

MUSSEL POISONING IN NOVA SCOTIA

BY ARTHUR L. MURPHY,

Halifax, N.S.

THE old warning, never to eat shell fish in months without an *r*, probably originated among the folk who live by the sea, and had no more scientific basis than the belief that good sauerkraut can be pickled only in the full of the moon. The superstition about the sauerkraut has been pretty well discarded by the younger generation in Nova Scotia, but those who enjoy the relish claim that it is not so good as it used to be. Disregard of the shell fish warning has resulted more seriously. There have been two fatalities, attributed to the eating of mussels.

On July 7, 1936, at 1 p.m., Dr. F. E. Rice, of Sandy Cove, Digby County, was called to Centreville, some five miles distant, to a sick boy. Responding immediately he found a well developed boy of eight years, deeply unconscious. His colour was very pale; he was pulseless. The heart could just be heard, being very rapid and weak. Within ten minutes he was dead.

The patient, with another boy of his own age, had gone to the shore in the morning to gather mussels. Centreville is on St. Mary's Bay, an inlet of the Bay of Fundy, and the blue-black shell fish are to be found in abundance on the mud flats when the great Fundy tide has swept out. At about 10 a.m. they cooked the mussels over a fire and ate an undetermined number. Shortly after, feeling ill, they went their own ways home. The patient vomited persistently and complained of faintness, but it was not until this merged into coma that his father became alarmed and called the doctor. The boy's companion, after a bout of vomiting and vertigo, made a rapid recovery.

At 1.30 p.m., the same day, Dr. Rice was called to East Ferry, fifteen miles from Centreville. He found two men faint and vomiting. They complained of numbness in their hands. Lying on the floor was a third, deeply comatose, moribund. His pulse was 160; his hands were pressed against his abdomen. In fifteen minutes, two hours and a half after eating mussels, he died. His companions quickly recovered. They had eaten only a few mussels, both cooked and

raw, whereas the victim had taken a considerable number. Dr. Rice regretted that the rapid termination of both cases made a more complete clinical picture impossible.

Shell fish poisoning has been recognized as a clinical entity for over a century in Europe where it was first described and the literature records 120 cases with 24 deaths. Outbreaks in California during the past nine years have produced 240 cases with 14 deaths and the only thorough work done on the problem comes from the University of California. Hermann Sommer and Karl F. Meyer of the George Williams Hooper Foundation have done extensive research (*Calif. & West. Med.*, 1935, 42: 423) and, while the exact nature of the poison has not been determined, valuable facts have been established.

The poison is most common in the mussel but has been found in the clam and sand crab. Guinea pigs fed on a species of clam gathered on the Bay of Fundy shore in the regions of Centreville and East Ferry died in forty-five minutes. Their brethren, fed on mussels from the same areas, died after a longer interval. Like the human beings, some of the guinea pigs escaped after a slight illness or none at all. Beyond confirming the presence of the poison no experimental work was done at the provincial laboratory at Halifax, specimens being shipped to Dr. Meyer in California. Nevertheless a few observations may be drawn from the local cases which conform with the established findings.

First, the poisoning takes a paralytic form. Although no information could be elicited from the fatal cases the two men who recovered complained of numbness in the hands. This may extend from the four extremities until the whole body is paralyzed. The poison is quickly eliminated; the recoveries of those who escaped death were rapid. It is present in fresh mussels. It is not present in lethal quantities in all the mussels of a particular region, nor are the mussels of any region always poisonous. Many have eaten of St. Mary's Bay shell fish without ill effect. The poison is not from contaminated

water. The Bay is too exposed to the Atlantic, its shores too sparsely settled, to make this tenable. The poison is not destroyed by boiling or cooking, or the boy would not have died. From the rapidity of its action it is not likely bacterial, and cultures made from different parts of the mussels confirm this.

Meyer and his co-workers, gathering mussels near San Francisco over a seven-year period, and determining the degree of toxicity by the intraperitoneal injection of mice, have shown the almost constant presence of poison. This is highest in the summer months, from June to September. In some years this peak transcends the lethal danger line, in others it does not. The occurrence of poisoning cases has been found to coincide with these results.

Mussels gathered at the lowest possible level are more poisonous than those exposed to the sun or those gathered in placid, land-locked bays. This suggests that the source of the poison may be in the sea, possibly the plankton on which the mussel feeds. Experiments in this direction have not been conclusive.

The poison is a basic alkaloid. The purest preparations so far obtained are lethal to mice in doses approaching one-millionth of a gram on intra-peritoneal injection. Thus it may be present in sufficient amount to kill without outward warning of its existence. It is one of the most active known chemical poisons. Only the antigenic toxins of some plants and bacteria are more potent. It is present in the digestive gland and the fluid about the fish. The muscle is probably unaffected.

The toxic mollusc has no distinguishing feature, although, usually, it has a fuller intestinal tract and larger digestive glands than its normal mate. There is no known antidote to the poison. Eighty per cent may be neutralized by boiling in soda bicarbonate solution for twenty minutes. Here, unfortunately, cook and toxicologist disagree. Education of the people would seem to be the only safeguard, and they have been warned not to eat mussels in the months without *r*, September and October being added, if only to show that science really is greater than superstition.

CARBON TETRACHLORIDE POISONING*

BY CECIL YOUNG, B.A., M.B.(TOR.), M.R.C.P.(LOND.),

Toronto

CARBON tetrachloride, used as a solvent for fats and oils, has been in common use in industry and in the home for many years. The safety element has been stressed, because it is non-inflammable as compared with gasoline and similar dry-cleaning preparations. Carbon tetrachloride is also an ingredient of "Pyrene" or similar hand fire extinguishers in common use in buildings, yachts and motor cars. As a vermifuge it has been used internally in the treatment of hookworm disease.

Recently it has been noted by many observers that carbon tetrachloride is not without danger if the fumes are inhaled in concentration. Butsch¹ reported poisoning in a workman who used carbon tetrachloride in cleaning old telephones. McGuire² reports seven cases of poisoning in employees of a dry-cleaning establishment where carbon tetrachloride was used. Alice

Hamilton³ notes the danger of carbon tetrachloride as a fire extinguisher in the presence of heat in a closed space, under which conditions phosgene is generated. The *New York Times*, July 7, 1932, reported a fire in a New York subway in which "Pyrene" fire extinguishers were used and 150 persons were overcome with the fumes, which were probably a mixture of carbon tetrachloride, phosgene, and chlorine. The *Journal of the American Medical Association*,⁴ in an editorial on the subject, states that in Portsmouth Navy Yard in 1919 two men died from the fumes produced when the clothing of one caught fire and Pyrene was used to extinguish the flames. The same editorial also reports poisoning from carbon tetrachloride used in Switzerland as a solvent for floor wax.

McMahon and Weiss⁵ were of the opinion that an individual's susceptibility played an important part in tetrachloride poisoning, and also stated that patients who were accustomed to the

* Read before the Section of Medicine, Academy of Medicine, Toronto, February 11, 1936.