

Captain Cook as a public health pioneer in the Pacific

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Introduction

Captain James Cook was born in Yorkshire, England on 27 October 1728. At the age of 17 he was apprenticed to a ship owner in Whitby. In 1752 he joined the British Navy and saw military action in Newfoundland against the French. Between 1763 and 1767 he surveyed and mapped the Newfoundland coast earning himself a reputation as a scholar and first rate seaman.

The great explorer made three spectacular voyages of discovery in the Pacific. During these voyages he contributed to science and the European conquest of the Pacific. He and his associates, like the British biologist Sir Joseph Banks, collected many samples of flora and fauna, and charted and mapped much of the southern hemisphere. The scientific and cartographic accomplishments made during these voyages were outstanding and upon his return, Captain Cook was hailed a national hero. Amongst his achievements was the discovery of the solution to scurvy.

Plight of scurvy

The history of discoveries by Europeans upon the seven seas and the Pacific Ocean, showed a progression of increasing size in ships. Ferdinand Magellan, who led the first circumnavigation in 1519 to 1521, had a fleet of five ships to start with, and these were trading vessels essentially, which had plied Mediterranean routes prior to being seconded for Atlantic and Pacific ventures. Others including Drake, Dampier, Anson, Buron and Wallis, opened new vistas, under abominable sailing conditions.

The sailors diet consisted of salted fish and meat, dried vegetables, weevil biscuits and rancid oils, cheese and butter. Although the caloric content was adequate, the foods were sorely deficient of vitamins, especially vitamin C. With the lack of vitamin C, scurvy was rampant. This was responsible for literally thousands of sailors deaths and disabilities. Nearly 75% of each crew was likely to be unable to sail due to this malady. Ships quarters were cramped. Men often shared a 15 inch wide hammock, worked around the clock in 4 hour shifts, were constantly wet and frequently cold, and were quartered in contagious, foul smelling decks below sea level.

In 1742 a young Scottish surgeon, James Lind, in what has been called the first controlled medical trial, determined that scurvy could both be cured and prevented by the administration of the juice of oranges and lemons. However, because citrus fruits were not readily available to the British Navy, their use was generally ignored for 50 years.

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Science in the Eighteenth Century had only reached the level of the humoral epoch. All diseases were believed due to the imbalance of body humours and to the presence of foul air. The germ theory of contagion

had not yet been formulated. Nutrition science was pre-embryonic. No one appreciated the role of essential dietary nutrients such as vitamins¹.

In 1740 George Anson began a circumnavigation planned to harass the Spanish in the Pacific and to discover new lands for the emerging British Empire. By the time he returned to England in 1742 he had lost 80% of his men and ships, although his mission over all was successful. Most of these losses can be attributed to scurvy. Something had to be done, if England, or any other nation, was to conquer the seas, develop trade routes to the Orient and colonise the Western Hemisphere.

Cooks first Pacific expedition

In 1768, the Royal Society convinced the Admiralty to form a scientific expedition to the Pacific to observe the transit of the planet Venus, across the surface of the sun. James Cook,

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because of his experience and reputation, was the natural choice to command the ship.

This extended voyage was to be the first circumnavigation expressly for scientific purposes. The observation of the transit was to be made from the newly discovered island of Tahiti. Young Lieutenant Cook was given the command of the *Whitby* collier, renamed the *Endeavour*. Sailing with Cook was the astronomer, Charles Green, and the botanist/naturalist, Joseph Banks, with their contingent of servants and artists. A total of 138 men accompanied Cook.

The *Endeavour* was provisioned with the standard foods for 18 months at sea. If they were at sea longer than that period, they would need to obtain new provisions on their own. In addition to the salted meat and dried vegetables the Admiralty supplied Cook with a modicum of historic antiscorbutics to try at sea. These included malt for the making of wort, sauerkraut, marmalade of carrots, saloup, portable soup, and a small amount of concentrated juices of lemons and oranges. The Admiralty's orders to Cook included observation of the Venus transit, a search of the great undiscovered southern continent, the taking possession of all newly discovered lands, and the observations of and trading with the natives on the islands visited.

The *Endeavour* left England on July 18, 1768 and reached Rio de Janeiro on December 7. However, the Portuguese viceroy did not allow the purchase of any provisions because he doubted the expressed scientific nature of the voyage. Leaving Rio, the ship gained the tip of South America at Cape Horn. At Tierra del Fuego the crew harvested local greens, selected by Joseph Banks, because he believed them to be antiscorbutic. They then sailed on to Tahiti. After observing the transit of Venus they sailed south to New Zealand looking for Terra Australia Incognita (the great southern continent). Cook circumnavigated the islands of New Zealand, found that they were not part of Terra Australis, and then decided to return to England by the westerly route to the Cape of Good Hope at the southern tip of Africa.

On the way they discovered the east coast of New Holland (later to be called Australia) and ran aground on the Great Barrier Reef. After repairing the damaged ship they took possession of Australia and sailed for Java for reprovisioning and further repairs at the Dutch harbour of Jakarta. Again, as at every anchorage, the naturalists and botanists, collected indigenous greens, and fed them to the crew. At Jakarta many of the crew developed dysentery and malaria. Over 30 of his men died from these illnesses.

The *Endeavour* gained the Cape of Good Hope on March 15, 1771. The vessel was refitted and provisioned at Table

Bay, left and finally returned to England on June 12, 1771, after 2 years, 9 months, and 17 days at sea. Of the initial complement of 138 men only 41 had died during the long voyage and none of them had succumbed to scurvy. Joseph Banks had described hundreds of new plant and animal species. Cook had taken possession of New Zealand and Australia, and the voyage had been a unique medical success².

The second expedition

Only four months from Cook's return, the Admiralty decided upon a second circumnavigation voyage. Captain Cook was commissioned for the leadership role in November 28, 1771. This time the primary mission was to search for Terra Australis Incognita. The belief in the presence of a large land mass at the southern pole stemmed from the consideration of a need to balance the land mass of the northern hemisphere for the earth to spin properly on its axis.

Two *Whitby* colliers were selected by Cook, who did not wish to repeat such a long voyage with only one ship, especially after his prior experience off the coast of Australia. Each ship was provisioned for 2 1/2 years at sea and was provided with similar antiscorbutics as on the first voyage. Better navigational instruments were added, including the new Kendal chronometer to be used to determine accurately the ship's longitude.

The two ships, *Resolution* and *Adventure* left England on July 13, 1772 to round the Cape of Good Hope and make several southerly passes as they circumnavigated the high southern latitudes searching for the great southern continent. The ships were separated in a fog in the Antarctic Ocean, and the *Adventure* returned to England. The *Resolution*, with Cook in command, continued on making two more sweeps south, crossing the Antarctic Circle three times, and wintering at Ship's Cove in New Zealand and at the South Pacific islands during the southern hemispheric winters. Cook sailed as far south as 71° latitude without finding the continent and each time was stopped by pack ice. Finally, the *Resolution* returned to England on July 30, 1775, having been at sea for 3 years and 18 days.

While not finding Antarctica, Cook postulated that land did likely exist at the South Pole, but that it would probably be uninhabitable with its cold weather and ice. The significant results of the voyage was the remarkable preservation of the sailors' health. Scurvy was never a serious problem and cost the lives of no sailor. Thus, this was the first long sea voyage without significant scurvy. The scourge of the sea had been defeated. Newlands were claimed for the King and longitudes

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had been measured accurately for the first time. Scurvy had been prevented by the consumption of local fresh greens collected at numerous sites of anchorage during the long voyage³.

The third expedition

The British Parliament and Admiralty were anxious to locate a passage from England to the East Indies and Orient by crossing the North America continent, thus saving time in their trade routes by the use of a Northwest Passage. The Parliament had a standing offer of 20 000 pounds sterling for any British subject travelling on a British ship, who found the passage. The Secretaries of the Admiralty convinced Cook that he should lead this expedition. James Cook, now 48 years old, was given the command and two ships, his *Resolution* and a second collier, renamed the *Discovery*. Both ships were provisioned. Because of the scientific nature of the voyage both France and the American Colonies, under the influences of Benjamin Franklin, granted protection to Cook and his ships.

The two ships left England on July 13, 1776 and were provisioned at the Cape of Good Hope and sailed on to Australia and New Zealand, where, once again, they rested at Ship's Cove on Queen Charlotte Sound³. Here, they obtained more antiscorbutic greens, made a few repairs and then left for the Northern Pacific. They visited the Society and Tonga Islands. On their way northward they rediscovered the Hawaiian Islands, naming them the Sandwich Islands. The ship's crew wintered and provisioned in Hawaii and then sailed for the west coast of North America, called New Albion by Sir Francis Drake. They arrived on March 7, 1778, took possession for the King and began their sail up the west coast searching for the Northeast Passage.

After crossing the Bering Strait without finding a passage to the Atlantic, they were once again halted by pack ice in the Arctic Ocean on August 29, 1778. They headed south to winter once more in the Sandwich Islands before another try north for the Passage. Cook was reprovisioned at Kealakekua Bay on the Big Island. He was given a great amount of provisions, actually depleting the supplies of local natives. After leaving Hawaii on February 4, Cook's *Resolution* sprung its foremast in a gale. Cook decided to return to Hawaii for repairs. The natives were upset with his return and stole one of the *Discovery*'s cutters. Cook had an altercation with the natives and was killed by them in Kealakekua Bay on February 14, 1779.

Following Cook's death Charles Clerke assumed command, and the two ships sailed northward once again. They were blocked by pack ice in the Arctic, turned south a final time, and slowly made their way back to England via Russia, China and the Cape of Good Hope, arriving in England on the fourth of October 1780, after a voyage of 4 years, 2 months and 22 days.

Both crews were in good health. No scurvy had appeared on either ship during the entire voyage. While a Northwest Passage had not been identified, the voyage was an immense success from the perspective of the crew's health and because of the discovery of new lands for England and the opening of the seal pelt and fur trades of the Pacific Northwest. Flora, fauna and native cultures were observed and described for all of Europe to appreciate⁴.

Conclusion

Thus, these three great circumnavigation voyages from 1768 to 1780 were of immense success for several reasons. Paramount among them is the preservation of the health of sailors enabling future long expeditionary voyages, especially through the control of scurvy. The opening of new lands for colonisation and new trade opportunities resulted. Scurvy prevention further allowed the British Navy to blockade the

French at the port of Brest and prevent the invasion of the British Isles. These successful voyages led to a shift in empire in the Pacific from Spain and France to England.

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How did James Cook maintain the health of his sailors? While it is customary to consider lemons, oranges and limes as the archetypal antiscorbutics, these were not available to Cook and, thereby, were not the deciding factors. The prevention of scurvy on these three voyages was related directly to the frequent stops, harvesting of the local greens, and consuming them as salads at the crew's mess. Most, if not all, growing plants contain quantities of ascorbic acid (vitamin C). Collecting and eating these growing, green plants provided an adequate source of the vitamin.

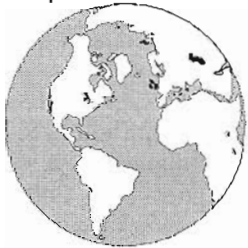
James Cook stopped at local anchorage's as often as possible for water, greens, fish, fowl and meat, and for the brewing of tea and spruce beer. This combination, especially the green, provided the source of vitamins. The plant species collected by Cook contained anti-scorbutic quantities of vitamin C and that it was the consumption of these greens that maintained the sailors scurvy-free on Cook's voyages. Other provided anti-scorbutics were of little value due to the fact that the means of preparation by prolonged boiling and long storage depleted the vitamin. Cook also helped to maintain the men's health by the use of the three-watch

system, by reducing overcrowding, by ventilating the ship's cover decks, and by providing clean, warm clothing for his sailors. Perhaps, just as important, was his concern for the sailor's welfare. Indeed, James Cook was true humanitarian leader⁵.

This, then, is a shining example of a simple health measure that of the consumption of local leafy plants to prevent the terrible scourge of the sea. This allowed prolonged voyages of discovery and changed the face of history. This is a lesson in history to be remembered even if some are defacing Cook's status⁵.

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