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Biochemical studies on Atlantic salmon
(Salmo salar L.) and some of its parasites

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Salmon proteins

In 1966 it was found that there existed qualitative differences in some of the protein patterns obtained from 2-year-old salmon of Swedish and Canadian origin (Nyman, 1966). From rearing experiments under as far as possible identical conditions it was shown that these differences indicated hereditary divergence between these salmon populations, and hybridization experiments later indicated the mode of inheritance (Nyman, 1967). Comparisons with samples from Ireland, Scotland, Norway and Finland, as well as from a number of rivers in Sweden, showed that all European populations sampled displayed the same protein patterns. It was thus suggested that these qualitative and genetically determined differences between European and Canadian salmon might be a useful tag for separating the evidently mixed populations off the west coast of Greenland.

However, it was necessary to prove that these differences would remain stable in adult fish, since variation in the 2-year-olds might be due only to differences at the ontogeny level. Through the kind assistance of Dr. Carlin, Swedish Salmon Research Institute, and Dr. Møller, Fisheries Research Board, St. Andrews, N.B. samples of adult fish could be compared.

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These tests indicated that the same differences were still present, except for the quantitative difference in serum esterase staining intensity. Liver samples of salmon that had been stored for 4-5 months indicate that storage may interfere and accelerate the denaturation of the esterases. Storage does not interfere, however, with the differences in the blood sera.

By employing modifications of various buffer systems it became apparent that four protein systems could be used for stock identification, viz. the alpha-2 globulins and one possible transferrin zone in blood serum, the liver esterases and the kidney esterases.

Gene frequency comparisons from polymorphisms are of course of limited value in this study, since a large number of populations contribute to the 'Greenland gene-pool'. Such polymorphisms may however be of much greater help in identification of salmon from specific rivers (Møller and Odense, 1969, personal communication).

Salmon parasite proteins

In a joint project with J. Pippy, Fisheries Research Board, St. John's, systematic and population genetic studies of some selected salmon parasites are being carried out. From a population point of view two polymorphisms in Anisakis sp. enzymes may prove of importance for separating salmon of European and Canadian origin. Samples of the probably mixed North American salmon populations off Bonavista, Newfoundland, indicate a good concordance with expected numbers as calculated from the Hardy-Weinberg law, which indicates that Canadian Anisakis may form a single inbreeding population. If Anisakis from European salmon display different gene frequencies these polymorphisms may serve as indirect biochemical tags.

References

Nyman, Lennart. 1966. Geographic variation in Atlantic salmon (Salmo salar L.). Swed. Salmon Res. Inst. Rep. 3: 6 p.

1967. Protein variation in various populations of Atlantic salmon. Swed. Salmon Res. Inst. Rep. 8: 11 p.