Cook and His Contemporaries: Differences in Medical Emphases

JAMES WATT

INTRODUCTION. Surgeon Vice-Admiral Sir James Watt, MD, MS, FRCP, FRCS (Edin.), Hon. FRCS (Eng.), Hon. DCh (Newcastle) had a distinguished medical career in the Royal Navy.

Among other senior appointments, he was Medical Director-General of the Royal Navy, 1972-1977; President of the Medical Society of London, 1980-81; President of the Royal Society of Medicine, 1982-84; and Honorary Surgeon to H.M. The Queen from 1978 to 1987.

He is currently President of the Institute of Religion and Medicine, Vice-President of the Society for Nautical Research, and Trustee of the Medical Society of London. Since retirement he has, among his many activities, become established as an important naval medical historian, and it was in this role - documenting the medical history of the First Fleet and early settlement on behalf of the Australian Government - that he came to Australia in 1986 and, as a Bicentennial Visitor, in 1988.

During the former visit he spoke to a meeting of the New England Branch of the Royal Society of New South Wales on 21st November 1986, and this paper is the written version of the talk he gave on that occasion.

INTRODUCTION

Throughout his naval service, Captain James Cook had received ample evidence that the success of maritime operations was often determined by health factors. In 1755, as an able seaman on board HMS Eagle, he had encountered the ravages of scurvy after only a few months' patrol off the English coast. Twenty-two men, including the surgeon, were buried at sea and 130 were landed sick. The experience was repeated when, on Palliser's recommendation, he was appointed master of HMS Pembroke. Scurvy was responsible for 26 deaths during her passage from Plymouth to Halifax, Nova Scotia, and her crew required four weeks' convalescence before she could join Boscawan for his attack on Louisburg. Its fall opened the way to the St Lawrence River which Cook successfully charted, enabling Admiral Saunders to negotiate the dangerous channel with 22 warships and 119 transports bearing Wolfe's army to capture Quebec in 1759 (R.T. Gould, 1978).

His reputation thus enhanced, Cook was next selected to survey the coasts of Newfoundland where his observations on an eclipse of the sun in August 1766 brought him to the attention of the Royal Society, which had him appointed as Commander of HMS Endeavour for the Society's expedition to Tahiti to observe the transit of Venus across the sun in 1769. That association was to influence and significantly modify Cook's provision for the health of his men.

THE INFLUENCE OF THE ROYAL SOCIETY

Cook's service on the North America station had taught him the antiscorbutic value of spruce beer (pine needles have 150mgm ascorbic acid/100g) and this remained his principal weapon for combating scurvy. Unfortunately, the Royal Society reflected the view of the Royal College of Physicians, the Admiralty's medical adviser, that the efficacy of the citrus fruits in the cure of scurvy was due to their acidity. Since fruits were also held to cause dysentery, elixir of vitriol was recommended as a suitable alternative and was carried by all ships (C. Lloyd and J.L.S. Coulter, 1961). It contained sulphuric acid, sugar, spices and spirit of wine. When the naval surgeon James Lind showed, by the controlled clinical trial he conducted at sea in 1747, that oranges and lemons, but not elixir of vitriol, could cure scurvy (J. Lind, 1753), the Admiralty Sick and Hurt Board rejected the evidence (Sick and Hurt Board, 1767).

The matter was further confused, because scurvy was regarded as a putrefactive disease, particularly by the Edinburgh School of Medicine which invoked the work of Joseph Priestley on carbon dioxide to promote a false hypothesis that tissue metabolism was influenced by 'pneumatic chemistry'. Developing this idea, Sir John Pringle, an Edinburgh graduate and President of the Royal Society, conducted a series of experiments to prove that fermentation inhibited putrefaction (K.J. Carpenter, 1986).

A young Dublin physician and former naval surgeon David MacBride, using Pringle's methodology, published the results of a series of experiments which purported to show that a substance like malt, which fermented in the digestive tract to liberate 'fixed air' or carbon dioxide, would prevent putrefactive diseases such as scurvy (D. MacBride, 1767). Pringle naturally gave his wholehearted support to the promotion of malt as an antiscorbutic though it contains no vitamin C. Malt therefore became Cook's...
second line of defence against scurvy. His third was sauerkraut, one of the antiscorbutics recommended by Lind. Lind, however, had powerful disciples, notably Nathaniel Hulme, an able and influential physician in London and also a Fellow of the Royal Society. Hulme ensured that Lind's ideas were communicated to captains and surgeons of naval vessels fitting out in the Thames, corresponded with the Admiralty and found a means of preserving lemon juice in bulk for long voyages (N. Hulme, 1768). It was this lemon juice which cured Banks of scurvy during Cook's *Endeavour* voyage (J.C. Beaglehole, 1962).

THE DEBT TO WALLIS

But Cook had also studied, with close attention, Wallis's journal of his circumnavigation from 1766-1768 during which he had discovered Tahiti, an ideal base for *Endeavour*'s observation of the transit of Venus. Wallis had a remarkable health record: 3 died from dysentery and 2 from accident. He appears to have been the first commander to have applied Lind's measures conscientiously. They included natural foods, ship hygiene and personal cleanliness enforced by daily sea bathing. Slabs of concentrated animal offal called 'portable soup' were carried. Rich in protein and probably containing Vitamin A, they were boiled with local greens to make a highly nutritious and satisfying food. To Wallis also belongs the credit for first putting his men into three watches instead of the customary two (G. Robertson, 1948). It ensured adequate rest and allowed clothing to be dried, thus reducing stress and demands upon the body's stores of Vitamin C, which diminished the incidence of scurvy.

The success of the voyage was due to the rapport Wallis enjoyed with his surgeon, John Hutchinson, who impressed upon the ship's company the need to eat local greens and vegetables if they wished to avoid scurvy (G. Robertson, 1948). Large quantities of winter's bark, an effective antiscorbutic, were therefore gathered in the Magellan Strait and Wallis sent specimens to Dr. John Fothergill, an enlightened Quaker physician who seems to have been a close friend (J.C. Lettson, 1784). Fothergill was a colleague of Dr. John Coakley Lettsom, friend of Nathaniel Hulme, who had been in close touch with Wallis and Hutchinson about the medical arrangements for the voyage (N. Hulme, 1766). This liaison seems to have persuaded Hutchinson to purchase an additional supply of medical stores out of his own pocket and Wallis also carried Lind's distillation apparatus. Hutchinson's report to Wallis on factors related to the prevention and treatment of scurvy appears to have been read by Cook, for it is enclosed in one of his holograph journals of the *Endeavour* voyage (J. Cook). Cook also sought the advice of his patron, Palliser, who had consulted Lind before undertaking a voyage to India in 1748 when he proved the value of Lind's methods (J. Lind). Fortunately for Cook, Palliser was Comptroller of the Navy during Cook's first two voyages and ensured that he got the ships, men and provisions he needed.

**CARTERET**

Carteret, whose unseaworthy vessel, the *Swallow*, had caused him to part company with Wallis in the Magellan Strait, discovered, to his dismay, that neither meat, nor salted victuals, had the antiscorbutic properties claimed for them. In a Pacific crossing of 246 scurvy-ridden days he lost one third of his ship's company, and abandoned all further exploration (H. Wallis, 1965). He returned too late to influence Cook, on his *Endeavour* voyage, but Cook may have read Carteret's narrative later because, in a rough notebook he kept, the value of various items of diet during the second voyage, he deleted a comment that malt was 'one of the best Antiscorbutic medicines yet known' and reserved that distinction for sauerkraut (J. Cook).

**BYRON'S CONTRIBUTION**

Cook must also have been impressed by the contrast between Anson's disastrous health record during his circumnavigation between 1740 and 1744 (J. Watt, 1985), and that of the Honourable John Byron, a survivor of that expedition, who appears to have adopted many of Lind's recommendations allied to his own practical experience. Although he made few discoveries, he deserves credit for being the first navigator to demonstrate that Pacific exploration could be achieved without prohibitive loss of life. In his voyage from 1764 to 1766, he reached Tinian in the Landrone Islands without losing a single man and, despite the ravages of malaria at Tinian and Batavia, lost only 6 out of 160 men in the *Dolphin* and 3 out of 125 in the *Tamar*. Cook would have found that the key to Byron's success lay in his attention to the hygiene, clothing and diet of his men, which he supplemented with fresh meat, fowls, vegetables and local antiscorbutic plants (J. Hawkesworth, 1773).

**COOK'S HEALTH POLICY**

The health policy which Cook adopted reflected all of these influences. It was displayed first in his choice of ships. They were commodious colliers with adequate space for men and provisions, unlike warships crowded with men, guns and ammunition, and he resisted overcrowding. It was the reason for his quarrel with Banks, who tried to encumber *Resolution* with a top-heavy structure to house his large staff, servants and specimens. Cook paid scrupulous attention to hygiene. His ships were kept clean, dry, fumigated and well-ventilated and, on the first two voyages, he was able to select his men, insisting upon their personal hygiene and the cleanliness of their hammocks and bedding which was aired daily. He issued heavy woolen "fearnought" jackets in cold climates and put his men into three watches, as Wallis had done.

Cook also chose routes which ensured, so far as possible, short passages between harbours which would afford natural fresh foods. For instance, in his *Endeavour* voyage, he called at Madeira and Rio for vegetables and fruits and, before rounding Cape Horn for the long passage to Tahiti, called at the Bay of Good Success in Tierra del Fuego to gather cress, scurvy grass, wild celery, winter's bark, cranberries, mussels and wild fowl, all excellent antiscorbutics. On his second voyage in *Resolution* and *Adventure*, his first Antarctic coastal sweep was planned to begin at the Cape of Good Hope and end at Dusky Bay, New Zealand, because of the fresh natural foods both provided, while he found a
splendid sheltered anchorage at Christmas Harbour before rounding Cape Horn for the final sweep of the Atlantic ice-edge. Yet, despite these admirable precautions, Cook's health policy had certain important defects. The influence of the Royal Society led him to accept, without critical appraisal, a variety of so-called antiscorbutics to the exclusion of lemon juice and this allowed scurvy to exact its toll on countless lives. Cook also quite ignored the value of cinchona bark against fevers, which Lind had emphasised, although he always endeavoured to obtain clean fresh water to avoid bowel complaints and carried a machine to sweeten it.

THE ENDEAVOUR VOYAGE 1768-1771

From a medical viewpoint, Cook's Endeavour voyage from 1768 to 1771 was not impressive. There were five outbreaks of scurvy and forty-one of the ship's company of ninety-four died; three from tuberculosis, six from alcohol excess hastened, in two cases, by hypothermia. Buchan, the artist, died from epilepsy. Three were drowned and thirty-one died from malaria and dysentery or typhoid fever contracted at Batavia. However, to put the record into perspective, Cook had visited Batavia during the sickly season and at the height of an epidemic of typhoid fever. Prior to that, there had been only eight deaths and no more than three of these could have been avoided, while scurvy had not been serious (J. Watt). Nevertheless, despite the superb navigational and geographical achievements of Endeavour's circumnavigation, the Batavia debacle underlined the defects of Cook's attitude to health, though he was ill himself (J.C. Beaglehole, 1962) and this adversely affected his relations with the Dutch East India Company (Kolonial Archief, 1770). Cook was more concerned with his ship than with his men and, unlike Wallis, appears to have taken little interest in the medical arrangements on board. When Monkkhouse the ship's surgeon was struck down by fever, he left his medicine chest empty. Monkkhouse had failed to keep a medical journal or to conduct four separate trials which Cook had been asked to ensure were done. Cinchona bark was expensive and seems to have been lacking, for Banks provided his own and Cook had apparently not appreciated the importance of this item. Perry, on the other hand, was a conscientious and skilled young man who seems to have brought the situation under control. He nursed Banks, among others, to health and became Banks' lifelong friend (J. Banks, 1788-90). Cook's indulgent attitude towards the drinking habits of his men, who were unsupervised and underemployed, was also a factor for the Dutch physician Bontius who attributed the high incidence of dysentery among seamen to their drinking habits (J. Bontius, 1629). By contrast, Wallis took a very different line in Batavia. Like Cook, he was ill himself, but he followed Lind's precepts, stopped all shore leave and prohibited alcohol from being brought on board. He made a large open berth in the ship, isolated affected patients and sterilised the drinking water in collaboration with his surgeon who proved 'indefatigable' (J. Hawkesworth, 1773).

RESOLUTION AND ADVENTURE 1772-1775

Having discovered the danger of relying upon a single ship, Cook embarked upon his circumnavigation of Antarctica in the Resolution accompanied by Tobias Furneaux, Wallis's second lieutenant, in Adventure. Resolution lost only four men, one from tuberculosis and three from accident. Adventure lost eleven, but eight of these were a boat's crew murdered by Maoris in New Zealand, though Furneaux's health measures were also less effective than those of Cook, who had learnt the lessons of the Endeavour voyage. If, however, we examine other records than Cook's own journals, it is clear that the cost in health had been rather higher than he cared to admit. For instance, the physician-naturalist, Sparrman, described the effect of deteriorating rations upon the health and morale of Resolution's crew during the Pacific and Atlantic ice-edge searches (A. Sparrman, 1785), while the incidence of venereal disease was high and there were five episodes of scurvy albeit less severe than the two in Adventure.

RESOLUTION AND DISCOVERY 1776-1779

Cook took Resolution again, accompanied by Clerke in the Discovery, for his ill-fated third voyage from 1776 to 1779, which was to repeat Drake's attempt of 1579 to find a North-West Passage. By then, Palliser, his friend and patron, had left the Comptroller's office. Delays, leaking ships and uncooperative crews sorely tried Cook's patience, but he discovered the Cook Islands, Nootka Sound on Vancouver Island and the Hawaiian Islands where, in February 1779, he mishandled a trivial local incident to meet his tragic end.

The most likely explanation is that his insistence upon eating native foods caused a heavy infestation of the bowel by ascarides or round worms, which were prevalent in Tahiti and caused him to have an acute bowel obstruction during the second voyage. It was followed by failure to absorb the B complex of vitamins which produced the characteristic syndrome and personality change displayed by Cook on the third voyage and was the most significant feature of the events which led to his death. It could therefore be argued that Cook was ultimately a victim of his own health policy (J. Watt).

After the second voyage, Cook was awarded the Royal Society's Copley Medal for his success in preserving health at sea (J. Cook, 1776) and his contribution to this field is best judged by comparison with his eighteenth century contemporaries.

BOUGAINVILLE 1766-1769

The first of the French explorations of the Pacific was that of Bougainville from 1766 to 1769. In terms of mortality, it was deceptively good, for there were only 10 deaths in the Boudeuse and 2 in the Etoile out of a total of 335 men. Four were drowned, 1 died from tuberculosis, 1 from apoplexy and 1 from peritonitis. Scurvy claimed only 3 and 2 died from dysentery. Morbidity, however, was high and the several journals of the voyage edited by Taillemite (E. Taillemite, 1977) disclose 4
episodes of scurvy, 3 of dysentery and rampant venereal disease. At least 116 men were discharged to hospital at various ports of call, but their mortality and eventual disposal are unknown. Sickness frustrated discovery and St. Germain, the purser, bitterly recalled the islands they had sighted without exploring one of them (E. Taillomite, 1777).

Bougainville thought he had discovered Tahiti and reached it in the nick of time, for his men, driven to eating rats, were falling rapidly hostage to scurvy. By the time they had reached New Ireland, half of Bougainville's men were suffering from a third outbreak of scurvy, dry provisions were being consumed by cockroaches, weevils and rats, and the inadequately cured meat was foul. On their arrival at Ceram, 'no-one was able to declare himself entirely exempt from scurvy and half the crew was incapable of any work (L.A. de Bougainville, 1772). The spectre of disaster, which had pursued Bougainville throughout the voyage, finally drove him to abandon further exploration towards Australia which effectively prevented him from pre-empting Cook.

Among the causes from the expedition's failure were the ineptitude of the French Admiralty, overcrowded ships with inadequate storage space, badly packaged provisions of inferior quality (A. Carré, 1981), the indifference and clinical ignorance of the surgeons, neglect of sound nutritional principles, and the indiscipline of the crews, despite Bougainville's inspiring leadership. He was not, however, always successful in trading relations with natives and, unlike Cook, Wallis and Byron, was more concerned about his own creature comforts than the nutritional needs of his men, who therefore suffered most.

LAPEROUSE 1785-1788

The next French expedition to the Pacific was under the command of Lapérouse, a Frenchman in the Cook mould and Cook's great admirer and emulator. He applied all Cook's health measures with signal success and had the benefit of Poissonière-Despérrières' 'Traité des maladies des gens de mer', which had been published in 1767 and incorporated Lind's teaching. Louis XVI took a personal interest in the voyage and had studied Cook's journals and charts, so that the instructions given to Lapérouse abounded in expressions lifted directly from Cook's journals. The Medical Society of Paris also discussed with Lapérouse the sort of information they would like to receive, based upon the observations of Cook and Anderson, his surgeon and naturalist on his second and third voyages (J.F.G. de Lapérouse, 1799). Rollin's industry, perceptions and acumen provided the Paris Medical Society with the information it required and Lapérouse with healthy crews, yet the medical emphasis differed from that of Cook.

In a letter from Botany Bay on 7 February 1788, Lapérouse provided an apparently unambiguous statement that "fresh provisions and fresh provisions alone, either animal or vegetable, cure the scurvy" (J.F.G. de Lapérouse, 1799) but then went on to confuse the issue, as Cook had done, by recommending a blunderbuss approach to its prevention without even mentioning lemon juice. Moreover, what he really meant by fresh provisions was fresh meat, for he attributed the cure of scurvy at Samoa to the fresh pork they obtained there. While he made full use of Cook's spruce beer in northern waters, he was persuaded by Rollin to have it mixed with cinchona bark in the mistaken belief that quinine was antiscorbutic (R.T. Gould, 1978).

Like Cook, Lapérouse was reluctant to admit sickness and it is therefore difficult to compute the true morbidity. For instance, on arrival in Botany Bay, he boasted that there was not a man sick in either ship, yet English officers of the First Fleet learnt that wounds sustained in Samoa had not yet healed (D. Collins, 1798) and two died there. In all, 21 died from a boat accident in Alaska, 12 from a native attack at Samoa, 2 others from injuries, 1 from chronic disease, 1 from scurvy and 1 from dysentery, an overall mortality of 38. However, 12 others were landed sick during the voyage, some of whom appear to have died; so his health record, in which he sought to outshine Cook, was less impressive than it appeared in his writings.

MALASPINA 1789-1794

Cook's influence extended also to Spain: Malaspina's expedition from 1789 to 1794 was conceived, like that of Lapérouse, on the grand scale which had characterised Cook's voyages. In the Cook tradition, health assumed a high priority and Malaspina had two corvettes specially built to carry provisions which he selected himself. It led, however, to the paradox of departing with his ships stuffed with malt and sauerkraut from a port overflowing with oranges and lemons.

Fortunately, Malaspina carried two able physicians, Gonzalez and Flores, who had studied the works of Lind and Sir Gilbert Blane, Rodney's enlightened and influential physician on the West Indies station. They therefore took a quantity of lemon juice, which had been either filtered or concentrated to preserve it, and this proved effective in limiting scurvy during the Pacific crossing. There were only 10 recorded deaths: 8 from disease and 2 from accident, but inadequate data preclude comparison of Malaspina's health record with that of other Pacific navigators, because there were numerous desertsions, exchanges and discharges to hospital and it is impossible to determine the ultimate fate of all who fell sick or even the number who completed the voyage (J. de Zulueta and L. Higueras, 1981). Nevertheless, this expedition had one important outcome. The experience enabled Gonzalez to publish a book on diseases of seamen in 1805 (P.M. Gonzales, 1805), which gave a Spanish accent to Lind's thesis of 1753 and complemented the French emphasis of Poissonière-Despérrières.

VANCOUVER AND DENTRECASTEAX 1790-1795

The last important voyages of the eighteenth century were the circumnavigations of Vancouver and Denticasteaux which, subject to similar political, environmental, psychological and physical influences, provide a useful comparison of the consequences of differing medical emphases upon the health policies they had inherited, directly
or indirectly, from Cook. Both commanders suffered from a fatal illness. Dentrecasteaux died from scurvy and a haemorrhage from the bowel, mismanaged by his surgeon (J. Watt, 1986). Vancouver died three years after returning to England from the complications of fever, which he appears to have contracted during a previous commission in the West Indies and which plagued him throughout the voyage (J. Watt, 1987).

Both expeditions were delayed by conflict, the French by the Revolution and the English by the dispute with Spain. This was reflected in the poor workmanship evident in the ships. It also extended to Dentrecasteaux's provisions which were of an inferior quality (J. Carré, 1977). Vancouver's provisions were excellent (A. Menzies, 1791), and he was generously supplied by the storeship Ducale during the voyage (G. Vancouver, 1798). He personally ensured that abundant antiscorbutics were carried, which included lemon juice, and he also carried a large stock of cinchona bark of the best quality (G. Vancouver, 1798).

Renaud, surgeon of the Récherche, compiled a somewhat garbled account of Dentrecasteaux's terminal illness (P. Renaud) and appears to have been less competent than his colleague, Joannet in the Espérance, who left a detailed record of 502 cases together with an account of the medical arrangements on board (L.D. Joannet). Despite instructions similar to those given to Lapérouse, the picture emerges of men living in squalor amidst the stench of the excreta of livestock for the officers' table, being prevented from washing, sleeping in wet clothing because they had no other, and obliged to live for long periods without fresh provisions or antiscorbutics. The sick were given vinegar, beer, honey and cream of tartar, with occasional 'limonade sèche' for there seems to have been little insight into the nature of the sea diseases. It is scarcely surprising that, after reaching the Pacific, scurvy and dysentery should dominate the clinical picture.

Vancouver, on the other hand, ran a taut, clean ship and meticulously followed the practices of his mentor, Cook, and the recommendations of authoritative medical writers. This difference in medical emphasis was high-lighted by the health records of the two voyages. Vancouver lost 5 out of the combined crews of 145 men. Only 1 died from disease and his consort Chatham did not lose a single man (G. Vancouver, 1798). By the time the French expedition had reached Java, 22 had died in the Récherche and 16 in the Espérance, including both commanders and the final death toll was in excess of 98 out of a combined complement of 219 men (J.H. de La Billardière, 1800).

CONCLUSION

It is therefore possible to conclude that health at sea during eighteenth century Pacific exploration derived largely from Lind's perceptions of the nutritional, hygienic and epidemiological aspects of the sea diseases, from the relationship of his disciple Hulme with Wallis and Hutchinson and from the influence of Wallis upon Cook, whose assiduous attention to hygiene, nutrition and the welfare of his men admirably complemented the superb navigational skills and uncanny intuition which were such features of his exploring genius. His emphasis upon the health aspects of voyages of discovery influenced all subsequent Pacific navigators and led to French and Spanish appraisal of Lind's work.

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