The Technological Research Program, 1948-49

Heads of the laboratories of the Technological Section of the Branch of Commercial Fisheries conferred with the Section Chief and Branch Chief in Washington early in July for the purpose of preparing a tentative program of projects for the laboratories which would meet the needs of the fishing industry as nearly as funds, facilities, and personnel would permit. Before coming to this conference, laboratory heads had interviewed representatives of all sections of the fishing industry in their areas to obtain their suggestions as to technological problems which needed study and solution. The results of these interviews were discussed at the conference and a tentative program was prepared.

At the same time that laboratory heads were asked to report to Washington letters were sent to trade organizations, labor unions, marine fisheries commissions, and others, enclosing copies of the previous year's program and a list of suggested projects for the current program. They were requested to obtain from their members suggestions as to the type of program they felt was most important. They were also asked to have a representative present their suggestions at a meeting on July 14 in Washington with the laboratory heads and the Section Chief and Branch Chief.

At this conference, the tentative technological program was discussed and to it added those suggestions of the industry representatives present. Obviously, it was impossible, with available funds and personnel, to undertake all of the investigations suggested. The final program was arranged by the technological staff according to the relative importance of the projects as gauged by the industry's interest and fitted into each laboratory according to facilities and personnel available.

The program for the present fiscal year ending June 30, 1949, is now under way and is as follows:

BOSTON, MASS., TECHNOLOGICAL LABORATORY

1. Freezing North Atlantic species of round fish at sea. After landing, the fish will be defrosted, filleted, refrozen, packaged, and stored.

   This study is for the purpose of determining whether or not the quality of fish handled in this manner is better than those handled in the usual way. The investigation will be handled primarily on board the Government-owned experimental vessel, Albatross III. Livers, viscera, and other waste material will be obtained for use in Project 5 under the Seattle Laboratory.

2. Investigation of pollution of clam beds in New England and development of purification methods.

Many New England clam beds have been closed to digging due to pollution. It is believed that improved methods can be devised to treat and cleanse the clams so that they can meet high quality market requirements. Various methods of washing and purging the clams will be investigated, on a pilot plant scale, to accomplish the desired results.

3. Isolation and identification of micro-organisms from fish and the fish holds of fishing vessels to determine their role in fish spoilage.

The information obtained from this investigation will be used to devise methods and chemical treatments for improving the quality of fish landed for filleting and sale fresh. It is also a cooperative project with Project 6 listed for the College Park Laboratory.

COLLEGE PARK, MD., TECHNOLOGICAL LABORATORY

1. Determination of food values of cooked fishery products.

Practically no data are available on this subject. It is needed to reply to requests for such data by members of the industry, workers in nutrition, and dieticians. It is also needed for home economists who are preparing balanced meals for the home and in school lunch programs.

2. Correlation of biological and spectrophotometric methods for the determination of vitamin A potencies.

These data are highly desirable since vitamin A oils are sold by fishermen on the spectrophotometric value and purchased by pharmaceutical firms on biological value. The purpose of the investigation is to coordinate these two values so that they will be more nearly equal. It is being conducted as a cooperative project with Project 3 listed for the Seattle Laboratory.

3. Determination of the rate of digestion of certain fishery products.

This information is continuously requested by workers in nutrition, members of industry, and dieticians. It will be closely coordinated with 1 above, and will furnish valuable information as to the food value of fish and other fishery products.

4. Preparation of canned sandwich spreads for the school lunch program.

Sandwich spreads acceptable to those arranging menus for use in school lunch rooms are urgently needed. A number of species of fish, which could be marketed more widely will be tested. Those first to be used are chum salmon, mackerel, lake herring, pollock, and rosefish.

5. Effect of fluctuating temperatures on quality of frozen fish in storage and transit.

This information is valuable in ascertaining the effect of changes in temperature of storage rooms on quality and on the storage life of both packaged and bulk fish. It is also desirable in evaluating the effect on quality of frozen fish which may be partially defrosted during transit in refrigerated trucks and refrigerated cars.

6. Identification of micro-organisms causing spoilage of fish and shellfish.

This is a cooperative project with that listed under Project 3 for the Boston Laboratory. The separation and identification of these micro-organisms is desirable and necessary in order to devise means to combat them, and thus produce higher quality fish for the market.

KETCHIKAN, ALASKA, FISHERY PRODUCTS LABORATORY

1. Clam processing methods.

This investigation is for the purpose of devising methods of processing which will eliminate the toxic property of the clams taken from certain areas in the territory. This will make it possible to find a market for the clams after processing which will furnish employment and augment the income of the fishermen.

2. Clam survey.

The objective of this investigation is to obtain accurate data on the seasonal and geographical distribution of the toxic clams. This information is needed in order to develop regulatory measures, if required.

3. Clam sampling and testing methods.

This study is for the purpose of improving the precision of securing samples and making tests on them.

Note: These three projects are a series and will furnish complete information as to the proper treatment of the Alaska clam industry.

SEATTLE, WASH., TECHNOLOGICAL LABORATORY

1. Freezing North Pacific species of round fish at sea. After landing, the fish will be defrosted, filleted, refrozen, packaged, and stored.

This is identical with Project 1 under the Boston Laboratory, except that both commercial and Government-operated vessels will be used in the preparation of samples of fish which are common to the North Pacific Coast. The objective is to determine whether or not the quality is better when fish are handled in this manner or by the conventional icing method. Some samples probably will be filleted, packaged, and frozen at sea for storage studies, for controls, and use in Project 2.

2. Frozen storage life of certain North Pacific species of fish.

This information is of value for such species as rockfish, Dungeness and king crab, pink salmon, Alaskan flounders, and pollock. The effect of anti-oxidants, packaging materials, and types of packages will be taken into consideration. It will ascertain the length of time fish can be held in storage before the quality depreciates materially.

3. Investigation of the correlation between the biological and the spectrophotometric methods for the determination of vitamin A in fish oils.

This is a cooperative study with Project 2 under the College Park Laboratory. The spectrophotometric method will be employed in this laboratory and the biological method will be handled at College Park where laboratory animals are available. Identical samples will be used in both determinations. An analysis of the data should yield a "correlation factor" by which future calculations can be made so that the same results from each method of assay will be obtained.

4. Studies on methods of extracting vitamin A from fishery products.

The effect of various drying and dispersing agents on the extraction of oil from low-fat livers will be considered. The study is for the purpose of obtaining basic information as to the mechanism of oil extraction from liver materials.

5. The determination of the vitamin A content of the livers of certain New England fish.

Samples of livers will be obtained under Project 1, Boston Laboratory, and forwarded to Seattle for the determination of vitamin A and the oil content of the livers. These data will be of value in developing new sources of vitamin A and a more economic use of fishery resources.

6. Determination of vitamin A in new species found in Alaskan waters in cooperation with the Alaskan exploratory fishery vessel program.

This will add to the volume of information dealing with sources of vitamin A and make possible a more complete use of the resource.

7. Determination of oil in fish meal in cooperation with the Association of Official Agricultural Chemists.

The determination of oil by the present methods in materials such as fish meal is highly inaccurate, particularly after storage, and leads to much confusion between buyer and seller. It is the purpose of this investigation to devise official methods to remedy this inadequacy. Since the A.O.A.C. is the official agency for prescribing methods of analysis, these data are valuable to those having responsibility for fixing the feeding value of fish meal.

8. Pilot plant manufacture of fish hatchery food.

The purpose of this study is to develop methods of manufacture in which a minimum loss of nutritive components is obtained. Materials will be obtained from cannery and fillet waste. This is the first of a series of these studies, the other two follow.

9. Food for hatchery fish.

The increase in importance of the propagation of salmon by fish hatcheries brings up the problem of adequate food for the young fish at a reasonable cost. Preliminary studies indicate that waste material from salmon canneries and filleting operations can serve to replace meat to a considerable extent. The study is needed to prove which parts of salmon waste are most effectively metabolized and how they may be processed

without loss of nutritional elements. Federal and State hatcheries are collaborating in the study.

10. Chemical composition of fish hatchery foods.

Further information is needed on the chemical composition of hatchery foods so that more nutritious balanced diets can be prepared for the young fish. This series of studies (Projects 8, 9, and 10) will provide an outlet for waste material and furnish hatcheries with fish food, a product which is now difficult to obtain.

- - -

Projects were assigned to laboratories on the basis of the facilities and personnel available. In some instances, projects are broken down in greater detail than in others, particularly because of the varied skills involved.

The whole program has been set up on a project basis and outlines prepared which incorporate such information as the project leader, collaborators, need for information, objective, method of procedure, estimated date of completion, estimated cost, and the manner in which results will be reported to industry. Provision is also made for periodic reports which will permit a check on progress being made and dissemination of such preliminary results as may be useful.

JUNE 1948

Boston, Mass.

The survey of clam beds in the Brunswick, Maine, area was completed. Results of the survey, as well as the data on the enterococci test, are being tabulated and evaluated. Equipment is being procured to photograph those organisms that interfere in the enterococci test.

* * *

Gram positive rods have been observed, either as a pure culture or mixed with enterococci, in the presumptive broth used in the enterococci test. Whenever this organism, believed to belong to the genus Lactobacillus, appears as a pure culture, the color of the media changes partially, i.e., to a light green color.

Beaufort, N. C.

A series of tests were made of a new type of commercially developed shrimp trawl net using a 50-foot trawl with a trouser or double tail bag. One of the tail bags was constructed of the standard type of shrimp net of 2-inch stretched mesh, and the other of experimental netting with $2\frac{1}{2}$-inch stretched mesh with the additional cotton threads for entanglement of the shrimp. The results of the first tests were inconclusive and further tests are to be made.

* * *

Studies on the utilization and development of new materials for fish models have continued resulting in additional plastic models of the cabio (Rachycentron canadus), the great barracuda (Sphyraena barracuda), the red porgy (Pagrus pagrus), and the spot-tailed pin-fish (Diplodus holbrookii). The largest fish model created thus far is a 31-inch long tarpon (Tarpon atlanticus).

College Park, Md.

Results of tests with frozen sea trout fillets indicated that maximum storage is between six and eight months under conditions of the test. There was no appreciable difference in palatability scores between fillets cut from fresh fish, from fresh fish held on ice for four days, from fish frozen for four days and partially thawed, and from four-day frozen fish completely thawed.

* * *

Sandwich spreads for use in the School Lunch Program were prepared from menhaden, garfish, and lake herring.

* * *

A sandwich spread prepared from Atlantic mackerel was given a test in two Maryland elementary schools. Acceptance was good.

Ketchikan, Alaska

The preparation of charts of clam beaches, showing the exact location where clam samples for toxicity tests were secured, is nearing completion.

Seattle, Wash.

Calculations were completed on the Alaska fur seal livers. No significant seasonal trends could be detected, but there was a slight tendency for the potency of the liver oil to increase with the age of the seal. A significant difference was found in the liver oil of the males and females, with the females yielding an oil of lower potency. A significant difference was also found between the normal-colored livers and those which were unusually pale. In a small sample of the latter, the vitamin A potency of the liver was 184,000 spectrophotometric units per gram. If an appreciable number of seals have light-colored livers, commercial utilization of these pale livers is indicated.

* * *

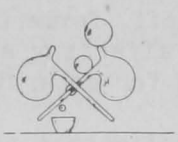
Seven lots of frozen crab meat were examined after 38 weeks of storage at 0° F. All packaged samples were edible and there was little difference in color and flavor scores of crab meat packaged in cellophane, tin, and tin with 1 percent brine. In general, the packaged crab meat was of marketable quality. Flavor varied from slightly flat to slightly off-flavored in separate portions from each sample pack; however, the more exposed portions in the dry packs did show a greater tendency for development of off-flavors. The texture of the meat was firm to tough in all packs; the brine packs had improved texture on the basis of tenderometer readings.

* * *

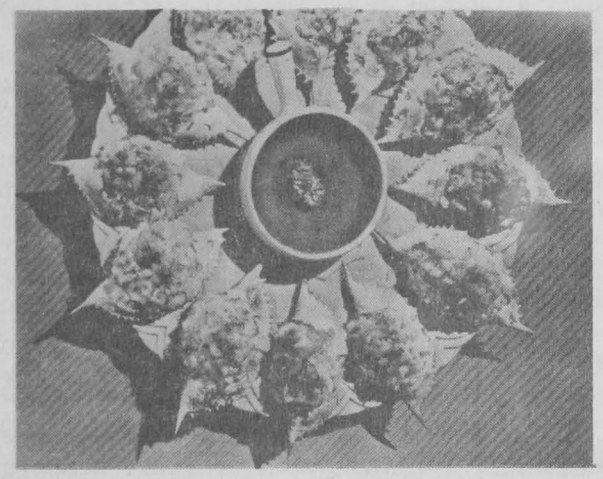
Crab meat shucked from frozen raw king crab legs was soft and fibrous in texture, off-flavored, and very difficult to separate from the shell. The meat from whole king crab legs which were frozen after cooking was highly variable in flavor and very tough in texture. Preservation of the crab meat by freezing in the shell appears to be impractical for any extended storage as the meat is not only inferior in flavor and texture but also is most uneconomical to separate from the shell.

* * *

Samples of fresh-water catfish and gaspergou livers from Louisiana were analyzed and found to be low in vitamin A but they contained a very large proportion of vitamin A_2.



DEVILED CRABS



1 pound crab meat
2 tablespoons onions, minced
3 tablespoons butter or other fat
2 tablespoons flour
¾ cup milk
½ teaspoon salt
1/8 teaspoon pepper
½ teaspoon mustard, dry
1 tablespoon lemon juice
1 teaspoon Worcestershire sauce
½ teaspoon sage
dash cayenne
1 egg, beaten
1 tablespoon parsley, minced
¼ cup bread crumbs
1 tablespoon butter

Pick over crab meat to remove any particles of shell, cook onion in fat until tender, blend in flour, add milk gradually, and cook until thick. Stirring constantly, add seasonings and beaten egg. Blend in crab meat and parsley. Fill crab shells or greased ramekins and sprinkle with buttered bread crumbs. Bake in a moderate oven at 350° F. for 15 minutes or until brown. Serves 6.