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Results from the Analysis of Geographical Variability in Parasite Fauna of Redfish, S*ebastes Mentella*, from the North Atlantic

by

Yu. I. Bakay

Polar Research Institute of Marine Fisheries and Oceanography
(PINRO), 6 Knipovich St., 183763, Murmansk, Russia

Abstract

An analysis of geographical variability in the parasite fauna of *Sebastes mentella* from the North Atlantic was performed based on mathematical set theory proposed by Russian authors V. Andreev and Yu. Reshetnikov (1978). Using the results from our examination of 1404 fish specimens by the method of complete parasitological dissection (Dogel, 1933; Bykhovskaya-Pavlovskaya, 1985), as well as the data from literature (Bourgeois, Ni, 1983; Khan *et al*., 1986; Moran *et al*., 1996 and others) lists were compiled of the parasites of *S. mentella* from 16 areas representing most of the area of distribution this species (Barents Sea to the coast of Canada). The individual and group specific characteristics of the parasite fauna of *S. mentella* were established for the areas investigated. A dendrogram of the degree of similarity of the *S. mentella* parasite faunal composition between these areas was plotted using the Serensen-Chekanovsky coefficient applying «weighed pair-group method».

The analysis of geographical variability in the parasite fauna revealed distinct areas. The first area combines the adjacent parts of the Barents and Norwegian Seas, the second the area of Icelandic and Greenland region ncluding the pelagial of the Irminger Sea and the adjacent part of the Labrador Sea. The third district is formed by the parts of the continental slope and Canadian Shelf from Southern Labrador to the Flemish Cap Bank and including the Gulf of St. Lawrence. The fourth and fifth areas were the slope of the Faroe Islands and the Faroe-Island Ridge (the Rosengarten Bank).

Introduction

By the results of our investigations (Bakay, 1988; 1997) consisting in examination of 1419 fish specimens according to the method of complete parasitological dissection (Dogiel, 1933; Bykhovskaya-Pavlovskaya, 1985), as well as by literature data (Sindermann, 1961; Bourgeois, Ni, 1983; Khan *et al*., 1986; Moran *et al*., 1996, and many others), parasite fauna of *Sebastes mentella* Travin in its distribution range counts 38 species. Parasites of *S. mentella* in 16 North Atlantic areas (from the Barents Sea to the Canadian coast) were listed (Table, Fig. 1). In each area the parasite fauna consists of the "nucleus" made up by 5-9 most common parasite species (*Myxidium incurvatum, M.obliquelineolatum, Pseudalataspora sebastei, Bothriocephalus scorpii, Scolex pleuronectis pl., Podocotyle reflexa, Anisakis simplex l., Hysterothylacium aduncum, Sphyrion lumpi*) and a supplement of other parasites, which were found less frequently.

Results

Ecological and geographical analysis of *S. mentella* parasite fauna variability was performed on the basis of set theory according to the method proposed by Russian researchers V. Andreev and Yu. Reshetnikov (1978). This technique allowed to identify individual and group specificity as well as pair and group similarity of *S. mentella* parasite fauna in 16 areas investigated. On this basis a graph (Fig. 2) and a dendrogram (Fig. 3) were constructed which illustrated similarity degree of *S. mentella* parasite fauna composition in the areas mentioned. According to the similarity degree of parasite fauna composition of *S. mentella* in the investigated part of its distribution range, five zones were identified (Table 1, Fig. 2, 3). The first one unites adjacent areas of the Norwegian and the Barents seas. The second zone is located off Iceland and Greenland, including pelagial of the Irminger Sea and of adjacent Labrador Sea waters. The third zone is made up by the continental slope and shelf of Canada from South Labrador (Subarea 2J) to Flemish Cap Bank and the Gulf of St. Lawrence. Slope of the Faroe Islands and the Rosengarten Bank are the fourth and the fifth zones, respectively. Parasite faunae of redfish in various areas within the first three zones show a different degree of similarity. The objective of our further investigations is to define the status of *S. mentella* local groupings in those areas and the degree of their interrelation.

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Distribution of *Sebastes mentella* parasites in the areas of the North Atlantic

Parasite species	AREAS OF INVESTIGATIONS															
	I				IV	V	II					III				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Ichthyophonus hoferi *																
Eimeria gadi																
Pleistophora sp.																
Myxidium incurvatum																
M. obliquelineolatum																
M. sphaericum **																
Ceratomyxa macrospora **																
Leptotheca macroformis																
L. adeli																
L. kovaljovae																
Pseudalataspora sebastei																
Bothriocephalus scorpii																
Pyramicocephalus phocarum pl.																
Pelichnibothrium speciosum pl.																
Phyllobothrium sp. pl.																
Hepatoxylon trichiuri pl.																
Grillotia erinaceus pl.																
Scolex pleuronectis pl.																
Diphyllobothrium sp. pl.																
Bucephaloides sp.																
Opecoelidae gen. sp.																
Podocotyle reflexa																
Anomalotrema koiae																
Derogenes varicus																
Hemiurus levinseni																
Lecithaster gibbosus																
Lecithophyllum bothriophoron																
Anisakis simplex l.																
Pseudoterranova decipiens l.																
Hysterothylacium aduncum																
Nematoda gen. sp.																
Corynosoma strumosum l.																
Echinorhynchus gadi																
Radinorhynchus sp.																
Johanssonia arctica																
Chondracanthus nodosus																
Peniculus clavatus																
Sphyrion lumpi																
Number of species by areas	20	11	13	12	12	11	11	16	12	20	17	19	19	20	19	18

Notes:

a) Here and in the figures the areas of investigation are designated as follows: 1 - Southwestern Barents Sea; 2 - Bear Island Bank (western slope); 3 - Kopytov area; 4 - North Norwegian Sea (pelagial); 5 - Slope of the Faroe Islands; 6 - Rosengarten Bank; 7 - Anton Dorn Bank; 8 - Southwestern slope of Iceland; 9 - Southeastern slope of Greenland; 10 - Irminger Sea (pelagial); 11 - Labrador Sea (area adjacent to the Irminger Sea); 12 - Subarea 2J; 13 - Subareas 3K and 3L; 14 - Subarea 3M; 15 - Subareas 3N and 3O; 16 - Gulf of St. Lawrence (Subareas 4R-T) (Moran et al., 1996);

b) (I - V) - five zones identified according to the degree of S. mentella parasite fauna similarity;

c) shaded cell - the parasite occurs; empty cell - the parasite does not occur. * - according to data C. Sindermann (1961); ** - according to data Khan et al. (1986).

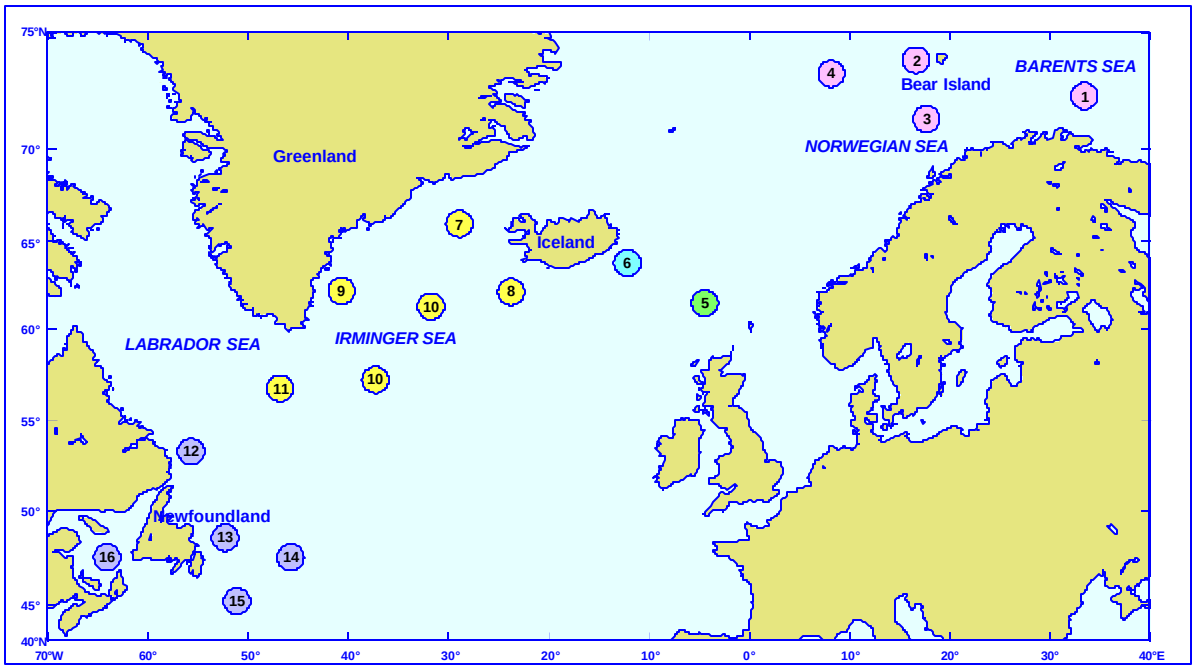

Fig. 1. Areas of investigation (1-16) on *Sebastes mentella* parasite fauna selected to study its geographical variability. For area designation see notes of Table.

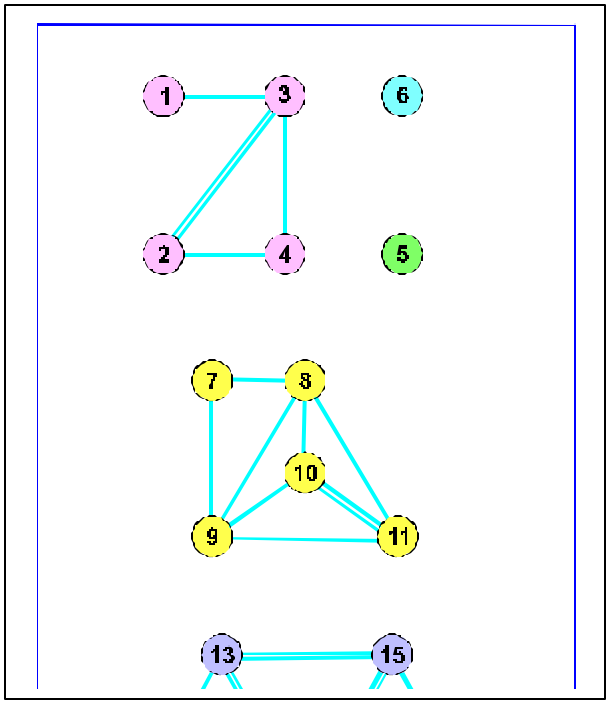

Fig. 2. Non-oriented graph constructed against the matrix of similarity degree of *Sebastes mentella* parasite fauna in 16 North Atlantic areas which shows connections at similarity degree t = 79 % (single line) and t = 90 % (double line).

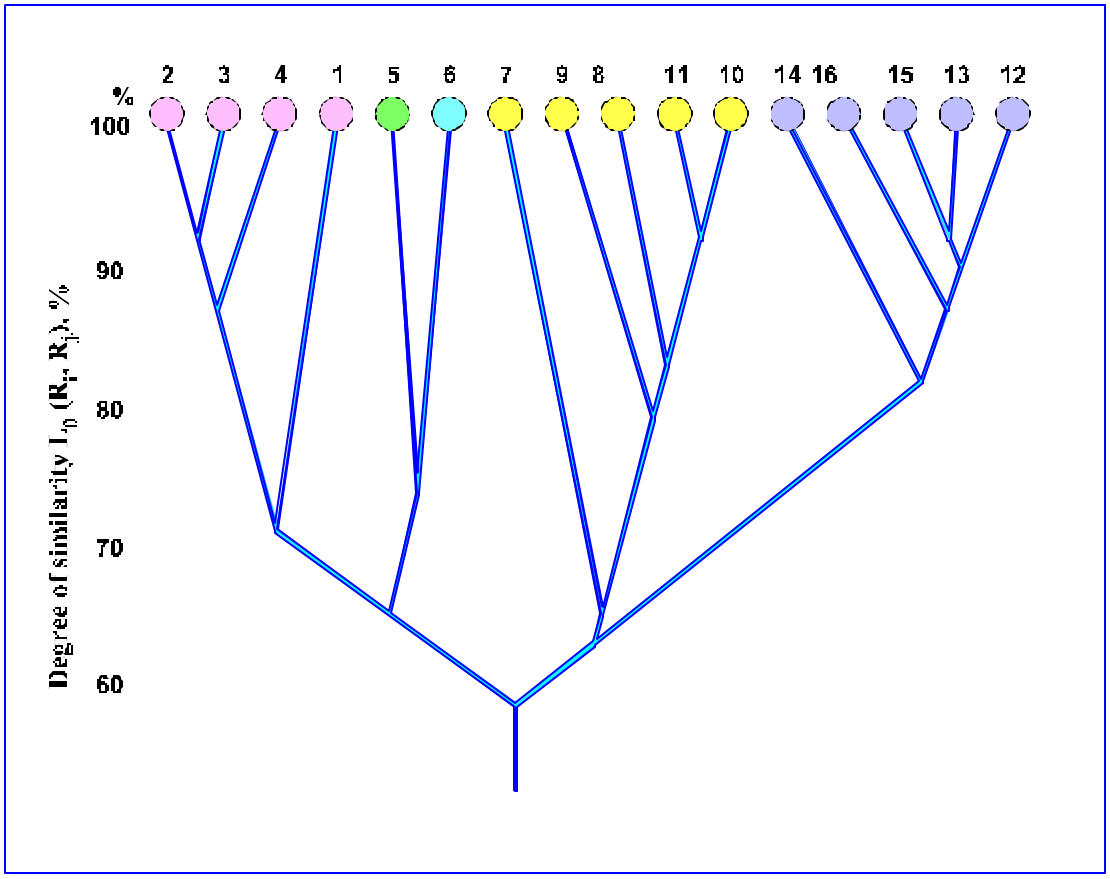

Fig. 3. Dendrogram of similarity of *Sebastes mentella* parasite fauna composition in 16 North Atlantic areas.