Scurvy and Anson's Voyage Round the World: 1740-1744 An Analysis of the Royal Navy's Worst Outbreak

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ON 18 September 1740, Commodore George Anson led a squadron of Royal Navy ships out of St. Helen's on the Isle of Wight. His mission, as given by the Admiralty, was to 'Annoy and distress' the Spaniards on the South American coasts by 'taking, sinking, burning or otherwise destroying all their ships,' to seize any Spanish settlements which might be vulnerable, to encourage the Indians and Peruvian colonists to revolt, and to intercept and capture the great Spanish treasure galleon on its annual run between Manila and Acapulco.[1] Anson left with eight ships and a total complement of 1,955 men. He returned three years and nine months later with one ship and 145 members of the original crew. Scurvy had killed nearly 1,300 of his men.

Scurvy had become a recognized clinical entity by the end of the sixteenth century when increased navigational experience and enthusiasm for exploration, plunder, and commerce led to long sea voyages. It was both expected and feared on any journey or expedition lasting several months. As Richard Hawkins put it, it was 'the plague of the sea and the Spoyle of Mariners.'[2] However a high mortality rate from scurvy was not inevitable. Modestly equipped expeditions such as the circumnavigations of Sir Francis Drake, Thomas Cavendish, and Woodes Rogers were not marred by excessive mortality from scurvy, although outbreaks occurred. Yet Anson's venture, backed and supplied by all the resources of the British government, turned out to be the worst seaborne medical disaster ever.

What went wrong? Was the high mortality rate a result of the implacable ravages of a killer disease? Of faulty navigation? Of bureaucratic bungling? Or was it just plain bad luck? One contemporary reporter even wondered whether divine 'Providence threw insurmountable Obstacles in the Way.'[3] This presentation will show that the tragic outcome of this disastrous voyage was a result of all these factors—except possibly the last.

The time of onset and the severity of an outbreak of scurvy are influenced by many factors. There are medical factors which affect the susceptibility of the ascorbic acid-deficient crew: concomitant illnesses, both chronic and acute, physical and emotional stress, and hard physical labor.[4] Another set of variables are those related to the actual sailing of the ship. Any circumstance which kept the ship away from fresh food would affect the duration and the mortality rate of an outbreak. These nautical factors include wind and weather, ship construction, and navigational problems.

The records of Anson's journey are profuse and explicit, and the two sets of variables—medical and nautical— are easily traced.

Although Anson's voyage took place in the eighteenth century, the accounts of the journey follow the tradition of the great narratives of the Age of Discovery. There are frustrations, privateering, storms, a mutiny, possible desertions, a sea battle, survival against great odds, a triumphant return—and scurvy. The symptoms of scurvy recorded on Anson's voyage are the same as those described on expeditions made 500 years earlier and in

* The author is indebted to Barbara M. Kreutz of Bryn Mawr College, Dean of the Graduate School and historian, for her help, advice, and encouragement.

1. Great Britain, State Papers, Public Record Office, 42/88, ff. 2-10, 'Instructions to Commodore Anson, 1740,' in *Documents Relating to Anson's Voyage Round the World: 1740-1744*, ed. Glyndwr Williams (London: Navy Records Society, 1967), pp. 34-39.

2. Richard Hawkins, *The Observations of Sir Richard Hawkins, Knight, In His Voyage into the South Sea: Anno Domini, 1593* (London: John Jaggard, 1622), p. 37.

3. [John Young], *An Affecting Narrative of the Unfortunate Voyage and Catastrophe of His Majesty's Ship 'Wager'* (London: John Norwood, 1751), p. 3.

4. Elaine P. Ralli and Sol Sherry, 'Adult Scurvy and the Metabolism of Vitamin C,' *Medicine* 20 (September 1941): 260; John H. Crandon, Charles C. Lund, and David B. Dill, 'Experimental Human Scurvy,' *New England Journal of Medicine* 223 (September 5, 1940): 363; Bernard S. Gould, 'Ascorbic Acid and its Role in Wound Healing and Collagen Formation,' in *The Science of Nutrition and its Application in Clinical Dentistry* (Philadelphia: W. B. Saunders Co., 1966), p. 181; A. P. Meiklejohn, R. Passmore, and C. P. Stewart, 'The Importance of Ascorbic Acid to Man,' in *Lind's Treatise on Scurvy* (Edinburgh: University Press, 1953), pp. 437-38; Robert E. Hodges, James Hood, John E. Canham, Howerde E. Sauberlich, and Eugene M. Baker, 'Clinical Manifestations of Ascorbic Acid Deficiency in Man,' in *American Journal of Clinical Nutrition* 24 (April 1971): 441.

experiments performed 230 years later. Scurvy is a disease of remarkable consistency, and the symptoms described by seafaring laymen are medically correct.

Table I shows the distribution of these symptoms in the historical accounts. The first eyewitness account of unequivocal scurvy is found in Bishop de Vitry's history of the Fifth Crusade. Jean de Joinville's memoirs of the Seventh Crusade give similar symptoms. Both outbreaks occurred during a siege outside Damietta in Egypt when the enemy cut off the supply of fresh foods. Vasco da Gama's double outbreak in 1498 is the first recorded episode of sea scurvy. Jacques Cartier's explorers were struck by scurvy in 1535 when a terrible Canadian winter locked his ship in two fathoms of ice in the St. Lawrence. In these four accounts the diagnosis of scurvy is .made in retrospect. The chroniclers did not know what it' was. By the end of the sixteenth century, however, scurvy was so common that Richard Hawkins identified it as a specific disease and discussed the clinical signs in some detail in his account of his journey into the South Sea in 1593.

Swollen bleeding gums, fetid breath, and loose teeth appear in all accounts. The gum lesions of scurvy are known to be much more severe in individuals who have preexisting gingivitis, caries, and periodontal disease.[5] One can assume that seamen in the sixteenth century—and beyond—were not likely to have good oral hygiene and were, therefore, at risk for the gum lesions unless they happened to have lost their teeth. In that case they would not get swollen gums, but they would have equal difficulty in chewing the salt beef and hard tack.

Skin discolorations are often cited. Cartier noticed that the lesions ascended from the lower extremities,[6] a

Table I SYMPTOMS OF SCURVY DESCRIBED IN HISTORICAL ACCOUNTS

	Fifth Crusade 1215 (de Vitry)	*Seventh Crusade 1250 (de Joinville)*	*Vasco da Gama 1498*	*Jacques Cartier 1535-1536*	*Richard Hawkins 1593*	*George Anson 1741-1742*
Gum lesions	+	+	+	+	+	+
Skin discoloration	+	+	−	+	−	+
Lassitude	−	−	−	+	+	+
Pain in legs and joints	+	−	−	−	+	+
Weight loss	+	−	−	+	−	−
Nosebleed	−	+	−	−	−	−
Swelling of legs	−	−	+	+	+	−
Shortness of breath	−	−	−	−	−	+
Skin ulcers	−	−	−	−	−	+
Personality changes	−	−	−	−	−	+
Convulsions	−	−	−	−	−	+
Sudden death	−	−	−	−	−	+

References

Jacques Cartier, 'Brief Recit et Succincte Narration de la Navigation faicte es ysles de Canada,' trans, in *Early English and French Voyages Chiefly from Hakluyt: 1534-1608,* ed. Henry S. Burrage (New York: Charles Scribner's Sons, 1932), p.73.

A Journal of the First Voyage of Vasco da Gama: 1497-1499, ed. and trans. Ernest George Ravenstein (London: Hakluyt Society, 1898), p. 20.

Richard Hawkins, *The Observations of Sir Richard Hawkins Knight, In His Voyage into the South Sea: Anno Domini, 1593* (London: John Jaggard, 1622), p. 35.

Jean de Joinville, 'The Life of St. Louis,' in *Chronicles of the Crusades,* trans. M. R. B. Shaw (New York: Penguin Books, 1963), p. 237.

Jacques de Vitry, 'Histoire des Croisades,' in *Collection des memoires relatifs a I'histoire de France,* ed. Francois Pierre Guillaume Guizot, vol. 22 (Paris: Briere, 1825), 351-52.

Richard Walter and [Benjamin Robins], *A Voyage Round the World by George Anson,* ed. Glyndwr Williams (London: Oxford University Press, 1974), pp. 105-07.

Glyndwr Williams, ed., *Documents Relating to Anson's Voyage Round the World* (London: Navy Records Society, 1967), pp. 86, 152, 166.

5. Gould, p. 180.

6. Jacques Cartier, 'Brief Recit et Succincte Narration de la Naviga tion faicte es ysles de Canada,' trans, in *Early English and French*

fact reiterated over 300 years later by Sir William Osier.[7] Lassitude, fatigue, or 'loathesome sloathfulnesse' as described by Hawkins,[8] is the earliest sign of the disease in both classical and experimental forms. Hawkins noted pitting edema.[9] Jean de Joinville remarked on the seriousness of nosebleed as a prognostic sign.[10] This observation made over 700 years ago was echoed by Osier[11] and is found in textbooks of the early twentieth century.[12] The symptoms which are taken from the accounts of Anson's journey represent much more sophisticated and detailed observations.

The phenomenon of sudden death in advanced scurvy was noted with sadness and resignation by one of the Anson chroniclers: 'if the afflicted person lay quiet in his hammock, he seemed to be perfectly well and hearty; but if he was removed out of it, on any necessity, he immediately fainted away; and this was always a sure sign of the party's dissolution.'[13]

Mental changes were a significant component of the clinical picture of scurvy. In addition to 'lassitude' and 'lost spirits,' the narratives of Anson's journey refer to 'idiotism,' 'lunacy,'[14] and 'a strange dejection of the spirits, . . . with shiverings, tremblings, and a disposition to be seized with the most dreadful terrors on the slightest accident.'[15]

Table II compares the symptoms noted on Anson's voyage with those observed by two physicians, James Lind and Sir William Osier, who had extensive experience with the disease. Lind, the naval surgeon, was familiar with scurvy as it developed on board ship, whereas Osier saw it at the bedside. Lind mentions sudden death

Table II

SYMPTOMS OF SCURVY DESCRIBED BY ANSON, LIND, AND OSLER

	Anson 1740	*Lind 1753*	*Osler 1892*
Gum lesions	+	+	+
Leg/joint pain	+	+	−
Weight loss	−	−	+
Skin discoloration	+	+	+
Edema	−	+	−
Nosebleed	−	+	+
Lassitude	+	+	+
Pallor	−	+	+
Skin ulcers	+	+	+
Shortness of breath	+	+	−
Sudden death	+	+	−
Convulsions	+	−	+
Mental changes	+	−	+

References

James Lind, *Lind's Treatise on Scurvy,* ed. C. P. Stewart and Douglas Guthrie (Edinburgh: University Press, 1953), pp. 113-25.

William Osier, *The Principles and Practice of Medicine* (New York: D. Appleton, 1892), pp. 313-15.

Richard Walter and [Benjamin Robins], *A Voyage Round the World by George Anson,* ed., Glyndwr Williams (London: Oxford University Press, 1974), pp. 105-07.

Glyndwr Williams, ed., *Documents Relating to Anson's Voyage Round the World* (London: Navy Records Society, 1967), pp. 86, 152, 166.

in advanced scurvy,[16] but Osier does not, probably because his patients were already in hospital beds. Modern researchers note that sudden death may indeed occur in severe scurvy after clinical deterioration, often rapid, has begun.[17]

The mental changes mentioned in the historical accounts are echoed in Osier's clinical observation of mental depression, indifference, and delirium.[18]

Recent experimental studies on healthy volunteers corroborate historical and clinical findings, although experimental scurvy, with its rigid controls, cannot be considered identical to the classical form. Table III lists the symptoms which developed during the course of a study done by Hodges and others in 1971.[19] The symptoms of experimental scurvy match those of the chronicles, although the earliest physical sign, hyperkeratosis, or rough

Voyages Chiefly from Hakluyt: 1534-1608, ed. Henry S. Burrage (New York: Charles Scribner's Sons, 1932), p. 73.

7. William Osier, *The Principles and Practice of Medicine* (New York: D. Appleton, 1892), p. 314.

8. Hawkins, p. 35.

9. Ibid., p. 36.

10. Jean de Joinville, 'The Life of St. Louis,' in *Chronicles of the Crusades,* trans. M. R. B. Shaw (New York: Penguin Books, 1963), p. 237.

11. Osier, p. 314.

12. M. Litten, 'Scurvy,' in *Nothnagels' Encyclopedia of Practical Medicine: Diseases of the Kidneys and of the Spleen: Hemorrhagic Diseases* (Philadelphia: W. B. Saunders & Co., 1905), p. 706.

13. Pascoe, Thomas, 'A True and Impartial Journal of a Voyage to the South Seas and Round the Globe in His Majesty's Ship *Centurion,* abstract in *Documents Relating to Anson's Voyage,* p. 86.

14. Guernsey, Philip Saumarez MSS, in *Documents Relating to Anson's Voyage,* p. 166.

15. Richard Walter and [Benjamin Robins], *A Voyage Round the World by George Anson,* ed. Glyndwr Williams (London: Oxford University Press, 1974), pp. 105-06.

16. James Lind, *Lind's Treatise on Scurvy,* ed. C. P. Stewart and Douglas Guthrie (Edinburgh: University Press, 1953), p. 35.

17. Harold H. Sandstead, 'Clinical Manifestations of Certain Clas sical Deficiency Diseases,' in *Modern Nutrition in Health and Disease,* 6th ed. (Philadelphia: Lea and Febinger, 1980), p. 692.

18. Osier, p. 315.

19. Hodges, et al., pp. 432-43.

Table III

SYMPTOMS OF EXPERIMENTAL SCURVY

FIVE SUBJECTS

Fatigue/listlessness	5/5	Arthralgia (pain in the joints)	4/5
Personality changes	5/5	Joint effusions (fluid in the joints)	3/5
Hyperkeratosis (rough skin)	5/5	Mild edema	2/5
Petechiae (minute skin hemorrhages)	4/5	Marked edema	1/5
Ecchymoses (bruises)	4/5		
Gum lesions	4/5		

Reference

Robert E. Hodges, James Hood, John E. Canham, Howerde E. Sauberlich, and Eugene M. Baker, 'Clinical Manifestations of Ascorbic Acid Deficiency in Man,' *American Journal of Clinical Nutrition* 24 (April 1971): 432-43.

skin, would be missed by participants of voyages where seamen had only one suit of clothing and rarely washed.

Personality changes are present in all cases. Detailed psychological studies performed during the experiment indicated that ascorbic acid deprivation produced early signs of depression, hypochondriasis, and hysteria.[20] Although the desperate circumstances and the hardships endured on long sea voyages into parts unknown would obviously be expected to produce signs of mental stress, this experimental evidence suggests that scurvy does indeed have a direct effect on the crews' emotional health.

In the sixteenth century scurvy was expected to appear in less than four months,[21] but the interval varied widely —from six weeks to six months. Minor replenishments along the way could delay the onset. The men who were already sick were the ones who were struck first. Hodges and his group's experiment produced signs of scurvy from forty-two days on. The severe manifestations, pain and fluid in the joints, were late developments.[22]

Anson's voyage attracted an enormous amount of interest when he returned to a hero's welcome in 1744. Books about the voyage appeared almost immediately. The official account is the one written by Richard Walter, the chaplain aboard Anson's flagship, *Centurion*. It first appeared in 1748 and went to five editions within a year. Recent scholarship indicates that Reverend Walter had some help in putting the book together.[23] This official account, written under Anson's supervision, is the best known. Fifteen editions had been printed by 1776. Other shorter recollections and narratives, many of them self-serving, also appeared and help fill out the story.

Commodore George Anson seemed an ideal choice for Commander-in-Chief of a force entrusted with such ambitious goals. He came from a prominent and well-connected family in Staffordshire, had gone to sea at fifteen, and had demonstrated his leadership while patrolling the South Carolina coast for pirates and while harassing French ships off West Africa. He was forty-three when he was selected for the expedition to the South Sea. Throughout the narratives, he comes across as a capable, indomitable, humane commander who faced incredible hardships in a manner befitting an officer in the Royal Navy.

Anson's fleet consisted of six naval ships: the flagship *Centurion,* a fourth rate with sixty guns; *Gloucester* and *Severn,* also fourth rates with fifty guns each; *Pearl,* fifth rate with forty guns; *Wager,* a sixth-rate store-ship which carried artillery and ammunition for assaults on land; and the little sloop *Tryal* with eight guns. In addition, two merchant ships, or victuallers, *Anna* and *Industry,* which were under contract to the Navy, were to accompany the squadron, transfer their cargo as space became available, and return to England. The ships' complement of 1,955 men included officers, their servants, warrant officers, midshipmen, seamen, ship's boys, marines, and supernumeraries, including the chaplain and a teacher of mathematics.[24]

Immediately we can recognize a medical factor—stress from overcrowding. *Centurion,* a two-decker of 1,005 tons, the largest of the ships, accommodated a company of 521. The official amount of hammock space per man was fourteen inches. The little 200-ton sloop *Tryal* carried 96 men. Osier points out the relationship between what he called 'physical and moral' stress and scurvy. Among these stresses he included overcrowding, dwelling in cold damp quarters and prolonged fatigue under depressing influences.[25] All of these conditions existed on an eighteenth-century British man-of-war.

Another medical factor which contributed to the se-

20. Robert A. Kinsman and James Hood, 'Some Behavioral Effects of Ascorbic Acid Deficiency,' *American Journal of Clinical Nutrition* 24 (April 1971): 455-64.

21. {George Whetstone], *The Cures of the Diseases in Forraine At tempts of the English Nation 1598,* ed. Charles Singer, facsimile repro duction (Oxford: Clarendon Press, 1915), p. 21.

22. Hodges, et al., p. 435.

23. Williams, ed., *Voyage Round the World,* pp. xxi-xxv.

24. Boyle Somerville, *Commodore Anson's Voyage into the South Seas and Around the World* (London: William Heinemann Ltd., 1934), p. xvi.

25. Osier, p. 313.

verity of the outbreaks of scurvy on this voyage was the basic poor health of many of the company. The fitting out of Anson's squadron was in progress at the same time as preparations were being made for an attack in the Caribbean, and Commodore Anson's request for fit ships, well-trained seamen, and adequate marines had a low priority on the Admiralty's list. Instead of the 300 additional sailors requested, Anson was allotted 170, of which 32 came straight from the convalescent ward in the hospital. The land forces assigned were 500 invalid soldiers, out-pensioners at Chelsea Hospital who were considered too sick for long marches. Only 259 reported for duty, most of them over sixty. These were the ones who were too crippled to desert when given their orders.[26] Such a group, already chronically ill and disabled, was especially susceptible to the illnesses common at sea—tropical fevers, the bloody flux and, of course, scurvy."

The rations ordered for a long sea voyage reflected current nutritional concepts, the need for durability, and seamen's eating habits. Table IV shows typical rations

Table IV

BRITISH SEAMAN'S RATIONS

ADMIRALTY VICTUALLING OFFICE MID-EIGHTEENTH CENTURY

Biscuit 1 lb./day	**Pease ½ pint 2 days/wk.**
Beer 1 gallon/day	**Butter 2 oz. 4 days/wk.**
Beef 2 lb. 2 days/wk.	**Cheese 4 oz. 3 days/wk.**
Pork 1 lb. 2 days/wk.	**Oatmeal 1 pint 3 days/wk.**

Reference

Christopher Lloyd and Jack L. S. Coulter, *Medicine and the Navy*, vol. 3 (Edinburgh: E. S. Livingstone, 1961), 81.

for a British seaman in the mid-eighteenth century. Details in the accounts of Anson's voyage indicate that his supplies were similar except that wine and brandy—in extremely large quantities—were issued instead of beer which would turn sour in the tropics.

Tables V, VI, and VII give a nutritional analysis of an eighteenth-century British seaman's ration. These tables should not be interpreted too literally. Assays based on American foods of 1975 may or may not be accurate for naval victuals of 1740, but the figures do serve as a rough guide. Table VIII gives the daily requirement of an adult male by 1974 standards. The official diet endorsed by the Admiralty contained adequate calories and protein, and riboflavin, thiamine, and niacin (the B vitamins). The diet was deficient, but not entirely lacking, in vitamin A. A deficiency of vitamin A causes night-blindness. Although ships were wrecked at night, there was usually a good reason, and there is no firm evidence that vitamin A deficiency was a factor.

Ascorbic acid (vitamin C) was minimally present in the seamen's rations, although officers often brought along foods which happened to be antiscorbutic, such as onions and marmalade. The standard rations were supposed to be supplemented by fresh foods on the journey, but these were not always available. Fresh fish might or might not have ascorbic acid. Codfish and halibut have very little, whereas one pound of baked flounder or broiled haddock provides nine milligrams.

There often was a discrepancy between the amount of food authorized and that actually issued. However Anson's ships seem to have been well provisioned. Some deterioration of provisions on a long voyage was inevitable. In addition to spoilage from leaky hulls there was rat and vermin infestation. Still the men did their best. The crew of the sloop *Tryal* toasted their bread over burning brandy to kill off the maggots,[27] a rather creative solution to a vexing problem. On journeys such as Anson's a shortage of water was always a threat because frequent landings for replenishment were not always possible.

Anson hoped to set sail in June to allow plenty of time to round Cape Horn in the months of December and January, the time of year considered most favorable. The delays caused by the dilatory preparations of the Admiralty, by unfavorable winds in the channel, and by unwelcome orders to escort a convoy postponed the departure until September. These delays were a crucial nautical factor which contributed to the unhappy outcome of the voyage. Anson reached Cape Horn in the worst possible time of year, that of the vernal equinox, and the passage was prolonged and terrible.

The squadron finally left on 18 September and set a course for the island of Madeira. The winds were so contrary that the passage took forty days instead of the expected seven to ten. Another costly delay. In Madeira the ships took on wine, appropriately, and 'other refreshments' of an unspecified nature. It is quite likely that they included fruit. After a week in Madeira, the squadron headed for the island of St. Catherine off the coast of Brazil, catching dolphins along the way. During this leg of the journey one of the victuallers, *Industry*, trans-

26. Walter and [Robins], p. 23.

27. Greenwich, National Maritime Museum MS. 9354/JOD36, Journal of Lawrence Millechamp, abstract in *Documents Relating to Anson's Voyage*, p. 78.

ferred her cargo of brandy and headed home to England. She was captured by a Spanish ship.

The first indication of illness is noted on 20 November, three weeks out of Madeira, when the captains described their crews as 'sickly.' This was not scurvy, but some sort of tropical fever which caused weakness and diarrhea. The infection and malabsorption led to an increased demand on the sick men's body stores of ascorbic acid. One hundred and seventy-one deaths from fever were recorded, mainly among the old pensioners, and those who survived the fever were the first to succumb to scurvy.[28]

Details from the narratives lead us to believe that the environment for Anson's sick was probably quite similar.

Once St. Catherine's was reached on 18 December, the surviving sick were taken ashore, and the healthy part of the crew repaired and cleaned the ships. The island provided fresh beef but very little else. In fact the unexpected scarcity of provisions on the Brazilian and the Patagonian coasts led Anson to recommend that the Admiralty explore the possibility of developing the Falklands as a supply base for British ships.[30]

Recovery of the sick was slow, and men were still convalescent and weak when the ships sailed south one month later. The squadron spent a week at Port St. Julian to repair *Tryal's* masts which were to provide trouble throughout the journey. They were too tall for the ship. Port St. Julian, the desolate spot where Magellan's and Drake's mutineers were executed, provided neither wood, water, nor provisions.

The ships then sailed toward Cape Horn by way of the Strait of LeMaire, the standard route in the eighteenth century. Although the weather was fair when the squadron passed through the strait, gale winds, snow, and sleet began soon afterwards and lasted nearly three months, scattering the squadron. The delays in starting from England had brought them to Cape Horn when the westerly winds were at their worst.

Table V

BRITISH SEAMAN'S DAILY RATION

PORK DAY (TWO DAYS A WEEK)

Food	*Calories*	*Protein Grams*	*Fat Grams*	*Carbohydrate Grams*	*Vit. A I.U.*	*Thiamine mgm.*	*Riboflavin mgm.*	*Niacin mgm.*	*Ascorbic Acid mgm.*
1 lb. biscuit (2 cups wheat flour)	800	32	4.8	170.4	0	1.32	0.28	10.4	0
1 gallon beer (3.6% alcohol)	1664	12.8	0	140.8	—	0.16	1.28	25.6	—
1 lb. pork (fresh ham)	1696	104.3	138.8	0	0	2.31	1.04	20.9	—
½ pint pease	386	27.3	1.5	68.4	135	0.84	0.33	3.4	—
2 oz. butter	406	0.4	46	0.2	187.5	—	—	—	0
Total	4952	176.8	191.1	379.8	322.5	4.63	2.93	60.3	—

A (----) in the table indicates that no reliable value could be found although there is reason to believe a measurable amount may be present.

References

Christopher Lloyd and Jack L. S. Coulter, *Medicine and the Navy,* vol. 3 (Edinburgh: E. S. Livingstone, 1961), 81.

U.S. Department of Agriculture, *Nutritive Value of American Foods,* by Catherine F. Adams, Agriculture Handbook No. 456 (Washington, B.C.: Government Printing Office, 1975).

An idea of the miserable conditions for the sick aboard a British man-of-war is found in Tobias Smollett's semi-autobiographical account of life as a surgeon's mate in 1741 in his novel *Roderick Random:*

I saw about fifty miserable distempered wretches, suspended in rows, so huddled one upon another, that not more than fourteen inches space was allotted for each with his bed and bedding; and deprived of the light of day, as well as of fresh air; breathing nothing but a noisome atmosphere of the morbid steams exhaling from their own excrement and diseased bodies, devoured with vermin hatched in the filth that surrounded them, and destitute of every convenience necessary for people in that helpless condition.[29]

28. Somerville, p. 304.

29. Tobias Smollett, *Roderick Random* (London: Everyman, 1927), p. 153.

30. Walter and [Robins], p. 97.

Table VI

BRITISH SEAMAN'S DAILY RATION

MEATLESS OR 'BANYAN' DAY (THREE DAYS A WEEK)

Food	*Calories*	*Protein Grams*	*Fat Grams*	*Carbo-hydrate Grams*	*Vit. A I.U.*	*Thia-mine mgm.*	*Ribo-flavin mgm.*	*Niacin mgm.*	*Ascorbic Acid mgm.*
1 lb. biscuit (2 cups wheat flour)	800	32	4.8	170.4	0	1.32	0.28	10.4	0
1 gallon beer (3.6% alcohol)	1664	12.8	0	140.8	—	0.16	1.28	25.6	—
1 pint oatmeal	1778	65	33.6	311.2	0	2.74	0.63	4.56	0
2 oz. butter	406	0.4	46	0.2	187.5	—	—	—	0
4 oz. hard cheese	452	28.4	36.4	2.4	1480	0.04	0.52	trace	0
Total	5100	138.6	120.8	625	1667.5	4.26	2.71	40.56	—

A (----) in the table indicates that no reliable value could be found although there is reason to believe a measurable amount may be present.

References

Christopher Lloyd and Jack L. S. Coulter, *Medicine and the Navy,* vol. 3 (Edinburgh: E. S. Livingstone, 1961), 81.

U.S. Department of Agriculture, *Nutritive Value of American Foods,* by Catherine F. Adams, Agriculture Handbook No. 456 (Washington, B.C.: Government Printing Office, 1975).

Table **VII**

BRITISH SEAMAN'S DAILY RATION

BEEF DAY (TWO DAYS A WEEK)

Food	*Calories*	*Protein Grams*	*Fat Grams*	*Carbo-hydrate Grams*	*Vit. A I.U.*	*Thia-mine mgm.*	*Ribo-flavin mgm.*	*Niacin mgm.*	*Ascorbic Acid mgm.*
1 lb. biscuit (2 cups wheat flour)	800	32	4.8	170.4	0	1.32	0.28	10.4	0
1 gallon beer (3.6% alcohol)	1664	12.8	0	140.8	—	0.16	1.28	25.6	—
2 lb. salt beef (yield from 2 lbs. raw corned beef)	2264	139.2	184.8	0	0	0.12	1.1	9.2	0
Total	4726	184	189.6	311.2	—	1.60	2.66	45.2	—

A (-----) in the table indicates that no reliable value could be found although there is reason to believe a measurable amount may be present.

References

Christopher Lloyd and Jack L. S. Coulter, *Medicine and the Navy,* vol. 3 (Edinburgh: E. S. Livingstone, 1961), 81.

U.S. Department of Agriculture, *Nutritive Value of American Foods,* by Catherine F. Adams, Agriculture Handbook No. 456 (Washington, D.C.: Government Printing Office, 1975).

The first cases of scurvy were seen on 7 March, the day the strait was passed and 125 days after leaving Madeira. The toll mounted rapidly for the next three months. In addition to scurvy, the crews, already weakened by the effects of the tropical fever, faced exhaustion, frostbite, and the terrifying storms. Captain Murray of *Pearl* wrote of his men's despair. They were:

> . . . now quite jaded and fatigued with continual labor and watching, and pinched with the cold and want of water . . . they became so dejected as to lay themselves down in despair, bewailing their misfortunes, wishing for death as the only relief to their miseries, and could not be induced by threats to go aloft.[31]

As the number of seamen ill with scurvy increased, fewer and fewer skilled hands remained fit to work the ships. The purser on the sloop wrote, 'Sometimes we had no more than the captain, lieutenant, surgeon, myself, and two boys with now and then one marine to work the sloop, mend the sails, bury the dead and do the more servile offices.'[32]

Dysentery as well as scurvy now appeared on some of the ships, especially *Gloucester,* and the supplies of water dwindled, thereby increasing the mortality. During the storm *Wager* was wrecked. Her desperate and drunken crew mutinied and set out in the ship's long boat and cutter eastwards through the Straits of Magellan. Thirty of them made it back to England. *Severn* and *Pearl* turned back, and after great hardships and heavy mortality from scurvy, reached Rio de Janiero. The remaining ships, *Centurion, Gloucester, Tryal,* and *Anna* lost sight of each other in the storms.

Anson in *Centurion* had underestimated the strength of the westerly current around Cape Horn and had miscalculated his longitude. During a temporary clearing of the weather he found himself off Cape Noir near Terra del Fuego. He was 300 miles east of his reckoning, and his crew were farther than ever from fresh provisions. The deaths from scurvy continued.

After being tossed around for another month, *Centurion* sailed for the island of Juan Fernandez, the appointed rendezvous, a place well known to English privateers, and the site of Alexander Selkirk's lonely sojourn. Anson chose to sail along the meridian toward Juan Fernandez. His navigation was inaccurate, and he could not find the island. At one point a few hours' sail west would have brought *Centurion* within sight of the island. But he sailed east, eventually turned around and found it, ten days and eighty lives later.

Although *Centurion* came within sight of Juan Fernandez on 9 June, three days passed before her sickly crew, helped out by officers, servants, and boys, could get her properly moored. Men continued to die during that time and for twenty days after landing. Eventually 167 sick men were taken to the shore on hammocks carried by the few men and officers, among them Anson, fit enough to wade through the surf from the boats to the beach. At least a dozen men died in transit, evidence of the sudden death feared in classical scurvy.

Tryal, sailed by only two officers and three men, arrived 11 June. Some of her sick died while being carried ashore. Because of the shortage of manpower, *Tryal's* anchor could not be properly secured. She blew out to sea for four days and lost more men. *Gloucester* was sighted 26 June. She had lost two-thirds of her company and the survivors were too weak to handle the ship. Even though *Gloucester* was close enough to the shore on several occasions to receive fresh provisions and water sent out in boats, she drifted about, sometimes out to sea, for four weeks. Seventy more men died in that interval.

Difficulty in making a good mooring was a constant problem for the clumsy square-rigged mid-eighteenth

Table VIII

DAILY REQUIREMENTS ADULT MALE

(19-35 YEARS OF AGE; 5'10"; 150 LBS.)

Calories kcal.	*Protein Grams*	*Fat Grams*	*Carbohydrate Grams*	*Vitamin A I.U.*	*Thiamine mgm.*	*Riboflavin mgm.*	*Niacin*	*Ascorbic Acid mgm.*
3000	75	150	338	3330	1.5	1.8	20	30

Reference

'Recommended Daily Nutrient Intakes—Canada. Revised 1974,' in Corinne H. Robinson, *Basic Nutrition and Diet Therapy,* 3rd ed. (New York: Macmillan, 1975), p. 334.

32. Great Britain, Admiralty Records, Public Record Office, 1/2099, Section 3, Captain Murray to Josiah Burchett, 10 July 1741, in *Documents Relating to Anson's Voyage,* p. 102.

32. Millechamp, in *Documents Relating to Anson's Voyage,* p. 78.

century ships. They did well with a fair following breeze but were awkward to maneuver in the manner necessary when the landing was uncharted and the winds were not favorable. A large component of skilled hands were needed to handle the ship under the best of circumstances. The toll from scurvy on Anson's voyage drastically reduced the size of the crew and the storm-damaged ships became even harder to manage. The deaths from scurvy continued as the provision of fresh food was delayed.

Meanwhile the merchant ship *Anna* had found a safe harbor with water, greens, and herbs on the coast. *Anna,* of 400 tons, carried a crew of only sixteen men, all of them presumably expert career merchant mariners. Although some cases of scurvy had occurred, there were no deaths from fever or scurvy. The little sloop *Tryal,* half *Anna's* size, carried a company of ninety-six and lost fifty-seven.[33]

Only four of the invalids survived the journey around Cape Horn.

The survivors on Juan Fernandez recovered on ample supplies of turnips, greens, herbs, cabbages and fresh fish. They learned to eat seals and sea-lions which some claimed tasted just like English bullock. Anson, determined to carry out his orders, made preparations to proceed. *Anna* was scuttled and the other three ships took on the 444 surviving crewmen[34] to carry on some hit-and-run raids on the Chilean and Peruvian coasts. Several Spanish ships, carrying modest amounts of silver and dry goods, were captured. On this run the sloop finally lost her mast for good and was scuttled. By March of 1742, the squadron, now reduced to just *Centurion, Gloucester,* and a few thinly manned small prize ships, lurked outside Acapulco to intercept the Spanish treasure galleon. Unfortunately, news of Anson's arrival had preceded him and the galleon remained in port. Anson then decided to take *Centurion* and *Gloucester* across the Pacific to China in the hopes of capturing the galleon off the Philippines after obtaining repairs, replenishments, and some healthy seamen at Canton. Anson departed on 6 May and expected to arrive in China in two months. It took six months and 221 more lives.

The expected northeast trade wind did not materialize for seven weeks. The two ships' masts began to disintegrate so that the ships could not make much headway. Then scurvy reappeared. The second outbreak began shortly after leaving the coast of Mexico sometime during May 1742. Reverend Walter, the chaplain-chronicler, was baffled by the reappearance of the disease in a warm climate this time and in the presence of adequate water, a clean uncrowded ship, live hogs and fowls, green sea turtles, bonitos, dolphins, and albacore.[35] Apparently there had been no antiscorbutics for some time, and scurvy developed rapidly in men who had already had the disease. The crew had, as Walter put it, 'the melancholy prospect of either dying by the scurvy, or perishing with the ship for want of hands to navigate her.'[36] The damaged *Gloucester,* again undermanned by a disabled crew, was scuttled, and the lonely *Centurion,* driven off course by storms, not knowing the longitude, on 27 August stumbled on the island of Tinian in the Marianas, or Ladrones, the very islands where Magellan had landed his scurvy-ridden crew in 1521.

The sick were again carried on shore by Anson and the officers, and again the men continued to die on landing. Anson himself was suffering with a case of scurvy by this time. He was the last man affected and his symptoms were mild. Scurvy was a disease of the deckhand. Lind observed accurately, 'It is for a long time confined to the common seaman . . . it is but rare to see this disease in even a petty officer.'[37] The officers, their servants, and the ship's boys were affected last if at all. The officers were in better health, had better teeth and had better provisions. They were housed in cabins which were commodious and sanitary in comparison to the crowded decks. The servants were looked after by their officers, and the boys certainly knew where the marmalade was kept. In the Anson accounts there are many references to only officers, servants and boys being fit for duty.[38] Two hundred twenty-one more men died on the second outbreak.[39]

The island of Tinian provided such an abundance of fresh foods: coconuts, guavas, limes, oranges, breadfruit, and scurvy grass, that most of the men who survived the first two days recovered within a week.

These curative properties of fresh fruits and vegetables had been observed, if not promulgated, by seafarers for nearly two hundred years. Yet the medical establishment, hung up on abstract reasoning, refused to acknowledge this empirical remedy. A young lieutenant on *Tryal* wrote quite correctly:

33. Somerville, p. 304.

34. Ibid., p. 305.

35. Walter and [Robins], p. 266.

36. Ibid.

37. James Lind, *A Treatise of the Scurvy* (Edinburgh: Sands, Murray and Cochran, 1753), p. 45.

38. Millechamp, in *Documents Relating to Anson's Voyage,* p. 78; Somerville, p. 303.

39. Somerville, p. 304.

Nor can all the physicians with all their materia medica find a remedy for it equal to the smell of a turf of grass or a dish of greens The land is man's proper element and vegetable and fruit his only physic.[40]

Centurion left Tinian 21 October and anchored in the harbor of Macao near Canton 12 November. Anson proved adept at dealing with the Chinese bureaucracy, and he was able to replenish his crew and repair the ship. He sailed out to the coast of the Philippines and did indeed capture the Acapulco galleon with a small force made up of his surviving seamen, a few new recruits and thirty ship's boys. On 10 December 1743, Anson began an uneventful journey home by way of the Cape of Good Hope. *Centurion* came to anchor off Spithead 15 April 1744.

The ship carried home a treasure worth 480,000 pounds.

Commodore Anson, considered a national hero, was appointed to the Admiralty Board, where he immediately set to work to improve ship design, and eliminate shoddy dealings in marine supplies and victualling practices. In 1747 he was ordered to sea again and defeated the French off Cape Finisterre. He was made a peer and became First Lord of the Admiralty in 1751.

To return to our original question. What went wrong? The medical factors alone—ascorbic acid deficiency in a group of men already at risk because of chronic illness, tropical fever and dysentery, and tremendous physical and mental stress—would have produced scurvy on this voyage. In this journey, however, and perhaps in others, the nautical factors contributed significantly to the *mortality*, if not the morbidity. If the weather had been favorable, the ships sound, and the navigation accurate, Anson's ships might have spent two months in the passage around Cape Horn from St. Catherine's to Juan Fernandez. Scurvy would have been inevitable, and the infirm members of the company would have been severely affected, but fresh foods could have saved many of the others. However, the sailing limitations of the ships of the Royal Navy, the inferior state of the art of navigation of the early eighteenth century, and the foul weather kept the ships away from land and proper food. A ghastly toll was the result.

It is remarkable that the expedition accomplished anything at all. Although the results fell far short of the expectations, the British public and the government thought it was a triumph. But one seaman on *Wager* raised a disturbing question: 'if we compute the whole Cost of the Expedition, including the Ships, Cargoes, and Lives that were lost in the Course of it, it is a Question if the Treasure imported will countervail the Expence.'[41]

Yet there was a very significant though intangible benefit. Walter's account of Anson's voyage stimulated James Lind to summarize all the known literature on scurvy and describe his own definitive experiments which demonstrated the curative properties of oranges and lemons. *A Treatise of the Scurvy* published in 1753 did not get the attention it deserved at first, but eventually it was accepted and scurvy was eliminated from the Royal Navy by 1799. James Lind dedicated his book to 'George, Lord Anson, Who as a just reward for the great and signal services done to the British Nation does now preside over her Naval Affairs.'[42] It was a fitting tribute to a man who had done his best.

40. Saumarez, in *Documents Relating to Anson's Voyage*, p. 166.

41. [Young], p. 6.

42. Lind, *Lind's Treatise on Scurvy*, ed. Stewart and Guthries, p. 4.

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BLACKING

Merchant ship owners and navies have been concerned with extending vessel life through preservation since the days of Pliny. Throughout the centuries, various combinations of wood types, fastenings, and preservative compounds have been tried.

One area of a ship that was always a concern was the planking that made up the vessel's sides. The wales, which were located near the waterline, and the planks just above them (the black strakes) often received particular attention. These planks were alternately wetted by salt water and then exposed to the sun as the ship made its way through rolling seas. Any wood which was constantly exposed to such changes would eventually decay. Consequently, these and other areas which would suffer from the effects of sun, rain, and sea were often coated with 'blacking.' This blacking served as an attractive decorative element as well as a preservative.

The blacking compound itself was usually a mixture of tar, lampblack, and oil. The material could be daubed or painted on during an overhaul, but was sometimes applied while the vessel made its way during fair weather. Depending on where a vessel was in service, the blacking may have needed renewal every few months.

During the cruise of the USS brig *Spark* in 1824, the hull needed to be blacked. The following recipes for blacking are quoted from the journal of John L. Cummings, who was aboard *Spark* during her 1824 cruise. Cumming's journal is presently in the manuscript collection at the G. W. Blunt White Library at Mystic Seaport Museum.

Directions for making good blacking for Ship's Sides Above the wails.

1 Ib. Lampblack, lib. Read Lead, 1 Gall. Paint Oil, ½ lb Letharge [probably lead oxide], ½ oz. Indigo ground fine. Boil & stir them for ½ hour. When cool enough stir in a pint of Spirits Turpentine. Lay on your paint warm.

Composition for Blacking Bends [Wales]

To a bucket of Tar add a pound of Lamp Black well mixed in Oil to which put 1 Ib. Gun powder. Keep the mixture covered with strong brine & that keep hot with loggerheads [A tool with an iron ball at one end. The ball would be heated in a fire and used for melting pitch or heating liquids.] taking care not to touch the Tarr while warming the water, let the Brushes be dipt through the water when laying on the mixture.

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THE AMERICAN NEPTUNE

A QUARTERLY JOURNAL OF MARITIME HISTORY

Volume XLIV, No. 3

Summer 1984