SHELLFISH AND PUBLIC HEALTH

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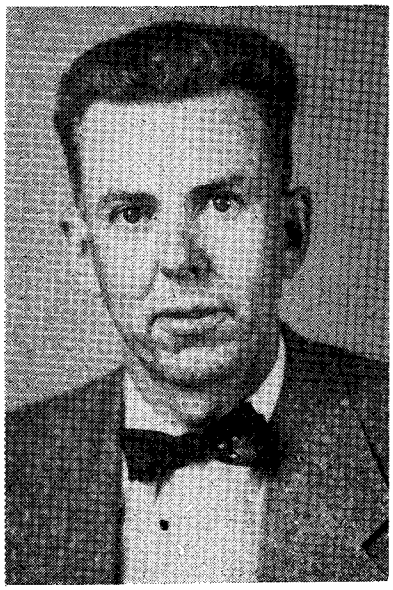
Oysters and clams have been an important item in man's diet for thousands of years. In Japan, oyster shells 4500 years old have been found in kitchen middens. The great East Coast shell piles are striking evidence that oysters were a favored food item of the coastal Indians. The reputation of the clam and oyster as tasty sea foods have continued to our present time.

Unlike most other marine animals, the bivalves feed by pumping water — as much as 25 gallons a day — through a complex system of gills which filter out the suspended marine organisms and bacteria. This feeding mechanism was of little consequence as long as man's settlements were small and primitive. But with urbanization, great quantities of sewage were discharged into the rivers and estuaries. The bivalves, lacking the power to discriminate between harmless organisms and pathogenic bacteria, assumed public-health significance. Dr. J. A. P. Pasquier's report in 1816 and 1818, on the apparent relationship between oysters and disease in France, were the first of a long chain of evidence associating shellfish with enteric disease.

Corroborating evidence continued to accumulate, with medical journals all over the world reporting a relationship between shellfish and diseases. The Health Officer of Brighton (1), England, estimated that about one-third of the typhoid-fever cases reported in Brighton during the four-year period 1894-97 were due to sewage- polluted oysters or mussels. Mason (2) in 1902 reported 10 cases of typhoid in Auckland, New Zealand, caused by oysters which had been stored in baskets near the mouths of sewers. Remlinger (3) in 1902 reported numerous cases of typhoid in Constantinople caused by oysters which had been stored in sewage-polluted tanks at a market. Vincey in 1912 (4) estimated that proper sanitary control of oysters sold in Paris would prevent 385 cases of typhoid fever yearly. In Japan, Kawakubo (5) reported 813 cases of shellfish-caused typhoid during 1924-26.

In the United States, the relationship of typhoid and enteric disorders to shellfish was also reported. Marvel (6) in 1902 reported 80 cases of typhoid fever at Atlantic City, traced to oysters and clams. Stiles (7) in 1911 studied 18 outbreaks of oyster-caused typhoid and 97 cases of enteric disease at Newburgh and Goshen. At San Diego in 1917, an outbreak of typhoid fever was attributed to polluted oysters by Banks (8).



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These few of many reported outbreaks serve only to indicate the worldwide interest in the problem.

In the United States, the last major link of the epidemiological chain was forged by the 1924-25 typhoid epidemic. On December 5, 1924, the Chicago Health Department recognized an unusual prevalence of typhoid in the city. Within a few days, abnormal typhoid rates were noted in New York City, Washington, D. C., and several smaller cities. On December 9th, in what was perhaps the first use of the radio for disseminating vital public-health information, the Chicago City Health Commissioner warned the public to refrain from eating raw oysters. On December 19th, the New York City Health Commissioner requested the Surgeon General of the Public Health Service to prevent the interstate shipment of oysters from certain contaminated bays. An extensive epidemiological investigation finally attributed 1,500 cases of typhoid, resulting in 150 deaths, to sewage-polluted oysters (9).

The effect on the industry was devastating; in some areas, sales of oysters and clams dropped almost to zero. At the request of the shellfish industry and several State health officers, the Surgeon General of the Public Health Service held a conference of interested health and industry representatives to determine what steps should be taken to insure against a repetition of the 1924-25 epidemic and to re-establish the public's confidence in oysters as a food.

The work of a special committee (10) formed the basis for the system of shellfish sanitation now used in the United States and Canada. This system, based entirely upon a cooperative understanding among the States, the Public Health Service, and the shellfish industry, is familiar to most food-control workers (11). Whereas, in the milk, food-processing, and restaurant industries, a high degree of control can be obtained through plant inspection and product examination, the biology of shellfish has dictated that the major control effort – perhaps 80 percent – must be directed toward the water in which shellfish grow.

Shellfish which are shipped in interstate commerce are, of course, subject to the provisions of the Food, Drug, and Cosmetic Act. However, in practice, the cooperative shellfish-certification program and the activities of the Food and Drug Administration are so integrated that there is no duplication of effort. Other factors tending to regulate the interstate shipment of shellfish include the Public Health Service's Interstate Quarantine Regulations, and the Federal Purchasing Specifications.

The cooperative certification program has been highly effective in controlling the spread of shellfish-borne disease. However, this does not mean that shellfish-borne typhoid or enteric diseases are things of the past, and that sanitary standards may be relaxed. It must be remembered that the low incidence of many diseases is due to the artificial barriers which the public-health professions have constructed. The cooperative shellfish-certification program is one of these barriers.

The continued existence of disease-causing bacteria is evidenced by the occasional small outbreaks of typhoid fever or enteric disease which occur when the certification system is broken or circumvented. In 1939, Old and Gill (12) described a Louisiana typhoid epidemic, involving 87 cases and 8 deaths, that was caused by a typhoid carrier bootlegging oysters. In 1948, Connecticut's first case of typhoid in seven years occurred when a local resident dug clams only 200 yards from a large sewage-treatment-plant outfall (13). In 1953, a small outbreak of enteric disease attributed to oysters was reported in California (14).

The sanitation of shellfish shucking and packing plants is a component part of the certification procedure. A complete system of plant inspection has been developed by the States and the Public Health Service to assist the industry in maintaining sanitary conditions in the processing plants (11). The bacteriological changes which take place during oyster shucking and processing have been investigated by Kelly and Arcisz (19).

The ability of oysters, clams, and mussels to concentrate a poison from marine organisms gives a second reason for sanitary control of the shellfish industry. In many respects, our understanding of this phenomenon has paralleled that of the bacteria-shellfish relationship.

The first reported death in North America from paralytic shellfish poison occurred on June 15, 1793, when John Carter, a seaman on Vancouver's ship, *Discovery,* died at Poison Cove, Alaska, after eating roasted mussels (15). Vancouver's records show that one of his noncommissioned officers had had mussel poisoning in England and knew how to treat the poisoned crew member. On the East Coast of the continent, Medcof, et al. (16), report that paralytic shellfish poisoning was reported in New Brunswick by Ganony as early as 1889.

No major outbreak of paralytic shellfish poisoning was reported in the United States or Canada until 1927, when 102 cases, resulting in 6 deaths, were reported from California. This outbreak, primarily due to mussels, resulted in the quarantine of California beaches during the summer months.

Toxic shellfish may be found along the West Coast from California to Alaska, and in some portions of the Canadian Maritime Provinces. The toxicity patterns in these latter areas have been investigated extensively and control measures devised. The control effectiveness is indicated by the fact that only two outbreaks of shellfish poisoning have been reported in the last two years, both of which were caused by eating shellfish from noncommercial sources (17) and (18).

The shellfish-certification program can assure that the shellfish beds are free from pollution, that the shellfish are from toxin-free areas, and that the processing plants are operated in a sanitary manner. However, the program cannot protect individuals who harvest shellfish from polluted or toxic areas, nor can it protect the community which does not exercise some control over the local sale of shellfish.

To maintain adequate sanitary control over the sale of shellfish (oysters, clams, and mussels), local food-control officials should: (1) Use the Public Health Service list of State-certified shellfish shippers to identify shipments of shellfish as originating in State-

certified sources; (2) require wholesale and retail food markets and restaurants to refrigerate shucked shellfish; (3) require that shell stock be protected against accidental contamination during storage; and (4) require that local food markets sell shucked shellfish only in the original sealed container as received from the processor.

Adherence to these simple guidelines will give maximum assurance that shellfish sold in the community will be from safe, nonpolluted sources, and have been processed in establishments meeting prescribed sanitary standards.

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