

International Council for the  
Exploration of the Sea

C.M. 1965  
No.166  
Gadoid Fish Committee

Cod populations: Preliminary results in the Lofoten area.

By

Dag Møller

Institute of Marine Research, Bergen.

Variations of the annual structure and the external form of the otoliths among cod was reported by Rollefesen (1933). Two main types of otoliths could be distinguished, one being typical for the Arctic cod which lives in the Barents Sea and migrates to the Norwegian coast for spawning. The other being representative for cods living all year round in the Norwegian coastal waters. Rollefesen refers to certain changes in zone types to alterations in the mode of life.

During the spring both types of cods appear in the spawning areas along the Norwegian coast from Møre to Finnmark. The Fishermen catch both types of fishes at the same time by the same gear, though the proportion between the types are different in the catches from the different gears used (Høyen, 1964).

In order to get knowledge about the types or groups of cods and their relation, genetic controlled variations have been established in cod. Sick (1961) found haemoglobin polymorphism by agar-gel electrophoresis and Møller (1965) established the system of codominant transferrin alleles by a modification of the same electrophoretic technique and by autoradiography. He also has studied the bloodtypes detecting eight different specific antigens of cod erythrocytes (Møller, 1962).

During the spawning season 1965 five samples of 90 to 130 individuals each, were collected in the Lofoten area. Each fish was investigated in regard to otolith-, blood-, transferrin- and haemoglobin types. According to the otolith types the samples were separated into two groups of cods, spawning Arctic cod (skrei) and coastal cod. Then the gene frequencies of the haemoglobin allele HbI, the transferrin alleles Tf<sup>A</sup>, Tf<sup>B</sup> and Tf<sup>C</sup> and the frequencies of the bloodtypes A and E were calculated for each group of cods.

The results are shown in the Table. By way of comparison corresponding results of two samples from Bjørnøya and Skjervøy, caught in the autumn 1964, with statements more or less representative for the spawning Arctic and coastal cod respectively, are placed at the bottom of the Table.

The frequencies of the skrei groups from each sample show to a great extent interdependent with the frequencies of the sample from Bjørnøya. The frequencies of the coastal cod groups show connection with the frequencies in the sample Skjervøy. The averages for the totals of the skrei and coastal cod groups correspond more with the frequencies of the samples Bjørnøya and Skjervøy respectively than with each other.

By means of the otolith types suggested to be formed by the environment, the spawning stock of cod in the Lofoten area can be separated into two groups, the skrei and the coastal cod, which are found to differ in frequencies of genetical controlled characters. The spawning in the same area accordingly do not give rise to important exchange of genetic material between the two main populations of cod.

#### References:

- Høyen, A. 1964. Coastal cod and skrei in the Lofoten area.  
FiskDir.Skr.ser.Havunders. 13 (7) : 27 - 55.
- Møller, D. 1962. Serology of cod in Norwegian waters. Interim report on technique. I.C.E.S., C.M. 1962, 38: 1 - 2
- Møller, D. 1965. Serum transferrins in cod. I.C.E.S., C.M. 1965
- Rollefesen, G. 1933. The otoliths of the cod.  
FiskDir.Skr.ser.Havunders. 4(3) : 1 - 14
- Sick, K. 1961 Haemoglobin polymorphism in fishes.  
Nature, Lond. 192: 894 - 896.

Samples from the Lofoten area during the spawning season 1955 with the individuals divided into groups according to the otolith types with relative frequencies of the haemoglobin gene HbI, the transferrin genes Tf<sup>A</sup>, Tf<sup>B</sup>, Tf<sup>C</sup> and the blood types A and E for each group.

Date of sampling	Sample Locality	Otolith type Group	No. HbI	Gene frequencies			Blood types frequencies		
				Tf <sup>A</sup>	Tf <sup>B</sup>	Tf <sup>C</sup>	A	E	
17.2.65	Hola	skrei coastal cod	65	0.1172	0.1154	0.1308	0.6462	0.5231	0.2308
25.2.65	Hola	skrei coastal cod	62	0.2981	0.1230	0.1393	0.6639	0.5294	0.6471
27.2.65	Hola	skrei coastal cod	54	0.0943	0.0932	0.2119	0.6864	0.7222	0.4074
2.3.65	Sorvågen	skrei coastal cod	80	0.1625	0.0952	0.2381	0.6548	0.4750	0.2750
5.3.65	Risvør	skrei coastal cod	49	0.2558	0.0900	0.1500	0.7600	0.7209	0.7442
			80	0.0563	0.1159	0.1546	0.6975	0.4750	0.0625
			40	0.2125	0.0500	0.2250	0.7125	0.6750	0.6000
			59	0.0862	0.1500	0.1167	0.6833	0.4915	0.1186
			39	0.2179	0.0897	0.1410	0.7308	0.6154	0.6153
Total / average		skrei coastal cod	298	0.0966	0.1157	0.1562	0.6758	0.4762	0.2013
By way of comparison		skrei	279	0.2607	0.0859	0.1387	0.6997	0.6619	0.6370
19.11.64	Bjornoya	skrei		0.1391	0.1554	0.1588	0.6385	0.3697	0.1008
26.10.64	Skjervøy	coastal cod		0.3878	0.0523	0.1373	0.7974	0.7679	0.9554