



ENZYMES IN FISH TISSUE UNDER STUDY

Applied research to be effective must have a foundation of fundamental information derived from basic research. Enzymes, for instance, must be studied at a basic biochemical level in order to establish a foundation for sound research on effects of such chemical entities at the applied level.

The action of the enzymes in fish tissue is important both to the life processes of the fish and to the changes that take place in the fish after death. A knowledge of the intermediary metabolism of fish would help research workers to understand the details of the reactions involved both in the synthesis and in the breakdown of proteins, fats, and carbohydrates. The potential applications of this knowledge are in the fields of fish nutrition and in the commercial handling of fish and fishery products.

As part of a collaborative research project between the Department of Food Technology of the University of California and the U. S. Bureau of Commercial Fisheries' Fishery Technological Laboratory at Seattle, Wash., a study is being made of the oxidative enzymes of fish. Knowledge of such enzymes is applicable in two areas of interest to fishery technology: (1) the nature and properties of enzymes that are active after the death of the fish and (2) the enzymes and pathways of intermediary metabolism in fish.

The nature and properties of the enzymes that are active after death are important because of their potential effect on fish held in refrigerated storage. The potential changes may be either detrimental or beneficial to the final product. In either case, an understanding of these changes is necessary if they are to be controlled.

Early in the collaborative investigations, it became apparent that knowledge of the fundamental pathways of metabolism in live fish was essential to understanding the actions of the surviving enzymes. The work therefore has been concentrated on the enzymes of intermediary metabolism of fish, with emphasis on oxidative enzymes.

Carp were used as the test fish in the investigations because they are available and relatively easy to maintain in aquaria.

The initial approach to the problem was to compare directly the reactions caused by the enzymes in fish with those caused by the enzymes in mammals. The research to date has been concentrated in the areas of carbohydrate metabolism and of fatty acid metabolism. Results now available indicate that the tricarboxylic acid cycles of carbohydrate metabolism in fish is similar to that in other animals.

The multienzyme system that causes the oxidation of fatty acids in fish tissue was studied in detail. In general, the behavior of this system has been found to resemble that observed in mammals, but with some differences in detail.

The work now in progress essentially is an extension of the work already reported. Because of the importance of unsaturated fatty acids in fish, the investigation of the oxidation of the highly unsaturated fatty acids will be intensified in the near future.



IMPROVED HANDLING OF FISH ABOARD MASSACHUSETTS FISHING VESSELS

During the period June 18, 1957 to June 18, 1958 a contract was in effect between the U. S. Bureau of Commercial Fisheries, Branch of Technology, and the Division of Marine Fisheries, Department of Natural Resources, Commonwealth of Massachusetts. Funds were provided under the terms of the Saltonstall-Kennedy Act of 1954. The purpose of this contract was to improve the handling and icing of fish at sea aboard vessels of the Massachusetts commercial fishing fleet. Details of the project were administered through the Division of Marine Fisheries, Massachusetts Department of Natural Resources, under the general supervision of the Bureau's Technological Laboratory in East Boston, Mass.

Under the terms of the contract an experienced man was assigned to instruct fishing vessel crews at sea in the best methods of handling their catch, particular attention being paid to the icing and stowage of fish in the hold. In addition, conditions aboard each vessel were noted and recommendations were made to the owners with regard to improvements and modifications.

Sixteen trips were made during the period under consideration, twelve of these on steel otter trawlers of the Boston fleet. Of the remaining four trips, three were aboard large wooden druggers (OTM) fishing out of Boston, and the fourth on a seascolloper based at New Bedford.

Results of the project, with respect to cooperation by fishermen and boat owners, were distinctly encouraging. Only two cases of indifference to suggestions were reported, and three other instances were cited where crew members were not wholly in accord with the aims of the program. Sellovers and condemnations of fish could largely be associated with poor icing and handling practices at sea and/or bad hold conditions, arising from such causes as infrequent cleaning and painting, mutilated pen boards, inadequate shelving, etc.

By mutual agreement, the contract has been renewed for another year. Emphasis will be placed on the training of fishermen engaged in the whiting and ocean perch fisheries. Good fish-handling techniques are known and can be easily taught. If reasonable care is taken of the catch at sea, the landing of a first quality product is inevitable.

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