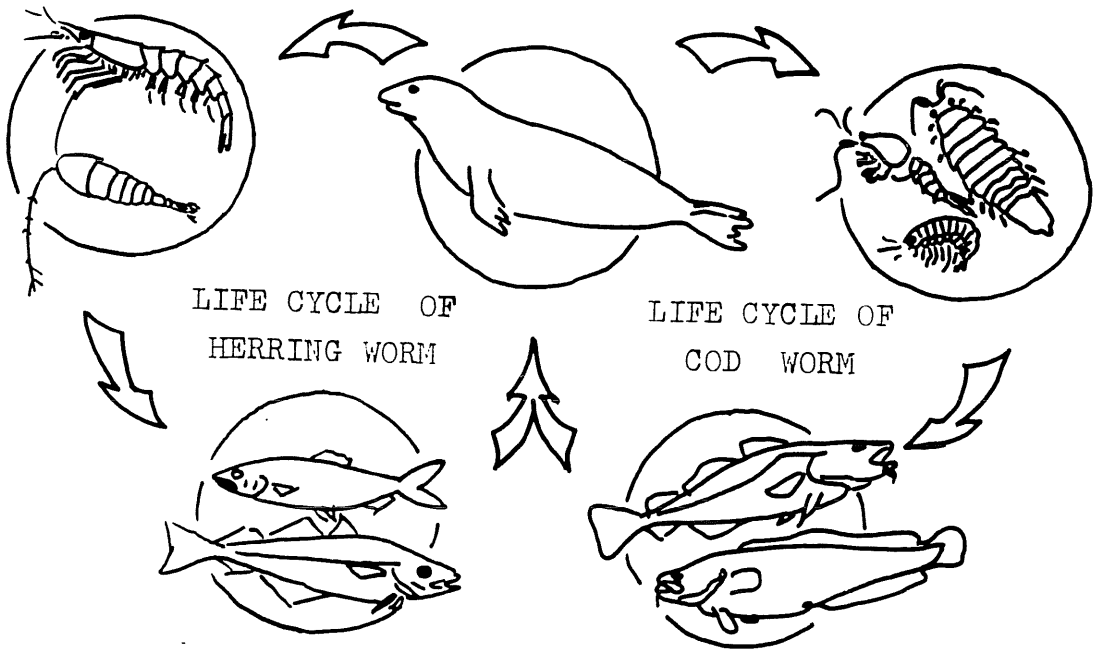


Fig 2. The change in relative abundances of cod worm (▲----) and herring worm (●++++++) with increasing age of grey seals.



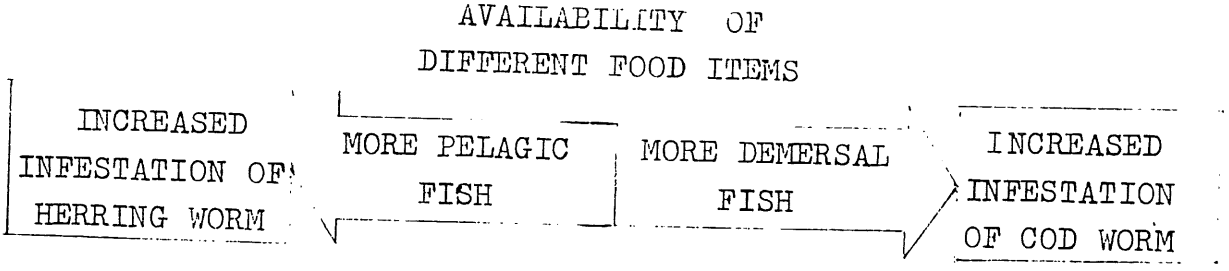


Fig 3. Possible interactions between the availability of different food items for seals, and the species distribution of parasitic nematodes in the stomachs of seals.