

a
history
of
medicine
in
pictures

by George A. Bender

painting by Robert A. Thom

James Lind: Conqueror of Scurvy

WORLD HISTORY and destinies of nations have been shaped on more than one occasion by alert physicians' capabilities to observe, to test, to provide solutions for health problems, and, most important of all, to convince governmental authorities that decisive remedial actions must be taken. Such a man was James Lind, naval surgeon, who pointed the way to overcome scurvy, scourge of sailing ships on the seven seas.

Scurvy was known to and described by the ancients; but it did not assume calamitous proportions until sailing ships replaced oared galleys, thereby making possible long journeys on the high seas. Prior to 1500, ships seldom ventured far from land, so frequent provisioning was not a problem. With the beginning of the sixteenth century, however, growth of nations, competition for trade with far-off places, world exploration, and colonization, set European countries to building fleets of sailing vessels and dispatching them upon journeys which ran from weeks into months and from months into years. Attendant to growth of oceanic travel came problems of provisioning, of preservation of stores, of recruitment of manpower, and of maintenance of health of crews. The latter problem, keeping crews healthy and capable of performance of duty, dependent as it was upon other factors, was of prime importance to success or failure of expeditions; yet for three



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centuries, it received the least official attention. Among many shipboard health hazards, scurvy was the most dangerous.

It is said that, during the three centuries from 1500 to 1800, scurvy caused more deaths among sailors than other diseases, naval engagements, marine disasters, shipwrecks, and accidents, combined. From 1600 to 1800, it is estimated that not less than one million lives were taken by this dreaded form of avitaminosis, even though naval surgeons had published reports of observations relative both to means of remedy and to prevention!

The world has been thrilled and entertained by countless tales of men who went to sea in sailing ships and of the romance of faraway places. Few readers, however, realize the hardships and privations men had to endure on such voyages; or the "hell that no poet's imagination ever was able to invent" that made up the daily life of sailors. But medical men were obliged to report in their journals the bleak facts: the wood from which these picturesque, full-rigged sailing vessels were built never dried and slowly rotted. Materials and stores, including food, were subject to mold, to putrefaction, and to infestation with vermin. Rats infested ships; and men had to live in "a terrible odor of bilge water, stale cooking, dry rot, dead rats, and unwashed humanity." What drinking water they had soon became foul and, frequently coming from contaminated sources, brought aboard causative factors of dysenteries and of enteric fever. Food rations, consisting mainly of salt pork, salt beef, and ship's biscuit, were as insufficient as they were disgustingly full of maggots and of beetles. Sailors' few clothes soon became ragged and were nearly always wet. There was almost total absence of ventilation inside crowded ships' crews' quarters. Replacements to ships' personnel sometimes were made by emptying jails, and by impressment. The untrained, the unfit, and the unwary, from waterfront bars in port towns, were driven or carried aboard just before sailing. After a few weeks at sea, overcrowded crews such as these readily succumbed to scurvy. Of the crews of five ships that started Magellan's famed round-the-world cruise (1519-1522), only 18 returned. Of 961 officers and men who, in 1740, began a round-the-world voyage under England's Lord Anson, only 200 returned in 1744. More naval objectives were lost as a result of incapacitation of crews by scurvy than were lost from shot and sword. Only in the last years of the eighteenth century was this situation changed by top administrative action, and then only by enforcement of measures based upon principles laid down by Dr. Lind, who has been called the father of naval hygiene in England.

Born in Edinburgh, Scotland, October 4, 1716, into a substantial upper middle-class family, James Lind, at 15 years of age, was apprenticed to a well-known Edinburgh physician, George Langlands. This city offered favorable environment for medical students, for the University of Edinburgh had become a famous medical center.

As did many young Scottish medical students of the period, Lind entered service in the Royal Navy as a Surgeon's Mate in 1739, the same year that war began between England and Spain.

During his ten years of service, Lind saw many men ill with scurvy. Ordinary

the picture James Lind, surgeon of the Royal Navy aboard H.M.S. *Salisbury*, in the English Channel in 1747, conducted a series of clinical experiments that definitely proved citrus fruits or their juices would cure scurvy, dread dietary-deficiency disease that killed a million seamen between 1600 and 1800. Dr. Lind's work, at sea, in Edinburgh, and at Haslar Naval Hospital, plus his three books, on scurvy, on care of sailors' health, and on tropical diseases, had much to do with reforming naval health practices, saving lives, and shaping nations' destinies.

seamen's diet was almost vitamin-free, so that after a few weeks at sea, beset by fatigue, by wetness, by cold, by loss of sleep, and by homesickness, symptoms and signs of scurvy and of other diseases appeared with appalling frequency.

Lind clearly describes the clinical picture of patients with scurvy: lassitude, weakness, swelling of legs and arms, softening and hemorrhage of gums, and hemorrhages under the skin, producing purplish or black patches. In patients in advanced stages, teeth became loose and sometimes fell out; the breath became foul; strength failed to the point where the victim was unable to stand or to be up and about; and the slightest touch or movement was excruciatingly painful. If no relief could be provided, death resulted from exhaustion, from heart failure, or from acute infection such as pneumonia.

Value of the juice of citrus fruits, of sauerkraut, of fresh vegetables, and of greens, in treatment for scurvy had been recognized, and reports on success therewith published, more than a century before Lind's time; but such confusion of recommendations of useless measures and drugs also had grown out of ignorance of the cause of scurvy that true remedies failed to impress most medical men. It remained for Lind, on May 20, 1747, to inaugurate a simple, straightforward series of tests, in the best clinical tradition, in order to determine relative effectiveness of a half dozen of the more popular measures. He reports: "I took twelve patients in the scurvy, on board the *Salisbury* at sea. Their cases were as similar as I could have them. . . . They lay together in one place in the forehold; and had one common diet, water-gruel sweetened with sugar in the morning; fresh mutton-broth often times for dinner; and for supper, barley and raisins, rice and currants, sago and wine, or the like. Two of these were ordered

each a quart of cyder a-day. Two others took twenty-five gutts (drops) of *elixir vitriol* three times a-day, upon an empty stomach. . . . Two others took two spoonfuls of vinegar three times a-day, upon an empty stomach. . . . Two of the worst patients . . . were put under a course of sea-water. Of this they drank half a pint every day. . . . Two others had each two oranges and one lemon given them every day. These they eat with greediness, at different times, upon an empty stomach. They continued but six days under this course, having consumed the quantity that could be spared. The two remaining patients took the bigness of a nutmeg three times a-day, of an electuary recommended by a hospital surgeon, made of garlic, mustard-seed, horse-radish, balsam of Peru, and gum myrrh. . . .

"The consequence was, that the most sudden and visible good effects were perceived from the use of the oranges and lemons; one of those who had taken them, being at the end of six days fit for duty. . . . The other was the best recovered of any in his condition; and being now deemed pretty well, was appointed nurse to the rest of the sick."

Cider, Lind reported, had the next best effect. There was no remarkable alteration of the course of the disease in any of the other patients at the end of the two weeks' tests.

Lind retired from the Royal Navy in 1748, and returned to Edinburgh to obtain his doctorate in medicine from the University and his license from the Royal College of Physicians of the city. In 1750, he was elected a Fellow of the College; and, in 1757, its treasurer. In 1753, his classic, *A Treatise on the Scurvy*, was published in Edinburgh. Three more editions were to be published in the next twenty years.

Appointment of Dr. Lind to the post of Chief Physician at the new Royal Naval Hospital—Haslar Hospital, near Portsmouth—

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came in 1758, probably due to the interest and admiration of Lord Anson, then First Lord of the Admiralty. At the time, Haslar was the largest hospital in Europe, capable of providing care for more than 2,200 patients. Lind served in this post for 25 years.

Just prior to his appointment to Haslar, Lind's second great volume on nautical medicine was published. First edition of *An Essay on the Most Effectual Means of Preserving the Health of Seamen in the Royal Navy* was published in 1757. It was to go through two later editions, in 1762, and 1779. During his years at Haslar, Lind not only observed patients with scurvy and with many other diseases common to seamen in European waters, but patients sick with a variety of diseases acquired all over the world—the Orient, India, Africa, North America, South America, and the Pacific islands. From this experience came the third book in his remarkable series, *An Essay on Diseases Incidental to Europeans in Hot Climates*, published in 1768, which was to go through six editions. These volumes formed a trilogy comprising observations relating to problems in most of the fields included in nautical medicine.

Readers of Lind's works are impressed with the soundness of his reasoning, the accuracy of his observations, and the logic he reveals in dealing with problems of diagnosis, of treatment, and of prevention of disease. In summing up achievements in improved naval medicine which may be credited to Lind, Louis H. Roddis cites these points:

1. The classic experiment proving the importance of citrus fruits or their juices in prevention of and in treatment for scurvy. Application of these principles late in the seventeenth century and early in the eighteenth century led to virtual elimination of scurvy in men of the Royal Navy.

2. Recommendation that new recruits be brought first to receiving ships for quarantine, and that they be bathed and issued clean clothing. This did more to eliminate shipboard typhus fever than any other measure.

3. The suggestion that special ships be run between England and naval blockading squadrons to supply fighting ships with fresh provisions, fruits, and green vegetables. Adop-

tion of this suggestion for maintaining ships' crews in fighting trim is believed to have been a definite deciding factor in favor of the British in their wars with Napoleon.

4. Demonstration of a practical method of obtaining fresh water from sea water by simple distillation, adapting utensils normally found on shipboard.

5. Recommendations for physical examination of naval recruits with maintenance of records thereof.

6. Suggestion of issuance of naval uniforms to seamen, a measure favorably affecting both health and morale of these men.

7. Insistence on physical exercise and on cold baths as "toughening-up" processes.

8. Use of cinchona bark for prevention of malaria.

9. Recommendations that, in the tropics, ships be anchored well off shore, and that crews not be given work details or liberty ashore at night. This did much to reduce incidence of malaria.

Dr. Lind did not live to see the Admiralty make use of lemon juice obligatory as a prophylactic against scurvy (this came at the insistence of Lind's pupils, Blane and Trotter, in 1795), but he did see his recommendation for receiving ships to which recruits were sent to be examined, clothed, outfitted, and quarantined for an indoctrination period, put into effect, in 1781.

On July 18, 1794, death came to Dr. Lind, then in his seventy-eighth year. Benefits of his work, however, continued thereafter, indirectly exercising powerful influences upon the course of history of his nation and of the world, and upon successes in sea commerce and in exploration, well into the nineteenth century.

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