The level of artefactual cells appears to be unaffected by ageing.

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Genetic Differences between Cod Groups in the Lofoten Area

VARIATIONS of the annual structure of the otoliths of cod (*Gadus morhua*) have been reported¹. Two principal types of otolith occurred, one typical for Arctic cod from the Barents Sea and the Bear Island–West Spitsbergen area, and the other typical for cod confined to coastal Norwegian waters. Rollefson¹ suggested that the two types of otolith might be caused by different modes of life.

In the spring, both Arctic and coastal cod spawn in the same areas along the Norwegian coast from Møre to Finnmark. The fishermen catch both types of fish simultaneously with the same equipment, although the proportion of the two types in the catch depends on the gear used².

Further knowledge of the types or groups of cod and the relationships between them has been obtained by studying genetically controlled variations. Sick^{3,4}, using agar gel electrophoresis, found polymorphism in cod haemoglobins. He found a highly significant difference in the gene frequencies of the haemoglobin allele *HbI*¹ between cod samples from the Baltic Sea, the Belts and Kattegat. Møller⁵ established the system of co-dominant transferrin alleles by a modification of the same electrophoretic technique and by autoradiography. He also studied blood types, and detected eight different specific antigens of cod erythrocytes⁶. During the 1965 spawning season, five samples, containing 90–130 cod each, were collected in the Lofoten area. Each specimen was examined to discover its otolith, blood, transferrin and haemoglobin types. The samples were separated into two groups, Arctic and coastal cod, according to otolith type. For each of these two groups the gene frequencies of the haemoglobin allele *HbI*¹, the

transferrin alleles *Tf*^A, *Tf*^B and *Tf*^C, and the frequencies of the blood types A and E were calculated.

The results are shown in Table 1. Corresponding results from two samples collected at Bear Island and at Skjervøy, near Lofoten, during the autumn of 1964 are given for comparison. Most of the frequencies of *HbI*¹, *Tf*^A, *Tf*^B, *Tf*^C and the blood types A and E of the Arctic cod groups deviate clearly from the corresponding frequencies of the coastal cod groups. The total means for the Arctic and coastal cod groups sampled in Lofoten correspond more closely with the frequencies of the samples from Bear Island and Skjervøy, respectively, than with each other.

Thus the spawning stock of cod in the Lofoten area can be separated into Arctic and coastal groups on the basis of otolith structure. The two groups differ in the frequencies of genetically controlled characteristics, and the simultaneous spawning in the same area apparently does not result in any important exchange of genetic material between the two populations of cod.

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Sex-linked Yellow in the Syrian Hamster

THE sex-linked yellow gene of the cat is widely known because of its uniqueness. The domestic cat was, until now, the only known mammal to possess a gene on the X chromosome which produces a yellow (ginger) phenotype in the hemizygous male and homozygous female, and a mosaic of wild type and yellow (tortoiseshell) in the heterozygous female. The tortoiseshell phenotype has been cited¹ in support of the hypothesis of the single inactivated X chromosome.

A sex-linked yellow mutant gene has recently been found in the Syrian hamster (*Mesocricetus auratus*). The gene (designation tortoiseshell: symbol *To*) produces the following phenotypes: hemizygous males and homozygous females are orange-yellow in colour; the dorsum is darker than the venter, and a fine sprinkling of dark guard hairs is usually present. In a few specimens these may be so numerous as to give the superficial impression that the animal is a sandy-coloured wild-type agouti. In the young yellow hamster, the undercolour of the coat is pale cream, but this darkens to bluish with increasing age. The elimination of eumelanism applies only to the hair, for dark pigment develops in the skin in amounts comparable with that found in the agouti hamster². The heterozygous female *Toto* is a parti-coloured mosaic of yellow and agouti (tortoiseshell), comparable with the corresponding phenotype of the cat.

Table 1. SAMPLES OF COD FROM THE LOFOTEN AREA COLLECTED DURING THE 1965 SPAWNING SEASON, SEPARATED INTO GROUPS ACCORDING TO OTOLITH TYPE

Date	Locality	Group	No.	Gene frequencies				Blood type frequencies	
				<i>HbI</i> ¹	<i>Tf</i> ^A	<i>Tf</i> ^B	<i>Tf</i> ^C	A	E
17.2.65	68° 11' N 14° 31' E	Arctic cod	65	0.1172	0.1154	0.1308	0.6462	0.5231	0.2308
		Coastal cod	62	0.2981	0.1230	0.1393	0.6639	0.5294	0.6471
25.2.65	68° 11' N 14° 31' E	Arctic cod	54	0.0943	0.0932	0.2119	0.6864	0.7222	0.4074
		Coastal cod	89	0.2778	0.0722	0.1833	0.6722	0.7361	0.5972
27.2.65	68° 08' N 14° 29' E	Arctic cod	40	0.1625	0.0952	0.2381	0.6543	0.4750	0.2750
		Coastal cod	49	0.2558	0.0900	0.1500	0.7600	0.7209	0.7442
2.3.65	67° 53' N 13° 06' E	Arctic cod	80	0.0563	0.1159	0.1646	0.6975	0.4750	0.0625
		Coastal cod	40	0.2125	0.0500	0.2250	0.7125	0.6750	0.6000
5.3.65	68° 15' N 15° 16' E	Arctic cod	59	0.0862	0.1500	0.1167	0.6833	0.4915	0.1186
		Coastal cod	39	0.2179	0.0897	0.1410	0.7308	0.6154	0.6153
Total/mean		Arctic cod	298	0.0966	0.1157	0.1662	0.6758	0.4762	0.2013
		Coastal cod	279	0.2607	0.0859	0.1387	0.6997	0.6619	0.6370
For comparison									
19.11.64	Bear Island	Arctic cod	150	0.1391	0.1554	0.1588	0.6385	0.3897	0.1008
26.10.64	Skjervøy	Coastal cod	160	0.3878	0.0523	0.1373	0.7974	0.7679	0.9554

Relative frequencies of the haemoglobin gene *HbI*¹, the transferrin genes *Tf*^A, *Tf*^B, *Tf*^C, and the blood types A and E are calculated for each group