Science Reading Selection: The Dancing Cats of Minamata

When the Chisso Chemical Company opened a plant in 1932 to produce fertilizer in the beautiful town of Minamata on Kyushu, the southernmost island of Japan, the area was noted for its beauty, its fishing boats on Yatsushiro (the Sea of Mysterious Fire) and groves of orange trees on the hills surrounding the city. The population was composed mostly of hard working fishermen and farmers. Now, fifty years and nearly 600 tons of mercury later, Minamata is a city in anguish. Its fishing boats are idle. Its orange groves are untended. Although Chisso no longer dumps chemicals into the surrounding waters, the number of victims of the painful and often fatal Minamata disease, methyl mercury poisoning, is increasing.

Unlike thousands of synthetic toxic chemicals, mercury occurs naturally. It is a heavy, silver-white, poisonous, metallic elements that is liquid at normal temperatures. Small amounts are found in soil, rocks, fresh water and the ocean. In 1714, German physicist, Gabriel Fahrenheit discovered its now most famous use as the temperature-indicating liquid in the thermometer.

Mercury is released from fossil fuels when they are burned, but the most serious cases of mercury contamination come from industries that use it in the manufacture of chlorine and caustic soda, paper and paper products and in the case of Minamata, fertilizer. When inorganic mercury is released into water, microorganisms convert it into lethal methyl mercury. Scientists estimate that methyl mercury remains in the food chain from 70-100 years. While natural mercury does not move up the food chain to concentrate in fish, methyl mercury does. Neither freezing nor any form of cooking reduces the methyl mercury content of the fish. Natural mercury is quickly excreted by humans in urine; methyl mercury is quickly absorbed by the body. To humans, it is a nerve poison. The people of Minamata, dependent on fish for such a large part of their diet, were to learn these scientific facts all too well.s

The Chisso plant employed about one-third of Minamata's work force, and at first seemed a boon to the city. However, in 1950, an unusual number of dead fish began to wash ashore and in 1952, a serious affliction sent local cats into convulsive spasms that left most of the pets dead. Between 1953 and 1956, the symptoms of the "dancing cats" of Minamata began appearing in people. Their arms and legs became twisted and spastic. They suffered convulsions, tunnel vision, blindness, madness and incredible pain. Some died. The doctors of Minamata, alarmed by these symptoms and fearful that the disease might be contagious, formed an investigative team. It did not take long to discover that the victims were being poisoned by the chemicals in the fish they ate from local waters, which were being poisoned by the effluent from the Chisso factory. While they speculated that mercury was probably the culprit, they wavered from this theory when Chisso published a list of the chemicals used in the manufacturing process and mercury was not included. Industrial chemists knew that mercury was a commonly used catalyst in the manufacturing process the factory was using. One of the Chisso chemists made a death-bed confession that he had withheld information for years.

The investigation at Minamata was frustrated at every turn by both the Chisso Chemical Company and Japan's Ministry of Welfare. The government blocked funds put aside for the Kumamoto Medical School when a research team attributed the disease at

Minamata to mercury poisoning. The ministry set up its own research team, supported by the Japan Chemical Industry Association, and tried to find other possible causes for the disease. The group produced no evidence to refute the findings of the Minamata doctors or the researchers at the Kumamoto Medical School. Mercury discharges from the plant continued to be dumped into the bay.

Meanwhile, based on the limited findings Kumamoto findings, the Minamata Fish Cooperative refused to sell any fish caught in Minamata Bay. Unemployment was added to an already miserable situation.

In 1956, after several thousand angry fishermen and families stormed the Chisso plant, the Chisso company -- without admitting any guilt - began to offer an annual "gift" of about $300 to afflicted adults and about $100 to children. In cases of death, the "gift" to the survivors was $1000. The string attached to the "gift" was a contract in which the victims agreed not to ask for further compensation, regardless of new evidence. Impoverished by hospital bills and unemployment, many people signed the contract. It was not until 1968, when the Japanese government declared the Chisso plant responsible for Minamata disease, that the discharge of mercury was stopped.

A former Life magazine photographer, the late Eugene Smith, traveled to Minamata and recorded the on-going story of human suffering and courage, as well as the indifference of the company executives in a series of powerful photographs that drew the attention of the world to Minamata. Severely beaten by thugs while he was attempting to photograph a demonstration against Chisso, Smith lost his sight for several years, but returned to Minamata after successful treatment in the U.S.

One of Smith's friends in Minamata, Tsuginori Hamamoto, a former fisherman struck with the disease, became a protest leader who dedicated his life to fighting mercury pollution. Both of his parents died of the disease. Financed by a group of local citizens, he told his story at the United Nations Conference on the Environment in Stockholm in 1973. At the trial against Chisso, Hamamoto painfully struggled into court every day. He expressed his wish:

> **"If only I may live long enough to get out into the world, using my own body as an example, and demonstrate to everyone...what our planet Earth would come to if we don't stop industrial pollution and the decimation of our waters and air..... but I fear I may crumble at any moment".**

By 1976, 120 Minamata residents had died of the disease and 800 had mercury-caused brain damage. By 1978, 8,100 residents claimed health damage, and about 1500 of them had been examined and certified as cases of mercury poisoning.

On March 22,1979, the former president of Chisso, age 77, and the former plant manager, age 68, were sentenced to 2 years in prison and 3 years probation for professional negligence at Minamata. Twelve victims of the disease, plaintiffs in the case, were awarded a total of $725,000.

Today, fetally damaged children and other victims continue to seek relief from pain in Minamata, years after they have stopped eating contaminated fish. Minamata was the first and most famous case of mercury poisoning from mercury effluent; since then there have been many others.

ANALYSIS/ COMPREHENSION

PART I: GEOGRAPHY: Create and color in a map of Japan showing the following locations:

a. Sea of Japan
b. Hokkaido Island
c. Honshu Island
d. Shokaku Island
e. Kyushu Island
f. Minamata
g. Pacific Ocean

PART II: VOCABULARY: Write a simple sentence defining the following terms:

a. natural mercury
b. methyl mercury
c. industrial pollution
d. effluent
e. catalyst
f. neurological damage

PART III: QUESTION/ANSWER: Answer the questions below in full sentences.

a. Describe the physical symptoms of Minamata disease.
b. List the chemical and physical properties of methyl mercury that make it so damaging to natural systems.
c. How did the diet of the residents of Minamata increase the effects mercury poisoning?
d. Describe the geographical location of Minamata on the map of Japan. Could it have added to the intensity of the pollution more than if it were located on the open ocean? How?
e. How was the Chisso company's behavior throughout the history of the Minamata problem typical of a business mentality? Give examples.
f. What steps were taken by Chisso to appease the victims? What conditions were attached?
g. How would a more environmental approach to solving the problem have been good for both the business and the ecology of the Minamata region?