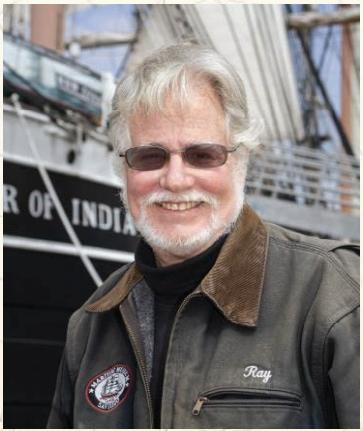


Dear Shipmates:



Raymond Ashley
Ph.D., K.C.I., President /CEO
Maritime Museum of San Diego

Another week has passed at the Maritime Museum and not much has happened, fortunately. Nighttime intrusion episodes are occurring about once per week as the ships continue to look appealing to homeless people, especially on rainy nights. The nightly raucous expressions of appreciation for health care workers and first responders continue, and in addition to the *Star of India*'s light show, we've set the mizzen staysail on which to project the nightly message "Hold fast, we will weather this!"

And we will.

This update gives me another chance to express our gratitude for all of our members and patrons who have responded so generously, for even if we are successful with Federal relief loans or grants, they do not cover the entire need. Every donation gives us more sea room off that financial fatal shore looming close under our lee.

Which also translates into some programmatic news. The Maritime Alliance has agreed to fund part of a series of video presentations using five of our ships and tracing the history of oceanography from Cabrillo's day to the USS DOLPHIN AGSS 555. We will be doing these in partnership with Scripps Institute of Oceanography, and the project will allow us to pivot our educational department to the production of on line educational content during this period when we won't be able to have classrooms visit the Museum physically. The product should also satisfy an urgent need for content desperately sought by countless teachers now required to conduct their classes on line. The objective of course, is to generate an understanding of how the role of the sea, and the history of it, affects every aspect of our present lives. That understanding is also an effort to stimulate a deeper understanding of science as a process and a methodology for generating knowledge and solving problems, rather than as a set body of information used to generate recipes. In other words, if it is a process, then you can't really understand science without knowledge of science history, the difference between "here's what we know," and "here's how we came to know it."

How we came to know medical research

Which is the problem that James Lind faced in the aftermath of his experiment inventing the clinical medical trial. Lind's experiment, after all, didn't prove that fresh citrus would cure scurvy, that was already well known, nor did it identify a cause for the disease, something that Lind would never know despite an entire subsequent lifetime of trying. Lind's experiment only proved that none of the remedies which prevailing medical theory said should work, and which were believed anecdotally to work, actually did so. Lind's real problem was that he had just hit upon a crucial method for conducting medical research, but he was not doing this while posted to a university or any other medical establishment that allowed him to share his findings. He was on a man of war in the English Channel with no means to communicate, nor even if he could have communicated, was there any

audience for him because as a surgeon, strange as it may sound today, he wasn't even considered a true medical professional.

Surgery was then considered a trade or craft like carpentry learned as an apprentice from a master, rather than through formal education following a defined curriculum and generating a professional literature. In Britain of that time, a surgeon was defined in the first *Encyclopedia Britannica* as "one who cures by manual operation; one whose duty it is to act in external maladies by direction of the physician." In the Royal Navy of Lind's day, seldom did any but flagships carry physicians to sea, but naval vessels of any size were required to have a surgeon listed among the ship's company as a warrant officer. In large ships, one additional surgeon's mate was required for every 200 men. Surgeon's mates of this period were required to pass examination at Surgeon's Hall (Company of Surgeons) in London, essentially a craft guild originating from medieval times, and at the Transport Board, or if overseas from an ad hoc committee of surgeons overseen by a physician of the fleet. After a sufficient amount of service in this subsidiary role, a surgeon's mate might apply for raise in grade to surgeon. A surgeon's pay at this time was £5 per month, about equivalent to that of a naval ship's master, augmented by small monthly fee extracted from each member of the crew for his treatment of their venereal disease (whether they were actually afflicted or not). Surgeons were required to supply their own tools including instruments and a chest of medicines, though these had to be certified as appropriate and sufficient by the Sick and Hurt Board (and later, alternatively, by the Physician of Greenwich Hospital), or the Governor of the Company of Surgeons. Nobody thought surgeons should be conducting experiments, contributing to medical theory, publishing papers, or inventing entirely new disciplines of scientific research.

By contrast, physicians were university trained and required a medical degree and board-certified license, attesting to their knowledge of the natural world and theories of how it was governed. They were of course qualified to deploy this knowledge in medical practice, but also to add to it through application of observation, backed by reason, and to publish their findings as a contribution to the ever-growing body of medical knowledge. When they served in naval vessels it was by special appointment or commission. Accordingly, and in contrast to surgeons' warrants, fleet commands tended to list a "physician of the fleet" among the commissioned officers. Even outside naval convention, the relationship of surgeons to physicians in the eighteenth century might be compared to the relationship between modern day construction workers and engineers or architects.

But naval surgeons didn't always stay surgeons. There existed a narrow career pathway which naval service seemed particularly to encourage, that might lead from trade to profession through experience gained at sea followed by admission to a university. By this means several prominent research

physicians and medical administrators of the day began as surgeon's mates, certified as surgeons, went to a university medical school, returned to naval service as physicians of the fleet, and finished their careers with distinguished appointments. Ultimately this was a pathway followed by James Lind, and which made him famous in the end. But one must ask, what was it about surgeon Lind of 1747 and his circumstances that led to his remarkable decision to initiate a clinical trial?

Naval surgeons lived and worked in a confined world packed with humanity, where injury and death were constant companions and dependable providers of lessons in human physiology. Sailing warships were dangerous machines that could deal out all manner of injury and illness entirely apart from battle. Naval surgeons and surgeon's mates were expected to be proficient in setting broken bones, suturing cuts, lancing boils, treating burns, extracting teeth, and dealing with hernias, inflammations, abscesses, and venereal disease. Battle raised other problems. Bullet wounds, head injuries, splinter wounds, mangled limbs, and stab wounds all required special treatment of large numbers of people in short order, but the wounds themselves were not so different from the normal mayhem that sailing ships produced on their own. Though its cause was not known, gangrenous infection was recognized as an extremely dangerous problem with every kind of injury and its avoidance was a primary reason for amputation. Sterilization would not be practiced until the 1860s, and surgeons performed multiple operations without washing either their hands or instruments in between.

Beyond this, the closely-packed conditions, lack of ventilation, presence of animals, poor sanitation, and poor diet found in sailing ships made them ideal disease environments. Typhus, smallpox, and tuberculosis were ongoing dangers, added to yellow fever, malaria, dysentery, dengue, and cholera as ships sailed across disease gradients into conducive climates. Epidemic diseases were understood to be either contagious or inherent to the environment, and quarantine was employed effectively, but germ theory would not offer a useful explanation for infectious disease until the 1870s. In gaining familiarity with epidemics and injuries in such abundance, naval surgeons had seemingly greater opportunity to observe what happened to the human body when things went wrong than did their collages ashore. Above all of this, they had special opportunity the sea provided to observe first-hand the greatest killer of all: scurvy.

James Lind was born in 1716 to a merchant family of Edinburgh, acquired the basic education common to the children of the middle-class, and left school at sixteen to serve an apprenticeship to a local surgeon. Though the Medical School of the University of Edinburgh had by that time been established, there is no evidence that Lind's formal training at that point went beyond apprenticeship to his master surgeon. When war against Spain was declared in 1739, Lind joined the Royal Navy as a surgeon's mate, after

which he saw service in the West Indies, in the Mediterranean, off the African coast, and in home waters.

In 1746, Lind was posted as full surgeon to the 50-gun *Salisbury*. He was present during a cruise from August to October, when 80 men out of her complement of 350 were incapacitated by an attack of scurvy. In 1747, scurvy struck the *Salisbury* again. As in the cruise of the year before, the ship was at sea for ten weeks but began to be visited by the disease after only one month, when the drinking water was "still uncommonly pure and good." The disease "raged with great violence." Shocked by the scale, mortality, and horrific symptoms of what he observed, the urgency to gain the upper hand on the disease destroying *Salisbury*'s crew resulted in his protocol. Embedded within a hierarchical shipboard social structure which emphasized adherence to system above all other things, Lind seems to have made the leap in applying system to experimenting with human beings in attempt to answer the question, which of the prescribed remedies for this disease works the best? The result ultimately became one of the most famous experiments of all time but had things with Lind run the course of a typical surgeon's career, no one would have ever heard of him or his experiment.

Because Lind did not remain a surgeon. In 1748 he left Navy and returned to study at the University of Edinburgh medical school where he was soon granted a medical degree, a license to practice as a physician, and fellowship in the College of Physicians of Edinburgh. The medical curriculum at Edinburgh included history of epidemic disease, history being deemed in the enlightenment essential to the proper education of a scientist.

It was there, possibly, that Lind would have first encountered the horrifying story of Justinian's plague.

Stay below and stay safe!

Raymond E. Ashley

Tropicus Capricorni



MARITIME MUSEUM of SAN DIEGO

At *Star of India* Wharf | 1492 N. Harbor Dr., San Diego, CA 92101-3309 | sdmaritime.org

