

Shellfish Poisoning Episode In False Pass, Alaska

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A FATAL CASE of shellfish poisoning attributed to eating mussels that had fed on the dinoflagellate plankton, *Gonyaulax catenella*, was reported July 21, 1954, by the United States Commissioner at Dutch Harbor, Alaska. Since a survey of shellfish toxicity was being conducted in northern Alaskan waters at the time by the Public Health Service Arctic Health Research Center in Anchorage, the case was investigated thoroughly.

The poisoning occurred at a salmon cannery in False Pass on the northeastern end of Unimak Island in the Aleutian Chain. The following is an excerpt from the log of Dr. J. Clark, Alderwood Manor, Wash., physician at the cannery hospital, who gave invaluable assistance and cooperation at False Pass:

"Patient seen by physician at 4:45 p. m. and found suffering severe abdominal pain and nausea with vomiting. Man expired at 5:00 p. m. same date. Time of onset of illness between 2:00 p. m. and 4:45 p. m. All information gathered from fellow workers as man was unable to talk to physician. It is stated he was quite ill before calling for assistance. Symptoms when seen were those of poisoning and believed to have been caused by mussels."

Four days prior to the fatality, six other cannery workers consumed mussels from the same source. They reported to the hospital, however, at the first signs of illness, received gastric lavage and medications, and were released the next day.

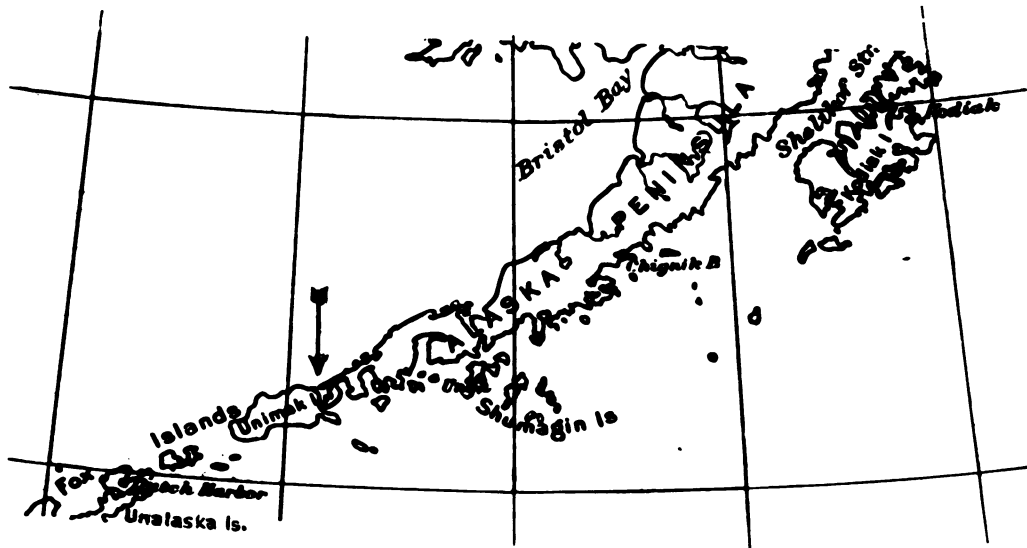
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The beaches at False Pass are primarily rock with some sand and gravel. The shoreline is irregular and has small coves which are undisturbed by the main current. These small coves are rich in various forms of algae and zooplankton, in addition to the usual debris and cannery waste. While the maximum difference between high and low tide is very small (2 feet) the current is extremely swift, changing direction with each change of tide. According to cannery workers, the current usually attains a velocity of from 5 to 7 knots.

Specimens of *Mytilus edulis* Linnaeus, the shellfish eaten by the cannery workers, were collected from several locations along the beach. While great numbers of the mussels were attached in clusters to rocks exposed at low tide, an even greater number were attached to the ocean floor and obviously not exposed during extreme tides. The mussels were extracted at the local cannery hospital, bottled, and retained for bioassay at the Arctic Health Research Center laboratory. Plankton samples were collected simultaneously and preserved in Transeau's solution for laboratory examination.

The extraction and bioassay were carried out according to currently accepted methods, that is, 100 gm. of mussel tissue were ground and mixed with 100 ml. of 0.1N hydrochloric acid. The mixture was refluxed for 5 minutes, rather than boiled in a beaker, so that it was unnecessary to bring the mixture back to the original volume. The pH was adjusted to 4.0-4.5, the mixture centrifuged, and the clear supernatant liquid withdrawn and preserved in sterile bottles. One ml. of this liquid, when injected intraperitoneally into a 19.8 gm. mouse, caused death in 48 seconds. Numerous dilutions were made, and a range of from 74,000 to 106,000 mouse units per 100 gm. of raw material was obtained. A mouse unit is the amount of poison contained in 1 ml., pH 4.0-4.5, that will kill a 20-gm. mouse in 15-20 minutes after intraperitoneal inoculation. It has been estimated by other workers that the minimum lethal dose for man is probably between 20,000 and 40,000 mouse units (1). On the basis of this evidence

False Pass (arrow) latitude $54^{\circ}52'$ N., longitude $163^{\circ}24'$ W., is the first break in the Alaska Peninsula allowing waters from the Bering Sea to come in contact with the Pacific Ocean.



the Arctic Health Research Center stated, for public information, that less than 4 ounces of raw material would produce lethal results.

Microscopic examination of the plankton samples obtained at False Pass indicated that the organism *Gonyaulax catenella* Whedon and Kofoid was present, but not in large numbers. Since travel in the Aleutian Chain is almost entirely by air and is dependent upon weather and fog conditions, 2 weeks had elapsed between the death reported and collection of samples. It is possible that the ideal conditions for growth of this organism no longer existed. It has been stated (2) that "The strong radiation of the sun together with the cold nutrient waters due to upwellings seem to be ideal for the growth of this dinoflagellate." The nutrition supplied by the cannery waste together with the cold waters of the Bering Sea coming in contact with the warm

waters of the Pacific in this small pass would more than fulfill these ideal conditions.

Future work is planned in connection with shellfish poisoning in the Aleutian Chain, particularly in the Kodiak area. Natives at False Pass, Kodiak, and at other points on the Aleutian Chain refer to individuals who in the past have become violently ill, with an occasional death, after eating shellfish. Since there was seldom a physician available, the stories could not be substantiated.

REFERENCES

- (1) Meyer, K. F.: Medical progress: Food poisoning. *New England J. Med.* 249: 843, Nov. 19, 1953.
- (2) Sommer, H., and Meyer, K. F.: *Mussel poisoning: Manual for the control of communicable diseases in California.* San Francisco, California State Department of Public Health, 1948.

