

VC2: Chemistry Mysteries: Buried in Ice

Buried in Ice



By Robin Meadows

In the spring of 1845 Sir John Franklin and a crew of 128 men set off to complete the Northwest Passage, a long-sought route from Europe to Asia via the frigid waterways north of Canada. Most of the passage had been charted and the British Admiralty expected Franklin, a veteran Arctic explorer, to chart the rest. When two winters had passed without word of Franklin, the British were not alarmed. It was not uncommon for ships to become locked in ice *throughout* the long Arctic winter, and Franklin's ships, the *Terror* and the *Erebus*, had been stocked with enough canned food to last at least three years.

The search is on

By the expedition's third winter in the Arctic, however, people at home began to get uneasy, and the search for Franklin and his crew began in late 1847. The Admiralty offered a reward for information leading to the *Terror* and the *Erebus*. Franklin's wife, Lady Jane, financed extensive private search parties. Even so, there was no sign of the Franklin Expedition until 1850, when searchers discovered the graves of three crewmen on Beechey Island. The searchers also found the remains of a camp, including tent sites, storehouse, and garbage mound enclosing more than 700 tin cans?evidence that the expedition had wintered there. The next four years of searching were fruitless and the British Admiralty abandoned the effort in 1854, declaring Franklin dead.

The first evidence of the fate of the Franklin Expedition was found on Beechey Island in 1850. Nine years later more evidence of the missing expedition showed up on King William Island.

The private expeditions that Lady Jane Franklin continued to finance were also futile until 1859, when Captain Francis Leopold M'Clintock made a discovery on King William Island, which lies southwest of Beechey Island just above the Canadian mainland. Following up reports that the Inuit had seen white men "who fell down and died as they walked" on King William Island, M'Clintock found a bleached skeleton dressed in the remnants of a steward's uniform on the southern coast of the island.

Traveling north, M'Clintock's group found a cairn containing two notes that Franklin Expedition members had written. The first note, dated 28 May 1847, confirmed that the Franklin Expedition had spent the first winter (1845?46) on Beechey Island. The second note, written around the margin of the first and dated nearly a year later, reported that the ships had become trapped in ice 24 km off the northwest coast of King William Island in September 1846. The ships spent the winter of 1846 there and were still locked in the ice in June 1847, when Franklin died at the age of 61. The ice failed to melt during the short Arctic summer, keeping the ships there for another winter?the third winter of the expedition.

By the spring of 1848, a total of 24 men had died, and the 105 survivors decided to desert the ships and walk across the ice to King William Island. Their goal was to walk the 150 km to the south coast of the island and then row up the Back River, which is in mainland Canada, to the nearest fur trade fort.

While M'Clintock answered some of the questions about the Franklin Expedition, he made a subsequent discovery that raised a new and very puzzling problem. South of the cairn, M'Clintock found skeletons of two more crewmen in a lifeboat that was mounted on sledges and crammed with button polish, silk handkerchiefs, curtain rods, a writing desk and other items useless to survival in the Arctic.

Modern methods

Why did Franklin's crew choose such strange supplies for their last-ditch gamble to return home? This question had gone unanswered for more than a century, when physical anthropologist Owen Beattie of the University of Alberta began investigating the Franklin Expedition during the 1980s. Beattie and his colleagues went to King William Island in 1981 looking for bones of Franklin Expedition members. They found a

crewman's skull and bones on the south coast of the island and had them analyzed for trace elements, hoping to learn about the crewman's health and diet.

Beattie originally believed that a combination of scurvy and starvation had doomed the expedition. To his surprise, trace element analysis showed that the bones contained very high levels of lead?228 ppm?more than 10 times higher than typically found in bones. If the crewman had taken in this much lead during the expedition, he would have suffered severe lead poisoning. If the rest of the crew had also had lead poisoning, that might explain the enigma of the lifeboat's capricious cargo.

In addition to causing anorexia, anemia, extreme weakness, and other debilitating physical symptoms, lead poisoning has devastating psychological effects. It can make people paranoid, impair their judgment, and render them incapable of making sound decisions?like what supplies to load into a lifeboat when trying to survive in the Arctic.

Beattie needed more evidence to be sure that lead poisoning had contributed to the expedition's failure. Bones accumulate lead over time, and so reflect a person's lifetime exposure. However, hair and soft tissue reflect recent exposure to lead. Beattie knew he could get the answers he needed from the three bodies buried on Beechey Island.

In August 1984 Beattie and a team of researchers went to the island to collect samples from the body of one of Franklin's crewmen, Petty Officer John Torrington of the *Terror*. Beattie found that the body had been amazingly well preserved by the permafrost underlying the surface layer of loose limestone gravel. Analysis of Torrington's hair showed that it contained more than 600 ppm of lead?120 times the amount typically found in hair?and proof that Torrington had indeed suffered lead poisoning during the expedition.

Beattie returned to Beechey Island in June 1986 to take samples from the bodies of Able-bodied Seaman John Hartnell and Royal Marine Private William Braine, both of the *Erebus*. Analysis showed that Hartnell's hair contained up to 313 ppm of lead and Braine's hair contained up to 280 ppm of lead, proving that both of these men had also suffered lead poisoning during the expedition.

Probable source of contamination

While examining the tin cans from the waste heap on Beechey Island, Beattie observed that their inside seams had large lumps of the solder that had been used to seal the tins. Until the late 1800s solder was 50% lead and 50% tin, which meant that food in the tins was in direct contact with lead. The Franklin Expedition tins were particularly poorly made. If they had not been icebound for the second and third winters but instead had completed the mission and returned to England, the crew probably would have survived the lead poisoning.

Beattie showed that the lead in the solder and the lead in the crewmen's hair were the same by isotope analysis. Isotopes of an element have the same chemical properties but different atomic weights, and lead from a given source contains characteristic amounts of the various isotopes.

Although devastating, lead poisoning was not the only reason the Franklin Expedition failed. Beattie believes that lead poisoning weakened the men to the point that they succumbed to diseases that they otherwise might have survived. The bones found on King William Island bore pits and scales characteristic of scurvy, which also causes bleeding, weight loss, exhaustion, and other symptoms. Moreover, the three crewmen buried on Beechey Island had all been afflicted with tuberculosis, and their immediate cause of death was probably pneumonia.

The search continues

The search for Franklin and the other lost men, as well as for the *Terror* and the *Erebus*, continues to this day. Canadian weather forecaster Wayne Davidson says he has found a previously unknown European campsite. He believes Franklin is dead on his ship and was left in it. The missing ships are still the biggest and toughest mystery, and Davidson believes that he has found one. If the team of researchers currently investigating this find determines that it is authentic, the remaining questions of what happened to the Franklin Expedition may be answered at long last.

References

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