The Ocean's Hot Dog

The Development of the Fish Stick

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"Der Mensch ist, was er isst."
—Ludwig Feuerbach[1]

The fish stick—the bane of schoolchildren who generally consider it an overcooked, bread-encrusted, cardboard-tasting, fish-less effort of lunchrooms and mothers to deceive them into consuming protein—is a postwar invention that came into existence as the confluence of several forces of modernity. These forces included a boom in housing construction that contained kitchens with such new appliances as freezers; the seeming appeal of space-age, ready-to-eat foods; the rise of consumer culture; and an increasingly affluent society. Yet the fish stick arose during the 1950s not because consumers cried out for it, and certainly not because schoolchildren demanded it, but because of the need to process and sell tons of fish that were harvested from the ocean, filleted, and frozen in huge, solid blocks. Consumers were not attracted by the form of these frozen fillets, however, and demand for fish products remained low. Manufacturers believed that the fish stick—a breaded, precooked food—would solve the problem. Still, several simultaneous technological advances had to take place before the product could appear.[2]

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1. Ludwig Feuerbach, "Der Mensch ist, was er isst" (in essence, "you are what you eat"), quoted in Hans Werner Wüst, *Das Grosse Zitaten Lexikon* (Vienna, 2004), 81.

2. On the industrialization of the postwar food industry, see Harvey Levenstein, *Paradox of Plenty: A Social History of Eating in Modern America* (New York, 1993), 101–18.

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These advances occurred in catching, freezing, processing, and transportation technologies. The postwar years witnessed a rapid increase in the size of merchant marines in many countries, with these merchant fleets adopting new, almost rapacious catching methods and simultaneously installing massive refrigeration and processing facilities onboard huge trawlers. Sailors caught, beheaded, skinned, gutted, filleted, and then plate- or block-froze large quantities of cod, pollock, haddock, and other fish—tens of thousands of pounds—and kept them from spoiling in huge freezing units. Once on shore, the subsequent attempt to separate whole pieces of fish from frozen blocks resulted in mangled, unappetizing chunks. Frozen blocks of fish required a series of processes to transform them into a saleable, palatable product. The fish stick came from fish blocks being band-sawed into rectangles roughly three inches long and one inch wide (~7.5 × 2.5 cm), then breaded and fried. Onboard processors eventually learned to trim fish into fillets and other useable cuts before freezing. Processors considered these other cuts the "portion," which found a home in institutional kitchens (schools, hospitals, factories, and restaurants). Fish sticks had a largely *retail* success, however, because demand for them in schools and elsewhere waned as more manufacturers entered production and quality declined.

How Gorton's, based in Gloucester, Massachusetts, entered the fish stick market and achieved a leading position is the story of this essay. Based on corporate archives and industry publications, it focuses on supply-side factors that contributed to the rise of the fish stick as an important icon of U.S. food-product ingenuity. I focus on Gorton's for two reasons. First, the company was a pioneer in the portion and fish stick industry, has remained at the cutting-edge of product innovations in institutional and home products, and, along with the Birds Eye and Mrs. Paul's companies, has dominated the fish stick industry in sales from the beginning.[3] And second, I believe the Gorton's experience with the fish stick is paradigmatic of the industry. Materials from its corporate archives reveal clearly how technology, marketing, and other forces led to the invention of the fish stick. I do not intend this essay to be a paean to Gorton's; the company was, however, a leader in product development and maintained levels of quality control higher than many other manufacturers.

Consumer demand, consumer attitudes, changes in the postwar American household and family—all of these things also contributed to the success of the fish stick. But its success had more to do with the revolutions in catching, processing, and preparing frozen foods, along with other factors: one was an apparently successful marketing campaign directed at busy housewives; another was the role of the federal government in developing,

3. Birds Eye is now owned by Unilever and sold under the Iglo, Birds Eye, and Findus brands; Gorton's has been a subsidiary of Nippon Suisan Kaisha, Ltd. since 2001.

promoting, and regulating new food products and in providing markets for them through school lunch programs. University scientists—in the case of Gorton's, those at the Massachusetts Institute of Technology (MIT)—gave rise to the modern fish stick through research funded jointly by the U.S. government and Gorton's. This research, which was tied to the expansion of supermarkets and the perfection of refrigeration, processing, shipping, and display of products, also fostered the creation of such products as the TV dinner. Gorton's, Birds Eye, and others showed the way with the fish stick, a product made of grade-A fish, light breading, and a few additives.

The Technology of Freezing, Packing, and Catching

The fish stick grew out of a half century of innovations in food-preservation techniques. Salt and other additives to prolong products' shelf life gave way to canning, refrigeration, and freezing so that unspoiled and wholesome fruit, vegetables, meat, and fish reached the consumer. Several individuals, the most well-known of whom was Clarence Birdseye, contributed to "quick freezing" processes and packaging innovations such as a moisture-proof cellophane wrapping. Quick freezing and other new processes rendered frozen products more palatable to consumers.[4] Early on, government and private researchers focused on freezing vegetables and fruits, not fish.[5] The first attempts to provide consumers with fresh or frozen fish using new refrigeration technologies failed; the fish had refrigeration burns, a tough texture, and they often smelled, and gills, stomach contents, and slimy skin frequently incubated bacterial infections. Refrigeration only retarded spoilage and had to be accomplished as quickly as possible after the fish were caught and cleaned—storing them on ice was not enough. Scientists therefore sought to combine refrigeration and freezing with various chemical dips. They experimented with mild antiseptics that were considered harmless to humans but killed fish bacteria, and poisons such as chlorine were even added to the ice itself. Soaking in brine with other chemicals was another possibility, although this led to the deterioration in appearance of the fish. Such antioxidants as ascorbic acid applied in glazes and additives were also effective in preventing oxidative rancidity (spoilage) of fish during storage. As in other areas of industrial food pro-

4. "Dinner, Frozen or Dried," *Newsweek*, 19 November 1945, 72–74; Don Wharton, "Birdseye Also Means Man," *Reader's Digest*, December 1946, 71–74; and Levenstein, 106–7. By 1926, Clarence Birdseye had established a twenty-ton quick-freeze operation in Gloucester that produced a crude form of the fish block, which was later to become the "ore" of the fish stick industry.

5. "Drip Control in Frozen Fish," *Food Industries* 13 (1941): 100; J. Perry Lane, "Time-Temperature Tolerance of Frozen Seafoods," *Food Technology* 18 (1964): 156–62; and "The 'Multiplier Effect' of Frozen Food Technology on American Life," *Food Technology* 15 (1961): 14–24.

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duction, fishery specialists explored the use of antibiotics to deal with spoilage—though this was no panacea because failure to ice the fish promptly and properly after they were caught seriously interfered with antibiotics' effectiveness.[6]

Freezing technology is relatively simple: fans blow cold air over banks of finned coils, and this air freezes the products passing near the coils, often on conveyor belts in large assembly line–like facilities. Yet this freezer design had several negative features relative to fish processing. Air circulation in freezers, combined with a slight drop in vapor pressure when water from the fish condensed on the coils, accelerated fishes' dehydration. Researchers determined that a critical velocity of the dry, cold air existed, above which the fish were damaged: the higher the air temperature, the lower the air velocity needed to cause damage.[7] Researchers also established that freezing started in intercellular regions where salt concentration was the lowest, which resulted in intercellular fluids becoming more concentrated than fluids within cells. Water then left cells through osmosis, especially during extremely slow freezing; this "drip" (or dehydration) resulted in dry, tasteless meats, vegetables, and fish of low nutritional value and that often had an "off taste." Quick freezing overcame this problem partly because only small ice crystals formed in the fish, thus allowing the cells to remain intact.[8]

Like other agricultural- and food-industry technological changes, refrigeration and freezing ended the seasonality of many products. This enabled the food industry to meet the demand for fish and other products during winter months when supplies were at their lowest.[9] But, for many reasons, the time was not yet right for such "heat and eat" products: during the Great Depression, high unemployment and low incomes discouraged development of new food products; limited trawling and refrigeration capacity prevented the economical production, distribution, and sale of frozen seafood products; packaging was unattractive; and last, many of the

6. Louis Berube, "Modern Practice of Fish by Cold," *Food Industries* 9 (1937): 645; J. C. Bauernfeind, E. G. Smith, and G. F. Siemers, "Commercial Processing of Frozen Fish with Ascorbic Acid," *Food Technology* 5 (1951): 254–60; "Drip Control in Frozen Fish"; and D. D. Gillespie, J. W. Boyd, H. M. Bissett, and H. L. A. Tarr, "Ices Containing Chlorotetracycline in Experimental Fish Preservation," *Food Technology* 9 (1955): 296–300.

7. F. W. Knowles, "How Foods Are Frozen in the Northwest," *Food Industries* 12 (1940): 54–56, and "Reduces Drying in Air Blast Freezing," *Food Industries* 13 (1941): 92–93.

8. Gerald Fitzgerald, "Why You Freeze It That Way," *Food Industries* 22 (1950): 73–77. Another way to limit drip had nothing to do with additives. Chemists at the Bureau of Commercial Fisheries determined that the excess cutting of fish caused millions of cells to rupture, thus exposing their contents to the atmosphere. See Frederick King, "Cell Damage from Excess Cutting of Fish Adversely Affects Frozen Seafood Quality," *Quick Frozen Foods* (1962): 115–16.

9. Ivan Miller, "Quick Freezing Thaws Frozen Channels of Distribution," *Food Industries* 10 (1938): 199, 202.

products simply did not catch on. For example, the fishing industry tried marketing "fishbricks," which were quick-frozen filleted fish packaged like blocks of ice cream. The main selling point was that "the housewife can cut the fish into any shape and be confident that the shape will be retained even after cooking"; no defrosting was necessary. But the First National and Kroger's grocery stores could hardly sell the product, and moreover, most stores lacked frozen-food display cases to accommodate the bricks.[10]

The market began to change when General Foods, using the Birds Eye trademark, fostered the development of freezer cabinets in grocery stores.[11] Birdseye had first marketed his quick-frozen foods in 1930 in Springfield, Massachusetts, and thereafter hundreds of food processors moved quickly into the frozen-food industry and introduced thousands of products. On the basis of Birds Eye's technology, Thompson Spa introduced main-course dinners in 1938; Mrs. Paul's and Timeliness joined in, as did Swift and Sara Lee with such ready-to-heat foods as potpies. By 1945, there were 450 quick-freezing firms selling 600 million pounds of frozen foods through 40,000 retail outlets. War rationing of canned goods for the armed forces led even more customers to frozen foods. Supermarkets expanded their freezer display cases to meet this rising demand.[12]

The fish stick also prospered from changes in catch and transport technologies. Increases in the size and speed of trawlers and their rapid handling of products resolved the problems of freshness and economy. Small boats that stayed close to shore gave way to large, powerful vessels that might trawl for days at a time, often working in groups that sold ever larger catches to canning and other processing factories along the coasts. Nets made of durable and flexible materials (eventually plastics) made it possible to catch almost indiscriminately, and increasingly powerful winches hauled in nets bursting with sea life. Oceanographic data on water chemistry, currents, and fish populations and migration behavior enabled captains to find schools of fish more easily. Ultimately, such military innovations as sonar made it possible to locate potential catches with little delay.

A crucial innovation for the fish stick was the construction of vessels with huge capacities for refrigeration and freezing. After World War II, the nations of the North Atlantic launched floating factories and trawlers that froze catches at sea. New trawlers had storage capacities of 15,000 tons and more. Trawlers often worked in pairs, pulling nylon nets that were kilometers in length, hauling in the fish living on or near the bottom and pelagic fish (those that live in the open seas), and freezing them according to size, species, and other criteria.

International competition contributed toward the taking of massive

10. "Fishbricks for Fastidious Housewives," *BusinessWeek*, 12 July 1947, 64.

11. Francis Schuler, "The Papal Decree, Kennedy Round Present Fish Sticks, Portions with Challenge," *Quick Frozen Foods*, 1968, 152, 188–89.

12. "Dinner, Frozen or Dried" (n. 4 above), 72–74, and Wharton (n. 4 above), 71–74.

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catches and over-fishing by the new trawlers and so-called floating factories, the fleets of many North Atlantic countries seeking out cod, haddock, and other fish. Most governments subsidized their fleets; for example, the Canadian government subsidized modern refrigeration plants and trawlers to provide steady employment for coastal fishermen in the maritime provinces.[13] Its support extended to Quebec province in the construction of a modern freezer and filleting plant at Grindstone on the Magdalen Islands, which supplied Gorton's with much of its catch. While the U.S. government belatedly got into the act of subsidizing trawler manufacture in the late 1960s,[14] by then fleets of trawlers had already depleted nearby fishing grounds such as Georges Bank off the New England coast. To ensure a steady supply of fish, Gorton's was forced to enter world markets with its own and also contracted vessels; to this day, Gorton's contracts with the Polish Distant Water Fleet.[15] The numerous fleets thereby contributed to the phenomenon of the "tragedy of the common":[16] rapacious over-fishing of a resource lest other ships or nations do so first.

The transportation of fresh or frozen goods also underwent rapid change on land, thereby enabling food processors to distribute throughout the country. These changes included new railway refrigeration cars, called "reefers,"[17] and large refrigerated trucks.[18] With the expansion of the federal highway system during the 1950s, trade associations of semi-trailer manufacturers joined the U.S. Department of Agriculture and National Bureau of Standards in examining refrigerated trailer performance in long and short runs with the goal of designing loading docks to minimize temperature changes and to keep labor costs down.[19] Still, the distribution of frozen foods remained a weak link in quality control; as late as 1966, J. Perry Lane of the Bureau of Commercial Fisheries' technological laboratory in Gloucester reported that most commercial refrigerated trucks failed to maintain proper temperatures.[20]

Another technology important to the fish stick was the supermarket

13. Miriam Wright, *A Fishery for Modern Times* (Oxford, 2001).

14. "Two New Freezer Factory Ships May Put U.S. Back into the Fish Industry Race," *Quick Frozen Foods*, September 1968, 97–98. On the economic, environmental, and social costs of the modern trawling industry in the North Atlantic, see Michael Harris, *Lament for an Ocean* (Toronto, 1998); Mark Kurlansky, *Cod: A Biography of the Fish That Changed the World* (New York, 1997); William Warner, *Distant Water: The Fate of the North Atlantic Fisherman* (Boston, 1983); and David Dobbs, *The Great Gulf: Fishermen, Scientists, and the Struggle to Revive the World's Greatest Fishery* (Washington, D.C., 2000).

15. E. Robert Kinney, personal communication, 20 October 2003; see also "Better Seafood Possible with New Fishing Boat," *Science News Letter*, 5 December 1953, 359.

16. Garrett Harden, "The Tragedy of the Commons," *Science* 162 (1968): 1243–48.

17. "Progress in Freezer Rail-Transportation," *Food Industries* 10 (1938): 62.

18. "Fresh and Frozen on the Same Delivery," *Food Industries* 17 (1945): 86–87.

19. "The 'Multiplier Effect'" (n. 5 above), 14–24.

20. Lane (n. 5 above), 197–201.

itself. The first U.S. supermarkets opened during the 1930s. Consumers flocked to them, although the Depression delayed further expansion until the postwar years, when they became a central feature of life.[21] During the period 1948 to 1963, large chains increased their share of the nation's grocery business from 35 to almost 50 percent. Managers installed high-capacity refrigerated display cases for the myriad frozen and other processed-food products.[22] In 1960, the Food Fair supermarket chain excitedly publicized the opening of its "completely mechanized, modern seafood distribution center" in Philadelphia at a cost of $100 million, the center being capable of shipping more than a million pounds of frozen and fresh North Atlantic seafood weekly.[23]

Gorton's and other frozen-fish companies embraced these changes in catching, processing, refrigerating, freezing, and transporting during a time of rapid social, demographic, economic, and lifestyle changes in the United States that helped shape consumer demand and create a market for such convenience foods as the fish stick. During World War II, when women went to work in industry to replace men who had gone off to war, "convenience cooking" found an immediate market. Rosie the Riveter could work all day and still cook for her family at night using ready-to-eat items. A booming postwar economy and a rapidly growing population increased demand for new food products. The GI Bill of Rights contributed to upward mobility through educational and training opportunities for millions of demobilized soldiers. Spurred by federal subsidies and tax laws, a housing boom giving rise to suburban lifestyles followed. Real income rose steadily and Americans spent a higher percentage of it on food. The food- and kitchen-appliance manufacturers jumped on the mass-market bandwagon to help satisfy the demand for filling these new homes. In 1952, when the population totaled 152 million, only four million families, mostly farm-based, had freezers; by 1960, this number had quadrupled. The boom in housing permitted the design of kitchens large enough to accommodate freezer and refrigerator–freezer units.[24]

In this environment, food processors sought to convert new techniques

21. Max Zimmerman, *The Super Market* (New York, 1955); Ralph Cassady, *Competition and Price Making in Food Retailing* (New York, 1962); and Edward Brand, *Modern Supermarket Operation* (New York, 1963).

22. Levenstein (n. 2 above), 113–14. The supermarket held a central place not only at home, but also in the ideology of cold war competition. The supermarket display case figured prominently in U.S. exhibitions at international trade fairs, as it did in the public sparring between Vice President Richard Nixon and Soviet Premier Nikita Khrushchev in a debate in an American kitchen at a Moscow exhibition in July 1959. See also Ruth Oldenziel and Karin Zachmann, eds., *Kitchen Politics: Americanization, Technological Transfer, and the Reconstruction of Europe* (forthcoming).

23. "Food Fair's Seafood Distribution Center Stresses Frozen," *Quick Frozen Foods*, June 1960, 86, 107.

24. Levenstein, 101–6.

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and products that grew out of military rations and meals into a "peacetime market for wartime foods," with a focus on "pre-cooked" products.[25] To promote these new products, processors promulgated a strategy of mass marketing, new menus and recipes, and new products, including the fish stick. These foods and meals built upon a tradition of scientifically based recipes in the name of public health and efficiency that originated in university home-economics departments and Department of Agriculture extension services. When Quaker State Foods introduced its unfortunately named "One-Eye Eskimo" label of frozen meals in 1952, consumer response was underwhelming. Although soon thereafter Swanson made a hit with TV dinners, frozen foods were not yet a "housewife's dream." Initially, producers successfully marketed only frozen orange juice. As Laura Shapiro points out, while by 1954 the annual consumption of frozen foods had risen from seventeen to thirty-six pounds per capita, 80 percent of it was purchased by only 3 percent of the population.[26]

Still, the Birds Eye product line of General Foods introduced fish sticks to national fanfare on 2 October 1953. A newspaper article even claimed that this was "the most outstanding event" in seafood since the early 1930s. Fish sticks signaled the modern era of easy-to-prepare, nutritious foods. This shift toward precooked foods, and sea foods in particular, represented "the first big improvement in the use of raw food materials since the early days of the introduction of quick freezing." Developed at Birds Eye's seafood laboratories in Boston over a three-year period, fish sticks' time-saving quality was its greatest attribute: "No actual cooking is required," its promoters proudly announced. Just as important, the fish stick would "help increase the per capita consumption of fish."[27] Nearly simultaneously, other manufacturers such as Gorton's entered the fish stick business.

The Gorton's of Gloucester Corporation

Gorton's predecessor was established in 1906, when four fishing companies were consolidated as Gorton-Pew Fisheries Company, a firm with nearly forty vessels. Gorton-Pew grew to a thousand employees on land and an equal number at sea, with some fifty-five vessels, fifteen wharves, and thirty-five buildings. The company survived the Depression and gained business during World War II. Sales slumped after the war, however, when the demand for fish declined as meat suppliers switched from the military to the domestic market. Innovations in catching, freezing, and processing fish offered great promise only if the processors could survive the shakeout and create consumer demand. Gorton's overcame several rather lean years

25. Schuler, "The Papal Decree" (n. 11 above), 152, 188–89.
26. Laura Shapiro, *Something from the Oven* (New York, 2004), 8–22, 24–27.
27. "New Product Seen Spurring Fish Use," *New York Times*, 3 October 1953.

to become a leader in fish sticks and several other fish products. How it did so illuminates the challenges facing fish processors during the postwar years, when new, scientifically tested products had to be developed, new regulatory pressures had to be met, and new foods had to be marketed in the changing retail setting of the supermarket.

In 1942, E. Robert Kinney of Pittsfield, Maine, a small town near Bangor, met Paul Jacobs of Boston. Jacobs worked for the New England Development Corporation, a Lincoln Filene-Cabot investment firm that sought to assist struggling New England industries. A history major at Bates College in Lewiston, Maine, Kinney had intended to become a high school teacher, but preferring business to education, he left graduate school at Harvard in 1942 and moved to Bar Harbor, Maine. There he founded the North Atlantic Packing Company, a crab-canning business, and as its president and treasurer turned the struggling operation into a firm that grossed $2 million annually in 1952. He joined Gorton's in 1953 as president, where he oversaw a sevenfold increase in sales. General Mills bought Gorton's in 1968, and Kinney became that company's president in 1973.[28]

Kinney, who knew firsthand the economic challenges facing Maine's coastal fishing towns, interested Jacobs in supporting North Atlantic Packing. Shortly after buying into the company and becoming its president, he expanded its product line into areas such as cat food made from fish byproducts. North Atlantic Packing next marketed "Bar Harbor Ready-to-Fry" fishcakes in competition with Gorton-Pew. This led to legal disputes over copyright infringement on the use of "ready-to-fry," which Gorton-Pew claimed as its own. But representatives of the two companies soon recognized that it was better to combine forces; eventually, Gorton's president McGeorge Bundy, who was later an adviser to President John Kennedy and then head of the Ford Foundation, invited Jacobs to join the company's management.

Jacobs joined Gorton's during a difficult time: sales had declined, and 1953 marked the first time in twenty years that it had sustained a loss. (Things were not so bad as they had been in 1923, however, when Gorton-Pew Fisheries nearly went bankrupt after Benito Mussolini's government confiscated a huge cargo of cod.) Jacobs worked as director of advertising and promotion to regain appeal for the Gorton label, and he even convinced *Parents* magazine to award fish sticks its seal of approval. Perhaps because of new leadership or rekindled interest in fish products or successful advertising, by 1955 sales had shot up 27 percent. Jacobs placed salesmen in the East, Midwest, Southwest, and on the Pacific Coast to market Gorton's products. While producers initially had trouble convincing supermarkets to expand freezer display-case capacity to carry frozen products, Kinney and others

28. "E. Robert Kinney, former General Mills CEO '39 repaying 'debt' to Bates," http://www.bates.edu/alumni-kinney.xml (accessed 20 August 2007).

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eventually succeeded in placing fish sticks and other ready-to-serve items in such grocery outlets as A&P, D'Agostino, Diamond K, Food Fair, and Star.

Like other producers, Gorton's devoted great attention to advertising, packaging, and display to generate consumer interest in fish sticks. The advertising firm of Petley, Clark, and Johnston investigated Birds Eye's fish stick advertising and in October 1953 recommended that Gorton's embark on a national campaign, the firm's president, G. E. Petley, sending Jacobs a series of newspaper and magazine clippings to underscore its potential.[29] Welles Sellew, a Gorton's vice president, followed with a memorandum to all brokers on "heat and eat" seafood, especially fish sticks, pointing out their convenience, quality, and great taste: "This is a new item—the potential for this product is *terrific*."[30] Manufacturers of fish sticks stressed their wholesomeness, modernity, and time-saving qualities: the "harried housewife" could "heat and eat" fish sticks, which were nutritious, based on scientific standards, and used only such wholesome ingredients as potatoes, salt cod, shortening, and meal. Jacobs likened the success of fish sticks for the fishing industry to that of "frozen juice . . . to the citrus industry." There was "seemingly no limit to the potential market" for fish sticks.[31]

Researchers, engineers, package designers, and salesmen were involved in the development of this new product. Jacobs glorified it in his standard stump speech, "The Fabulous Fish Stick Story," which he delivered during the early 1950s to business, community, and other groups. He called the fish stick a "tribute to the ingenuity of the American business man" and praised the product's uniformity and simplicity. The consumer had only to open the package, heat the contents, and serve. While cod and canning had a long tradition in New England, canned fish had never duplicated the flavor and appeal of fresh fish. Birds Eye's quick freezing allowed frozen fillets to be shipped anywhere and maintain their fresh taste. Jacobs observed that the fish industry thrived during the Depression because fish products were economical in cost, and it continued to grow during World War II when meat was in short supply. But as meat rebounded during the postwar period, it threatened to win the "battle of proteins." Modern boats, electronic location devices, better, more efficient trawling equipment, and new methods to cut and process, skin, and fillet permitted increased output, but these could not create consumer demand.[32] That job was up to the fish-product industry.

To engender "a positive response in most people's minds," Jacobs promoted an extensive advertising campaign to educate consumers about how fish had as much protein as meat and was easier to digest. He admitted the

29. G. E. Petley to Paul M. Jacobs, Gorton-Pew Fisheries Co., Ltd., 9 October 1953, Gorton's Corporate Archives (hereafter GCA).

30. Welles Sellew, memorandum, 3 July 1953, GCA (emphasis in original).

31. Director of Sales Promotion Paul Jacobs, memorandum, 1 December 1953, GCA.

32. Paul Jacobs, "The Fabulous Fish Stick Story," typescript (c. 1952), GCA.

challenges involved, since "most women do not like to handle fish [and] most women don't know how to cook fish properly." Birds Eye, Fulham Brothers, and Gorton's—all Massachusetts companies—introduced fish sticks in the spring of 1953 as the answer to those challenges. They had solved the problem of undercooking fish sticks at the factory to prevent overcooking at home and hence the production of dry, tasteless fish. Simple instructions saved the day, as did an appealing package: "Here I am—I'm a Fish Stick—take me home and try me out—I taste good!"[33]

Gorton's rose to the top among competitors, and it expanded its facilities and products rapidly. It built its own $1 million processing plant in Gloucester, which it opened in 1956 as the Gorton's Seafood Center. Over the next ten years Gorton's acquired other companies and also entered international markets. Its other facilities serviced shrimp, fish by-products, and institutional sales, all of which it offered through the acquisition of such other businesses as Florida Frozen Food Processors, Canapro of Canada, and Blue Water Seafoods, a subsidiary of Fishery Products. In addition to its fish sticks that used less filler and bread than other fish sticks and "Bake 'n' Serve" dinners such as fish steaks in cheese sauce, the company now marketed scallops, perchies (breaded and cooked perch fillets), and other dishes in "family-size" packaging. The company expanded sales to restaurants, hotels, caterers, and schools, and it vigorously pursued the manufacture of easy-to-serve "portion-controlled items." The impact on Gorton's of innovations in refrigeration, freezing, and processing technologies and of social-demographic change on the product mix between 1906 and 1957 is indicated in table 1. The table also reflects how its inventory changed from salted and cured products, which required overnight soaking to remove excess salt, to those that a housewife could simply pop into the oven with little mess or bother. Other innovations followed during the coming years, such as the four shrimp products and six new lines of fish fry that were added in the early 1960s. But the most important items for Gorton's postwar rejuvenation were fish sticks and portions.

Gorton's brochures touted fish sticks as "the industry's greatest contribution to modern living." "Thanks to fish sticks," one brochure read, "the average American homemaker no longer considers serving fish a drudgery," but a pleasure because they were easy to prepare, "thrifty to serve and delicious to eat." Fish sticks "have greatly increased the demand for fish while revolutionizing the fishing industry." To accomplish this, first solid blocks of clean, white, frozen-fresh fillets were cut into stick sizes with as little waste as possible, using modern band saws. Because processors preferred thinner band-saw blades, which limited the waste of food substance during cutting, there was an effort to improve the set of teeth, hardness, and welding of the blade ends. But there was a fine line between the life of the saw

33. Ibid.

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TABLE 1
GORTON'S OF GLOUCESTER MAJOR PRODUCTS, 1906 AND 1957

1906	*1957*
Codfish flakes in glass jars	Main courses: *sole, flounder, and other fillets*
Water Lily brand boneless codfish	Fried/frozen specialties: *fish sticks, cakes, and perchies*
Perfect, hand-picked codfish	Frozen fillets: *perch, sole, codfish, whiting, pike, and others*
Codfish cakes (boneless)	Frozen, portion-controlled seafoods for institutions: *"uni-fill-etts," fish sticks, patties, cakes, and others*
Smoked bloaters	Salted and pickled fish
Boneless herring in glass jars	By-products
Sliced, smoked halibut in glass jars	

blade and its thinness, and the thinner the blade, the faster the teeth wore down and the more often the band broke. When this happened production came to a halt, and lost production time was more costly than the blade itself. After cutting, the fish sticks were covered with "just the right percentage of breading for maximum taste appeal." Next, conveyors conducted the fish through automatic fryers where they acquired an "appetizing light golden-brown hue" in fat heated to between 375 and 400 degrees Fahrenheit. From there, it was on to packaging, labeling, freezing, and shipment.[34]

Once at the supermarket, Gorton's, Birds Eye, and other manufacturers encountered problems related to freezer display cases, including significant temperature variations. Too often, store personnel placed frozen products above the load-line in display cases so that products at the top front and middle were stored at higher temperatures than those at the bottom and rear. While the latter were acceptable insofar as product maintenance was concerned, they were unacceptable regarding display, marketing, and sales. And, of course, temperature variation could lead to rapid deterioration in quality. Studies showed that frozen products encountered their highest temperatures in local retail deliveries; that is, just before the products passed to the consumer.

These problems interfered with the creation of a stable niche for frozen foods such as fish sticks in the market.[35] Further, Gorton's salesmen com-

34. Fish stick brochure (c. 1954), GCA; Robert Vanderkay, "The Fine Edge in Continuous Cutting of Frozen Seafoods for Processing," *Quick Frozen Foods*, November 1966, 74–76; and Berube (n. 6 above), 645. Most engineers argued that mechanization enabled them to fully control workers and the production process.

35. J. Perry Lane, "Time-Temperature Tolerance of Frozen Seafoods," *Food Technology* 20 (1966): 197–201.

peted with those of other companies to secure freezer display space in supermarkets and to instruct supermarket personnel on their products' proper handling and display. Gorton's instructed its representatives always to keep frozen-food displays "neat and attractive," and it gave them a brochure explaining not only how best to do this, but even how to park: far from the front doors so as to leave the "close in, important spaces" to customers. Salesmen were to talk "with the manager and stocking clerk together if possible, be enthusiastic, reveal charts and pictures showing how to arrange foods." When suggesting how to arrange Gorton's products in the cases, they were told to watch for blind spots, but to be fair to other companies' products in arranging the case. "Show the manager what you've done and why you have done it. Show them sales statistics" demonstrating how volume will grow rapidly.[36]

As noted, fish sticks met with immediate success. Within months of their introduction in 1953, they had grabbed 10 percent of noncanned fish sales. Production leapt upward; in Gloucester alone, there were 500 new jobs and processing went from seven months to year-round. According to the *Wall Street Journal*, fish sticks were "the first really new processing development in a quarter-century for one of the nation's oldest industries." In 1953, thirteen companies produced seven-and-a-half million pounds; in the first quarter of 1954, another nine million pounds were produced and fifty-five new companies entered the business. Fulham Brothers of Boston expanded into fourteen cities, with a resulting tenfold increase in sales since September 1953. A sampling program in Detroit that involved "hitting 200,000 families with coupons" proved successful. While fish sticks were slightly more expensive than frozen fillets (which were neither breaded nor cooked), company representatives claimed that their breading saved the housewife both time and money.[37] In 1954, supermarkets reported a 30 percent sales increase of fish sticks over the previous year, and Gorton's was running 100 workers in two shifts and expanding facilities wherever it could. As the corporate newsletter, *The Man at the Wheel*, commented: "Acceptance of fish sticks . . . has been so widespread that many expect them to do for the fisheries what fruit juices have done for the fruit trade."[38] Their quality, attractive wrapping, and advertising had been the key to success.

Gorton's instructed salesmen that women were the shoppers and buyers and that in marketing fish sticks, they needed to approach men and women differently. According to a survey whose origin and conception is unclear, of a thousand individuals randomly selected from three million subscribers to *Ladies' Home Journal* in autumn 1954, almost two-thirds of the 738 respon-

36. GCA, various undated Gorton's salesmen brochures; Welles Sellew to all brokers, memorandum, 3 July 1953; and Paul M. Jacobs to all brokers, memorandum, 1 December 1953.

37. Lee Geist, "Fish Fillip," *Wall Street Journal*, 7 May 1954, 1, 11.

38. "Fish Stick Expansion," *The Man at the Wheel*, December 1954, 1.

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dents knew about fish sticks, and most said they were available at local stores. Yet only one-third were familiar with specific brands—10 percent with Birds Eye, 7 percent with Mrs. Paul's, and 4 percent with Gorton's—and fewer than 40 percent had served the product.[39] A Gorton's internal memorandum (with the apparent goal of increasing name recognition among housewives) used simple drawings to indicate the influence of the female and male subconscious on purchasing behavior. When women heard the word "cheesecake," the memo indicated, they thought of food; on hearing the same word, men thought of a sexy woman. So the question was, how to appeal to 55.5 million women in the United States, 90 percent of whom were homemakers—meaning cook, driver, mother, nurse, host, teacher, and "purchasing agent"—and fourteen million of whom also worked outside the home? Gorton's 1958 sales promotions therefore aimed at the busy women who bought the groceries. Its "Busy" campaign adopted the slogan, "Let Gorton's Famous Seafood Chefs Cook for You." Advertisements in women's magazines for its "Heat 'n' Eat Seafoods"—fillets of sole, flounder, steaks, scallop casseroles, and fish sticks and fishcakes in various sauces, cheese, or breaded—focused on this market.[40] By 1960, Gorton's billboards had spread from New England to Florida,[41] and fish sticks had spread across the nation.

Federal Regulation, Federal Funding, and the Fish Stick

Government regulatory and purchasing programs significantly helped the fish stick. Federal efforts to regulate frozen seafood accelerated after World War II; in fact, culminating with the Food Additive Amendment of 1958, the government had become active in ensuring a healthful and safe food (and drug) supply. The regulatory history of various industries, processes, and labor practices for public safety is not the focus of this essay; suffice it to note that leading manufacturers and businesses, while often initially opposing regulation, have eventually endorsed it as a way to reduce cutthroat competition. In virtually every aspect of the food industry self-proclaimed ethical manufacturers welcomed regulation, while cut-rate producers feared it because they would face higher costs in order to meet higher standards. Regarding fish sticks, many producers initially opposed regulation as interference in commerce, yet in the face of daunting competition among an increasing number of producers and a decline in product quality that shook consumer confidence, the leading suppliers eventually embraced it.[42]

39. "Fish Sticks: A Survey Made among LHJ Subscribers," *Ladies' Home Journal* Research Department, November 1954, in GCA.

40. Internal memorandum, "Who Buys the Food and Who Prepares It? Women" (c. 1958), GCA.

41. *The Man at the Wheel*, March 1960, 2.

42. "Frozen Fish Grading Offered in Bill," *Food Industries* 22 (1950): 147.

Evidence had accumulated that the frozen-fish industry could not guarantee quality without some kind of inspection program in place. Francis Schuler, an economist with the Bureau of Commercial Fisheries, concluded that lower costs in an increasingly competitive industry had been attained only by using shortcuts, leading to loss of quality of the final product. In a series of articles during the 1950s and 1960s, *Consumer Reports* noted a general decline in the quality of fish sticks as more producers entered the market.[43] When consumer dissatisfaction caused a decline in production in the mid-1950s, firms such as Gorton's called for voluntary standards of government inspection of fish sticks. Believing that a U.S. Grade A inspection seal on packaged products would "erase many of the suspicions the public had toward all frozen seafoods," Gorton's marketing people decided to embrace standards as a way of separating their fish sticks from those of competitors. Consequently, the Department of Agriculture published *U.S. Standards for Grades of Frozen Fried Fish Sticks* (effective 21 August 1956, recodified 1 July 1958) as recommended by the Bureau of Commercial Fisheries of the U.S. Department of the Interior. This voluntary program stipulated standards, inspections, and certifications for sticks and portions.[44] Grade A fish sticks had "good flavor and odor" and good appearance and were practically free from defects—that is, with no identifiable bones, no broken or damaged sticks, and no blemishes. Leading manufacturers promptly implemented the standards though enforcement increased production costs, since it required the funding of continuous inspection of fisheries' products by full-time federal inspectors at all plants. By December 1958, sixteen fish-processing plants, located primarily in the Northeast and Gulf states, had adopted the continuous-inspection standard. By March 1960, forty-one inspectors had placed thirty-two plants in the industry under continuous inspection, and some 92 million pounds of fish passed under their noses in that year alone.[45]

Inspectors turned up a series of problems that illustrate the significance of inspection. One inspector had rejected a certain lot of frozen fish, only to learn that the same lot turned up at another plant, a hundred miles distant, where another inspector also rejected it.[46] Yet if fish sticks were to survive as a product, more than voluntary inspection standards were necessary. In February 1961, the editors of *Consumer Reports* published a highly critical analysis of the product. Of twenty-six brands (312 samples), only

43. "Frozen Fish Sticks," *Consumer Reports*, March 1956, 63–65; and "Frozen Fried Fish Sticks," *Consumer Reports*, February 1961, 80–83.

44. Francis Schuler, "History and Future of Fillet-Based Frozen Fish," *Quick Frozen Foods*, May 1968, 94–95.

45. J. J. Powell, "Pre-Standard Educational Program," *Quick Frozen Foods*, April 1960, 130.

46. J. R. Brooker, "Six Years of Frozen Seafood Inspection," *Quick Frozen Foods*, August 1964, 131–32.

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two received "acceptable" ratings. The others were deficient "apparently by poor storage and handling practices." Worse still, fully 25 percent of the sticks tested did not meet the requirement that a stick was to be "clean," "wholesome," rectangular, and containing not less than 60 percent fish flesh by weight.[47] Were these fish sticks or breadsticks?

By 1967, the National Fisheries Institute supported a bill that provided for mandatory inspection of fish and fishery products.[48] "Let's face it," the editors of *Quick Frozen Foods* insisted, "whether it is a mandatory inspection set by the industry or by the government, *the ultimate judge of our products* [sic] *quality is the consumer herself.*"[49] The Wholesome Fish and Fishery Products Act of 1968 provided for, after a six-year grace period, mandatory and continuous inspection standards for quality and cleanliness and the approval of both labels and packaging.[50]

E. Robert Kinney, Gorton's president, defended the government's standards. In frozen seafood, "as with so many other new and expanding industries," he wrote, "we are prone to believe that recently proposed governmental regulations will needlessly complicate our lives." But industry "must learn to live with [the laws] gracefully, and take advantage of what they can offer us in consumer confidence and acceptance of our products." He claimed that Gorton's had pioneered continuous government inspection of seafood with the opening of its new Seafood Center in 1956. Gorton's considered inspection "an important facet of the great American search for constantly improved productions to meet new and changing appetites." Inspection and advertising that touted goodness and wholesomeness were the key to developing consumer confidence in new convenience foods such as breaded shrimp, breaded portions, and fish sticks.[51]

Several other federal programs helped the fish stick. One was the Saltonstall-Kennedy Act, passed by Congress in 1956, that both supported fisheries research and provided $45 million to promote the virtues of new products in supermarkets, including the fish stick. Senators Leverett Saltonstall and John F. Kennedy, Republican and Democrat of Massachusetts, respectively, introduced this legislation for several reasons: to support commercial fisheries during a recession in the industry due, in part, to growing foreign competition; to convince a skeptical public of the value of fish sticks

47. "Frozen Fish Stick Quality Blasted in February 1961 *Consumer Reports*," *Quick Frozen Foods*, April 1961, 136.

48. J. R. Brooker, "USDA Frozen Seafood Inspection," *Quick Frozen Foods*, September 1964, 99, 167.

49. "Should Mandatory Frozen Seafood Inspection Replace Voluntary Inspection?" *Quick Frozen Foods*, January 1966, 95–98 (emphasis in original).

50. "Number of Frozen Seafood Processors Increased 774% Over Past 20 Years," *Quick Frozen Foods*, November 1967, 265–66.

51. E. Robert Kinney, "Government Inspection Vital Facet of Search for Improved Products," *Quick Frozen Foods*, May 1968, 95–96.

and other products; and to encourage supermarkets to undertake the large expense of purchasing and installing freezer display cases.[52]

The federal government also supported the fish stick through school lunch programs, and suppliers took advantage of this. Building on programs run by charities, federal and state governments had expanded school lunch programs during the Depression in part to provide a market for excess farm products.[53] In 1946, Congress, stressing military expediency, passed the National School Lunch Act "as a measure of national security, to safeguard the health and well-being of the nation's children and to encourage the domestic consumption of nutritious agricultural commodities" through the establishment, maintenance, operation, and expansion of nonprofit school lunch programs. The number of children, number of meals served, and amounts of food used all increased rapidly, as there seemed to be universal recognition of the act's benefits. In 1944, nearly 3.8 million children participated, which swelled to over six million by 1947. By 2004, federal funding for twenty-seven million school lunches daily, together with food-assistance programs to mothers and small children and several other programs, cost approximately $16 billion.[54]

Fish stick managers found a ready-made market in school lunches. The inexpensive yet wholesome fish stick, served with potato chips, orange juice, salad, rolls and butter, cake, and milk, would be a "favorite school lunch entrée." Gorton's first tested fish sticks in Manchester, Massachusetts, public schools. Fish sticks had to be served "piping hot," which left great responsibility in the hands of the food-preparation staff. The company was confident this would not be a problem and suggested a variety of options to keep fish sticks as a high-demand item in schools: they could be served as fish burgers with tartar sauce on a bun; as hot appetizers; with scrambled eggs at breakfast; and so on.[55] Gorton's worked tirelessly during the 1950s to promote fish sticks through distributors to school lunch programs,[56] and to this day they maintain a spot in many school cafeterias.

52. "Your Company," *The Man at the Wheel*, March 1954. To this day, the National Marine Fisheries Service supports research, development, and marketing strategies for fisheries and fishery products under the act through "grants for research and development projects addressed to any aspect of U.S. commercial and recreational fisheries including, but not limited to, harvesting, processing, marketing, and associated infrastructures" (Grants Office, National Marine Fisheries Service, http://www.ago.noaa.gov/grants/ [accessed 2 August 2006]). Funding for the program was severely reduced by the Bush administration in 2002.

53. Gordon Gunderson, "History of the National School Lunch Program," in *National School Lunch Program Background and Development*, Food and Nutrition Service (FNS) 63 (Washington, D.C., c. 1969).

54. Kathryne I. Sheehan, "Trends in the School Lunch Program," *Journal of Home Economics* 44 (1952): 697–700.

55. "Fish Sticks 'n' Chips," Gorton's pamphlet, mid-1950s, GCA.

56. Stan Hurley, memoranda to brokers, 16 August and 24 September 1954. The cover

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One last input was crucial to the success of the fish stick: scientific research and development in various forms. In 1953 or 1954, Gorton's management commissioned a detailed report by Harvard University economists to determine the proper long-term strategy to secure its position within the industry. The marketing specialists noted that in spite of a postwar decline in demand for fish that had hurt Gorton's and other suppliers, fish sticks were ready to hit the market. Surveys of consumers by producers, distributors, and grocers indicated that fish sticks were "extremely easy to handle, the housewife simply heating them up in the oven." While New York's Fishery Council for fresh fish raised the concern that fish sticks "may turn out after all only a 'sizeable flash in the pan,'" the Harvard report indicated that greater faith in the future of fish sticks was warranted. The management specialists called for extensive promotion of distinctive Gorton's packaging to attract consumers, and replacement of the bulk pack with family-size packages to keep Gorton's "out of the price-cutting mill race." They also recommended that Gorton's quickly modernize facilities to include a continuous frying facility like the one recently built by Birds Eye.[57]

Food science and technology also supported the fish stick.[58] To give just one example, in 1956, Paul Jacobs asked researchers at MIT's Department of Food Technology to help Gorton's improve fish sticks, especially in the areas of quality control and efficiency of production. The department could determine when a product was best, how to produce it in the most efficient way, and how to invent a new product that was novel and appealing in taste and convenience.[59] To promote closer ties between research and food, between

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of a Gorton's brochure from 1954 featured a young girl in a Newton, Massachusetts, school, supposedly typical of the "10 million children who eat school lunches everyday. She is ready to enjoy what is rapidly becoming a favorite lunch of school children . . . Gorton's Cooked Fish Sticks." See "A Smile," *The Man at the Wheel*, November 1954. On school lunches, see also Grace E. Hochmuth and Bessie West, "Organizing a School Lunch Program," *Journal of Home Economics* 41 (1949): 559–60; George Hecht, "Save the School Lunch Program!" *Parents* 23 (1948): 14; Levenstein (n. 2 above), 78; Sheehan, 697–700; and http://www.scusd.edu/nutrition_education/history_of_school_lunch_program.htm (accessed 20 August 2007).

57. Harvard University report, typescript (1954), 27–33, 36–40, GCA.

58. Levenstein characterizes the postwar years as the "golden age" of food chemistry, when scientists developed hundreds of additives, preservatives, color stabilizers and dyes, and "smootheners." Fish sticks had the built-in advantage among processed foods that cod and other fish used in them could not be farmed, but only industrially harvested from the ocean (Levenstein, 109–12).

59. Paul Jacobs, memorandum (c. 1956), GCA: "I am a fish peddler, and as such I am not invited to illustrious gatherings such as this. There has been a stigma against my industry. . . . I realize it all-too-well in my own family life. My daughter came home from school recently looking somewhat crestfallen. . . . She told me the teacher had asked all the children what their fathers' occupations were. When my daughter, Susie, said her

science and industry, in July 1956 Gorton's and MIT sponsored what the organizers claimed was "the first seminar in the history of the frozen foods industry." The seminar focused on "how to keep frozen seafood sufficiently frozen at all times from plant to customer to maintain flavor, texture, nutrition and kindred values inherent in wholesome fresh fish." Observers called the seminar a "unique [and] trailblazing researcher–marketer" session. The seminar's participants visited several supermarkets and the automatic seafood-freezing plant recently opened by Gorton's. Professor Bernard Proctor, head of MIT's food-technology department, committed his department to a long-term effort to assist Gorton's in improving the fish stick.[60]

Because of its proximity to Gorton's and its long tradition of involvement in food science, MIT was a logical choice to help improve the fish stick. From its founding in the late nineteenth century, MIT's scientists had conducted research on "industrial biology" in the service of the food industry, including efforts to preserve and package products for the canning industry.[61] Its extensive efforts in food preservation continued through 1944 when the independent Department of Food Technology was established, whose faculty worked closely with a number of food-processing firms that were investigating ways of applying new technologies to the food-service industry. Fish sticks were an object of some interest, two MIT students even writing theses on the subject.[62]

MIT scientists joined Gorton's directly and indirectly in product improvement. Concerning direct involvement, they developed the "fresh-lock" process, which Gorton's marketers claimed prevented loss of "natural fish flavors, texture, color and nutrition";[63] indirectly, MIT scientists conducted research on "irradiation pasteurization" to prolong the shelf life of seafood and other foods. Funds for this research came to MIT from the food and container industries, the Atomic Energy Commission (AEC), the U.S. Army Quartermaster Corps, and the Public Health Service. In 1966, AEC scientists petitioned the U.S. Food and Drug Administration to allow commercial use of irradiation on cod, haddock, pollock, flounder, and sole,

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father sold fish, all the children said . . . 'Gee, he must stink!' So, to solve a family problem I changed my vocation. Gentlemen, I stand before you as a piscatorial engineer!"

60. "Frozen Foods Seminar Held," *Boston Herald*, 20 July 1956; and "Gorton's Company History," unpublished manuscript (ca. 1964), GCA, 133–34.

61. Samuel Goldblith, "Introduction," in *Exploration in Future Food Processing Techniques*, ed. Samuel Goldblith (Cambridge, Mass., 1963), 1–2. The National Canners' Association Laboratory was established in 1913 under the direction of E. J. Cameron, an MIT graduate.

62. Stephen Lirot, "A Study of Some Factors Affecting the Quality of Precooked Fish Sticks" (master's thesis, MIT, 1955); and Robert Goldthwaite, "A Study of the Oxidation of Fat in Fried Frozen Fish Sticks" (bachelor's thesis, MIT, 1961).

63. "Gorton's Unveils Its 'Fresh-Lock' Process," *Quick Frozen Foods*, September 1962, 108–9. "Fresh-lock" was a patented dip process by which natural chemicals forming a jell-like solution of protein interacted with the cells of the fish and eliminated drip loss.

having concluded that shipboard irradiators were feasible. One such device was installed on the ship MV *Delaware* to test radiation preservation at sea. Ultimately, however, it was found that radiation adversely affected the taste, texture, color, and shelf life of fish products, no matter how they were packaged or handled; proper refrigeration and sterile facilities were just as crucial and ultimately cheaper.[64]

Conclusion: The Fish Stick on Your Table

The fifth anniversary of Gorton's Seafood Center on 25 August 1961 celebrated the close ties among technology, science, and fish sticks. The celebration drew 250 visitors, guests, and speakers from Gorton's, government, science, and labor—all involved in the evolution of fish sticks, the participants behind the packaged product. Senator Benjamin Smith II (Dem., Mass.) praised the connections between federal subsidies and the fishing industry, declaring that "the government's revenue and its success depends [*sic*] on business profit and business success." Smith, whose father was a former president of Gorton's, added: "I hope that the foresight and vision of this company will be contagious not only in industry but also in the community."[65]

Samuel Goldblith, deputy head of MIT's Department of Food Technology, presented his speech, "Industrial Research Is the Answer to the Challenge of Ignorance about Seafoods." The ignorance he alluded to was the consumer's reluctance to buy fish products, and his presence reflected his mission to overcome this ignorance and promote the diffusion of food-irradiation technologies throughout the fishing industry. Goldblith, a director of Gorton's since 1959 and a consultant to other food companies, stated that "[t]he key to leadership in this industry is scientific research and a gamble of time, people and money." After this speech, Kinney presented the professor with a check to support additional research on seafood freshness by an MIT graduate student.[66]

While frozen seafood sales generally increased during the 1960s, fish stick sales were uneven, in part because competitors were bringing lower-quality products into the market. The number of frozen seafood processors had increased by 774 percent in over twenty years, from 107 in 1947 to 935 in 1967, 529 of whom produced frozen fish products and 406 produced

64. William Phelps, "MIT Scientists Preserve Food by One-Second Shots of Cathode Rays," *Boston Sunday Post*, 24 May 1953; "Radiation-Pasteurization Extends Storage of Fresh Seafoods Significantly Longer," *Quick Frozen Foods*, April 1966, 126–30, 196; John Nickerson, "Radiation-Pasteurization of Marine Products," in *Exploration in Future Food Processing Techniques*, 46–53; and "Irradiation Preservation of Pacific Northwest Fish," *Food Technology* 14 (1960): 411.

65. Dave Rhinelander, "Seafood Center's Birthday: Seminar Speakers Arrive," *Gloucester Daily Times*, 25 August 1961, 1, 14, and "Management, Labor, Government Chart Seafood Industry Growth," *Gloucester Daily Times*, 26 August 1961, 1, 10.

66. Rhinelander, "Seafood Center's Birthday."

frozen shellfish. There were 120 cod processors, 89 sole, 81 haddock, 74 salmon, and 34 fish stick processors,[67] and standards went only so far in maintaining quality. Another reason was that several producers decided to focus on the more lucrative "portions" commercial market, as opposed to the smaller retail market for fish sticks. In addition, a papal decree ending "fish Fridays" for Catholics seems to have contributed to a decline in demand, especially in school lunch programs. By 1962, breaded fish portions had surpassed fish sticks in production at 78 million pounds, a 30 percent increase over 1961. Portions—uniformly cut two-, three-, or four-ounce segments of ground-fish—generated sales, especially among such institutional users as restaurants and hospitals, because of their consistent size, ease of preparation, and cost effectiveness.[68] Institutional sales of portions, shrimp, and breaded shrimp dominated processors' sales. And as for the retail market, fish sticks—at some 80 to 100 million pounds and $70–80 million in sales annually through the 1960s—fell to second, third, or fourth, depending on the year, behind fillets, portions, and shrimp. Yet, while not a major seafood nor an institutional favorite, the fish stick was here to stay.[69]

Like many processed foods, the fish stick occupies an important place in the American diet and the American marketplace. A visit to any neighborhood supermarket reveals no fewer than a half-dozen companies producing fish sticks. Still, it is not a staple of the diet. To most Americans, fast food means beef, not fish, and even when fish is chosen it is more likely to be breaded fillets than fish sticks. Among the factors that prevented the fish stick from becoming as celebrated as the hamburger were the American palate, which often suffers from landlubbers' taste buds, and the declining quality of many fish stick products after their initial introduction. As more and more companies entered the market, many of them sought to cut costs by producing an inferior product, one with more breading and other non-fish substances. The fish stick became the "hot dog" of the ocean; many Americans continued to feel that fish sticks were a mediocre food, and companies that strove to keep quality (and fish) at the forefront of production suffered the consequences. This may have been because producers created demand for a product after fortuitous technological innovations and social pressures had combined to create the fish stick. Ultimately, the "piscatorial engineer"—part advertiser, part salesman, and part food-product innovator—could only put fish sticks on the table, but couldn't make consumers fill their plates.

67. "Number of Frozen Seafood Processors Increased 774% Over Past 20 Years" (n. 50 above), 265–66.

68. "Portion Production Hits New High," *Quick Frozen Foods*, March 1963, 182.

69. "Frozen Fish Near 50% of Total Consumption," *Quick Frozen Foods*, July 1965, 129–30; *Quick Frozen Foods*, January 1966, 101; *Quick Frozen Foods*, April 1966, 133–34; "U.S. Seafood Per Capita Consumption Up in 1968," *Quick Frozen Foods*, April 1969, 139–40; "1967 Fish Portion Production Up," *Quick Frozen Foods*, May 1968, 93; and "Frozen Seafood Reaches Record High," *Quick Frozen Foods*, June 1970, 79–81, 85, 120–21.