5. The *tw* (twittering) mutation is recessive and of limited penetrance. It does not affect any other aspect of behaviour but it was originally associated with a striking reduction in viability.
6. Stocks are available on request.

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TWO RACES OF COD AT FAROE

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THE known transferrin types in the blood sera of cod (*Gadus morhua* L.) are controlled by five co-dominant allelomorphous genes which occur in different proportions in the races of cod tested at Norway (Møller, 1966) and at Greenland (Jamieson, 1967). Recent tests on transferrins in cod at Faroe suggest that there is some genetic isolation between the cod on the Faroe Plateau and those on the Faroe Bank. The Plateau is a shelf surrounding the islands, extending to the 200 metres isobath. The Bank lies about 150 kilometres south-west of the islands; its shallowest water is about 100 metres deep and its margin is also 200 metres deep. A channel 830 metres deep at its shallowest part separates the Bank from the Plateau. The area of the Plateau is about five times that of the Bank.

In a review of the statistics and biology of cod at Faroe, Jones (1966) discussed earlier, non-genetic evidence for this isolation. The results of tagging experiments over the past fifty years include rare examples of cod migrating between the Plateau and the Bank, and even fewer examples of cod migrating between Faroe and other regions. A study of otolith types also indicates that immigration from other regions occurs only rarely. In comparison with Plateau cod, the Bank fish appear lighter in colour, grow faster and have a higher mean number of vertebrae. These combined observations indicated the presence of distinct cod stocks at Faroe Plateau and Faroe Bank, but provided no direct demonstration of any genetic diversity.

The genotypic distributions of cod samples tested at both Faroe Plateau and Faroe Bank, on cruises of R.V. *Ernest Holt* in May 1966 and again in March 1967, are given in table 1; all of the five known *Tf* alleles in cod were found in fish from both areas. Estimates of the cod *Tf* allele frequencies are given in table 2, and the final column compares the frequencies on the Plateau and the Bank. Arrows show the order of the five relationships, which remained consistent for both cruises.

TABLE 1

Distribution of Tf genotypes in Faroe cod. The expected numbers assume genetic equilibrium in each of the four samples

Genotypes	Faroe Plateau				Faroe Bank			
	May 1966		March 1967		May 1966		March 1967	
	Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected
Tf^A/Tf^A	...	...	...	...	...	1	1	...
Tf^B/Tf^B	2	2	1	2	...	...	...	...
Tf^{C1}/Tf^{C1}	...	...	...	...	...	...	...	...
Tf^C/Tf^C	21	22	73	76	26	25	52	51
Tf^D/Tf^D	...	...	1	...	1	...	1	...
Tf^A/Tf^B	1	2	1	2	1	1	...	1
Tf^A/Tf^{C1}	...	...	...	...	2	0	...	...
Tf^A/Tf^C	7	6	11	11	7	7	8	8
Tf^A/Tf^D	1	...	2	1	...	1	...	1
Tf^B/Tf^{C1}	...	...	...	...	...	...	...	...
Tf^B/Tf^C	15	13	31	26	7	6	8	6
Tf^B/Tf^D	...	1	...	2	1	1	...	1
Tf^{C1}/Tf^C	...	...	1	1	...	1	1	2
Tf^{C1}/Tf^D	...	...	...	...	...	...	2	...
Tf^C/Tf^D	3	3	11	11	3	4	6	8

TABLE 2

Comparisons of the frequencies of the five cod Tf alleles at Faroe Plateau and Faroe Bank

Alleles	The frequencies of the alleles at the cod <i>Tf</i> locus				Difference (Plateau, 1966 and 1967, minus Bank, 1966 and 1967)
	May 1966 cruise		March 1967 cruise		
	Faroe Plateau	Faroe Bank	Faroe Plateau	Faroe Bank	
<i>Tf</i> ^A	0.090	< 0.104	0.053	< 0.063	-0.016
<i>Tf</i> ^B	0.200	> 0.094	0.129	> 0.051	+0.071
<i>Tf</i> ^{C1}	0.000	< 0.021	0.004	< 0.019	-0.017
<i>Tf</i> ^C	0.670	< 0.719	0.758	< 0.804	-0.038
<i>Tf</i> ^D	0.040	< 0.063	0.057	< 0.063	-0.011

TABLE 3

The analysis of variance of the allele frequency data

	Degrees of freedom	Mean squares	Probability
Items			
Alleles	3	2248.895	<0.001
Populations	1	1.398	...
Years	1	1.097	...
Interactions			
Alleles × populations	3	39.874	<0.01
Alleles × years	3	25.943	<0.05
Populations × years	1	0.685	...
Alleles × populations × years	3	1.177	...

The angular transformations of the allele frequencies were used in the analysis of variance shown in table 3. A considerable part of the total variation obviously is due to the differences between the alleles ($P < 0.001$), but two of the interaction items are noteworthy also. The interaction of the populations and alleles indicates a significant degree of genetic isolation between the cod stocks ($P < 0.01$), and the interaction of alleles and years ($P < 0.05$) suggests that random genetic changes occurred in the Faroe cod stocks between May 1966 and March 1967.

The total samples of typed cod for the Plateau were compared with the total for the Bank. This overall comparison resolved itself as a $2 \times j$ contingency for the two regions and the five (j) alleles. A χ^2 value of 14.17 for four degrees of freedom showed that the probability of the genetic coincidence of the two cod stocks, on transferrin data alone, is less than one chance in a hundred.

No sub-population sample of Faroe cod appeared to have collected recruits from a genotypically distinct stock, since the observed numbers of genotypes showed good agreement with the expected numbers in table 1.

This demonstration using cod serum protein types supports the opinion that two distinct breeding stocks of cod are fished at Faroe, and that their conservation is basically two problems.

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